

RF Exposure Lab

802 N. Twin Oaks Valley Road, Suite 105 • San Marcos, CA 92069 • U.S.A.

TEL (760) 471-2100 • FAX (760) 471-2121

<http://www.rfexposurelab.com>

CERTIFICATE OF COMPLIANCE SAR EVALUATION

AMX LLC
3000 Research Drive
Richardson, TX 75082

Dates of Test:
Test Report Number:

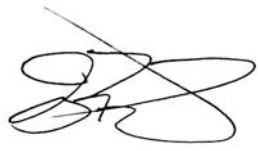
March 2-4, 2011
SAR.20110301
Revision A

FCC ID:	CWU-MVP9I
IC Certificate:	5078B-MVP9I
Model(s):	MVP-9000i-GB, MVP-9000i-GW
Module:	Silex Model SX-SDCAG FCC ID: N6C-SXSDCAG
Test Sample:	Engineering Unit Same as Production
Serial No.:	Beta
Equipment Type:	Wireless Tablet Computer
Classification:	Portable Transmitter Next to Body
TX Frequency Range:	2412 – 2462 MHz; 5180 – 5240 MHz; 5745 – 5825 MHz
Frequency Tolerance:	± 2.5 ppm
Maximum RF Output:	2.4 GHz, (b) 16.71 dBm, (g) 17.58 dBm; 5.2 GHz 13.39 dBm; 5.8 GHz 13.12 dBm Conducted
Signal Modulation:	DSSS, OFDM
Antenna Type (Length):	Internal(Ant 1 – Skycross P/N 2-3612-A; Ant 2 – On PCB)
Application Type:	Certification
FCC Rule Parts:	Part 15C
Industry Canada:	RSS-102

This wireless mobile and/or portable device has been shown to be compliant for localized specific absorption rate (SAR) for uncontrolled environment/general exposure limits specified in ANSI/IEEE Std. C95.1-1992 and had been tested in accordance with the measurement procedures specified in IEEE 1528-2003, OET Bulletin 65 Supp. C, RSS-102 and Safety Code 6 (See test report).

I attest to the accuracy of the data. All measurements were performed by myself or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RF Exposure Lab, LLC certifies that no party to this application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).



Jay M. Moulton
Vice President



Certificate # 2387.01

Table of Contents

1.	Introduction	3
	SAR Definition [5].....	3
2.	SAR Measurement Setup	4
	Robotic System	4
	System Hardware	4
	System Description	4
	E-Field Probe	5
3.	Robot Specifications	7
4.	Probe and Dipole Calibration	8
5.	Phantom & Simulating Tissue Specifications.....	9
	SAM Phantom.....	9
	Head & Body Simulating Mixture Characterization	9
	Device Holder	9
	Body Worn Configurations	10
6.	ANSI/IEEE C95.1 – 1992 RF Exposure Limits [2].....	11
	Uncontrolled Environment.....	11
	Controlled Environment	11
7.	Measurement Uncertainty	12
8.	System Validation	13
	Tissue Verification.....	13
	Test System Verification	13
9.	SAR Test Data Summary.....	14
	Procedures Used To Establish Test Signal.....	14
	Device Test Condition	14
	SAR Data Summary – 2450 MHz Body	16
	SAR Data Summary – 5200 MHz Body	17
	SAR Data Summary – 5800 MHz Body	18
10.	Test Equipment List	19
11.	Conclusion	20
12.	References.....	21
	Appendix A – System Validation Plots and Data	22
	Appendix B – SAR Test Data Plots.....	33
	Appendix C – SAR Test Setup Photos	77
	Appendix D – Probe Calibration Data Sheets.....	85
	Appendix E – Dipole Calibration Data Sheets	116
	Appendix F – Phantom Calibration Data Sheets	138

1. Introduction

This measurement report shows compliance of the AMX LLC Model(s) MVP-9000i-GB & MVP-9000i-GW Wireless Tablet Computer FCC ID: CWU-MVP9I with FCC Part 2, 1093, ET Docket 93-62 Rules for mobile and portable devices and IC Certificate: 5078B-MVP9I with RSS102 & Safety Code 6. The FCC have adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on August 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC regulated portable devices. [1], [6]

The test procedures, as described in ANSI C95.1 – 1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [2], ANSI C95.3 – 1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields [3], FCC OET Bulletin 65 Supp. C – 2001 [4], IEEE Std.1528 – 2003 Recommended Practice [5], and Industry Canada Safety Code 6 Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz were employed.

SAR Definition [5]

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dV} \right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

where:

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m³)

E = rms electric field strength (V/m)

2. SAR Measurement Setup

Robotic System

The measurements are conducted utilizing the ALSAS-10-U automated dosimetric assessment system. The ALSAS-10-U is designed and manufactured by Aprel Laboratories in Nepean, Ontario, Canada. The system utilizes a Robcomm 3 robot manufactured by ThermoCRS located in Michigan USA.

System Hardware

The system consists of a six axis articulated arm, controller for precise probe positioning (0.05 mm repeatability), a power supply, a teach pendant for teaching area scans, near field probe, an IBM Pentium 4™ 2.66 GHz PC with Windows XP Pro™, and custom software developed to enable communications between the robot controller software and the host operating system.

An amplifier is located on the articulated arm, which is isolated from the custom designed end effector and robot arm. The end effector provides the mechanical touch detection functionality and probe connection interface. The amplifier is functionally validated within the manufacturer’s site and calibrated at NCL Calibration Laboratories. A Data Acquisition Card (DAC) is used to collect the signal as detected by the isotropic e-field probe. The DAC manufacturer calibrates the DAC to NIST standards. A formal validation is executed using all mechanical and electronic components to prove conformity of the measurement platform as a whole.

System Description

The ALSAS-10-U has been designed to measure devices within the compliance environment to meet all recognized standards. The system also conforms to standards, which are currently being developed by the scientific and manufacturing community.

The course scan resolution is defined by the operator and reflects the requirements of the standard to which the device is being tested. Precise measurements are made within the predefined course scan area and the values are logged.

The user predefines the sample rate for which the measurements are made so as to ensure that the full duty-cycle of a pulse modulation device is covered during the sample. The following algorithm is an example of the function used by the system for linearization of the output for the probe.

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



The April E-Field probe is evaluated to establish the diode compression point.

A complex algorithm is then used to calculate the values within the measured points down to a resolution of 1mm. The data from this process is then used to provide the co-ordinates from which the cube scan is created for the determination of the 1 g and 10 g averages.

Cube scan averaging consists of a number of complex algorithms, which are used to calculate the one, and ten gram averages. The basis for the cube scan process is centered on the location where the maximum measured SAR value was found. When a secondary peak value is found which is within 60% of the initial peak value, the system will report this back to the operator who can then assess the need for further analysis of both the peak values prior to the one and ten-gram cube scan averaging process. The algorithm consists of 3D cubic Spline, and Lagrange extrapolation to the surface, which form the matrix for calculating the measurement output for the one and ten gram average values. The resolution for the physical scan integral is user defined with a final calculated resolution down to 1mm.

In-depth analysis for the differential of the physical scanning resolution for the cube scan analysis has been carried out, to identify the optimum setting for the probe positioning steps, and this has been determined at 8mm increments on the X, & Y planes. The reduction of the physical step increment increased the time taken for analysis but did not provide a better uncertainty or return on measured values.

The final output from the system provides data for the area scan measurements, physical and splined (1mm resolution) cube scan with physical and calculated values (1mm resolution).

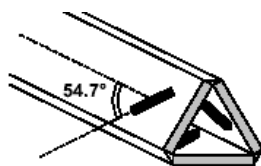
The overall uncertainty for the methodology and algorithms the ALSAS-10-U used during the SAR calculation was evaluated using the data from IEEE 1528 f3 algorithm:

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

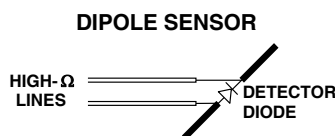
The probe used during the measurement process has been assessed to provide values for diode compression. These values are calculated during the probe calibration exercise and are used in the mathematical calculations for the assessment of SAR.

E-Field Probe

The E-field probe used by RF Exposure Lab, LLC, has been fully calibrated and assessed for isotropic, and boundary effect. The probe utilizes a triangular sensor arrangement as detailed in the diagram below right.



Δ-BEAM



The SAR is assessed with the probe which moves at a default height of 4mm from the center of the diode, which is mounted to the sensor, to the phantom surface (Z height). The diagram above right shows how the center of the sensor is defined with the location of the diode placed at the center of the dipole. The 4mm default in the Z axis is the optimum height for assessing SAR where the boundary effect is at its least, with the probe located closest to the phantom surface (boundary).

The manufacturer specified precision of the robot is ± 0.05 mm and the precision of the APREL bottom detection device is ± 0.1 mm. These precisions are calibrated and tested in the manufacturing process of the bottom detection device. A constant distance is maintained because the surface of the phantom is dynamically detected for each point. The surface detection algorithm corrects the position of the robot so that the probe rests on the surface of the phantom. The probe is then moved to the measurement location 2.44 mm above the phantom surface resulting in the probe center location to be at 4.0 mm above the phantom surface. Therefore, the probe sensor will be at 4.0 mm above the phantom surface ± 0.1 mm for each SAR location for frequencies below 3 GHz. The probe is moved to the measurement location 1.44 mm above the phantom surface resulting in the probe center location to be at 2.0 mm above the phantom surface. Therefore, the probe sensor will be at 2.0 mm above the phantom surface ± 0.1 mm for each SAR location for frequencies above 3 GHz.

The probe boundary effect compensation cannot be disabled in the ALSAS-10U testing system. The probe tip will always be at least half a probe tip diameter from the phantom surface. For frequencies up to 3 GHz, the probe diameter is 5 mm. With the sensor offset set at 1.54 mm (default setting), the sensor to phantom gap will be 4.0 mm which is greater than half the probe tip diameter. For frequencies greater than 3 GHz, the probe diameter is 3 mm. With the sensor offset set at 0.56 mm (default setting), the sensor to phantom gap will be 3.0 mm which is greater than half the probe tip diameter.

The separation of the first 2 measurement points in the zoom scan is specified in the test setup software. For frequencies below 3 GHz, the user must specify a zoom scan resolution of less than 6 mm in the z-axis to have the first two measurements within 1 cm of the surface. The z-axis is set to 4 mm as shown on each of the data sheets in Appendix B. For frequencies above 3 GHz, the user must specify a zoom scan resolution of less than 3 mm in the z-axis to have the first two measurements within 5 mm of the surface. The z-axis is set to 2 mm as shown on each of the data sheets in Appendix B.

The zoom scan volume for devices ≤ 3 GHz with a cube scan of 5x5x8 yields a volume of 32x32x28 mm³. For devices >3 GHz and <4.5 GHz, the cube scan of 9x9x9 yields a volume of 32x32x24 mm³. For devices ≥ 4.5 GHz, the cube scan of 7x7x12 yields a volume of 24x24x22 mm³.

3. Robot Specifications

Specifications

Positioner: ThermoCRS, Robot Model: Robocomm 3
Repeatability: 0.05 mm
No. of axis: 6

Data Acquisition Card (DAC) System

Cell Controller

Processor: Pentium 4™
Clock Speed: 2.66 GHz
Operating System: Windows XP Pro™

Data Converter

Features: Signal Amplifier, End Effector, DAC
Software: ALSAS 10-U Software

E-Field Probe

Model: Various See Probe Calibration Sheet
Serial Number: Various See Probe Calibration Sheet
Construction: Triangular Core Touch Detection System
Frequency: 10MHz to 6GHz

Phantom

Phantom: Uniphantom, Right Phantom, Left Phantom



4. Probe and Dipole Calibration

See Appendix D and E.

5. Phantom & Simulating Tissue Specifications

SAM Phantom



The Aprel system utilizes three separate phantoms. Each phantom for SAR assessment testing is a low loss dielectric shell, with shape and dimensions derived from the anthropomorphic data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM phantom shell is bisected along the mid sagittal plane into right and left halves. The perimeter sidewalls of each phantom half is extended to allow filling with liquid to a depth of 15 cm that is sufficient to minimize reflections from the upper surface [5]. The Uni-Phantom is used to conduct body measurements and held to face measurements. The depth of the phantom allows for 15 cm of tissue material to be filled within the phantom. See photos in Appendix C.

Head & Body Simulating Mixture Characterization

The head and body mixtures consist of the material based on the table listed below. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. Body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations.

Table 5.1 Typical Composition of Ingredients for Tissue

Ingredients		Simulating Tissue		
		2450 MHz Muscle	5200 MHz Muscle	5800 MHz Muscle
Mixing Percentage				
Water		73.20	70.00	76.50
Sugar		0.00	0.00	0.00
Salt		0.04	1.50	1.50
HEC		0.00	0.00	0.00
Bactericide		0.00	0.00	0.00
DGBE		26.70	28.50	22.00
Dielectric Constant	Target	52.70	48.95	48.22
Conductivity (S/m)	Target	1.95	5.36	5.98

Device Holder



In combination with the SAM phantom, the mounting device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation point is the ear opening. The devices can easily, accurately, and repeatably be positioned according to the FCC specifications. The device holder can be locked at different phantom locations (left head, right head, and uni-phantom).

Body Worn Configurations

Body-worn operating configurations are tested in a normal use configuration. Body dielectric parameters are used.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst-case positioning is then documented and used to perform Body SAR testing. All test position spacings are documented.

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements are included in the user's manual.

6. ANSI/IEEE C95.1 – 1992 RF Exposure Limits [2]

Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 6.1 Human Exposure Limits

	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIROMENT Professional Population (W/kg) or (mW/g)
SPATIAL PEAK SAR ¹ Head	1.60	8.00
SPATIAL AVERAGE SAR ² Whole Body	0.08	0.40
SPATIAL PEAK SAR ³ Hands, Feet, Ankles, Wrists	4.00	20.00

¹ The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

² The Spatial Average value of the SAR averaged over the whole body.

³ The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

7. Measurement Uncertainty

Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_i^1 (1-g)	c_i^1 (10-g)	Standard Uncertainty (1-g) %	Standard Uncertainty (10-g) %	v_i
Measurement System								
Probe Calibration	3.5	normal	1	1	1	3.5	3.5	∞
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	0.7	0.7	1.5	1.5	∞
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	0.7	0.7	4.4	4.4	∞
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6	∞
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7	∞
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6	∞
Readout Electronics	1.0	normal	1	1	1	1.0	1.0	∞
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5	∞
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0	∞
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
Probe Positioner Mech. Restriction	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2	∞
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7	∞
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1	∞
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0	7
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0	2
Drift of Output Power	4.2	rectangular	$\sqrt{3}$	1	1	2.4	2.4	∞
Phantom and Setup								
Phantom Uncertainty (shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0	∞
Liquid Conductivity (target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4	∞
Liquid Conductivity (meas.)	0.5	normal	1	0.7	0.5	0.4	0.3	5
Liquid Permittivity (target)	5.0	rectangular	$\sqrt{3}$	0.6	0.5	1.7	1.4	∞
Liquid Permittivity (meas.)	1.0	normal	1	0.6	0.5	0.6	0.5	5
Combined Uncertainty		RSS				9.6	9.4	>500
Combined Uncertainty (coverage factor=2)		Normal (k=2)				19.1	18.8	>500

8. System Validation

Tissue Verification

Table 8.1 Measured Tissue Parameters

		2450 MHz Body		5200 MHz Body		5800 MHz Body	
Date(s)		Mar. 2, 2011		Mar. 3, 2011		Mar. 4, 2011	
Liquid Temperature (°C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ϵ		52.70	54.17	48.95	48.71	48.22	48.12
Conductivity: σ		1.95	1.98	5.36	5.42	5.98	5.99

See Appendix A for data printout.

Test System Verification

Prior to assessment, the system is verified to the $\pm 10\%$ of the specifications at the test frequency by using the system kit. Power is normalized to 1 watt. (Graphic Plots Attached)

Table 8.2 System Dipole Validation Target & Measured

Date	Test Frequency	Targeted SAR _{1g} (W/kg)	Measure SAR _{1g} (W/kg)	Deviation (%)
02-Mar-2011	2450 MHz	51.50	53.24	+ 3.38
03-Mar-2011	5200 MHz	59.81	62.27	+ 4.11
04-Mar-2011	5800 MHz	61.36	60.08	- 2.09

See Appendix A for data plots.

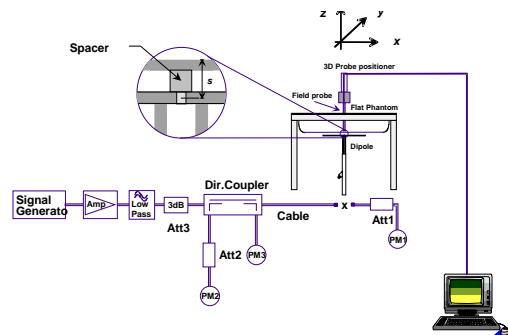


Figure 8.1 Dipole Validation Test Setup

9. SAR Test Data Summary

See Measurement Result Data Pages

See Appendix B for SAR Test Data Plots.
See Appendix C for SAR Test Setup Photos.

Procedures Used To Establish Test Signal

The device was either placed into simulated transmit mode using the manufacturer's test codes or the actual transmission is activated through a base station simulator or similar equipment. See data pages for actual procedure used in measurement.

Device Test Condition

In order to verify that the device was tested at full power, conducted output power measurements were performed before and after each SAR measurement to confirm the output power unless otherwise noted. If a conducted power deviation of more than 5% occurred, the test was repeated. The power drift of each test is measured at the start of the test and again at the end of the test. The drift percentage is calculated by the formula $((\text{end}/\text{start})-1)*100$ and rounded to three decimal places. The drift percentage is calculated into the resultant SAR value on the data sheet for each test.

The testing was conducted on Bottom Face and edges closest to each antenna. The Bottom Face and Side 'A' testing was conducted for Antenna 1. The Bottom Face, Side 'B', and Side 'C' testing was conducted for Antenna 2. All remaining sides were not tested as the distance to the antenna exceeded the distance on the sides tested. All testing was conducted per KDB 447498 and KDB 248227. See the photo in Appendix C for a pictorial of the setups, labeling of the sides tested and antenna locations.

802.11b				
Freq	Channel	Data Rate	Antenna	Power
2412	1	1	Ant 1	15.52
2437	6	1	Ant 1	15.69
2462	11	1	Ant 1	16.71
2412	1	1	Ant 2	15.61
2437	6	1	Ant 2	15.67
2462	11	1	Ant 2	16.69
802.11g				
Freq	Channel	Data Rate	Antenna	Power
2412	1	6	Ant 1	13.11
2437	6	6	Ant 1	17.58
2462	11	6	Ant 1	12.82
2412	1	6	Ant 2	13.15
2437	6	6	Ant 2	17.52
2462	11	6	Ant 2	13.24

802.11a 5.2 GHz				
Freq	Channel	Data Rate	Antenna	Power
5180	36	6	Ant 1	13.38
5200	40	6	Ant 1	13.31
5220	44	6	Ant 1	13.35
5240	48	6	Ant 1	13.36
5180	36	6	Ant 2	13.39
5200	40	6	Ant 2	13.27
5220	44	6	Ant 2	13.36
5240	48	6	Ant 2	13.32
802.11a 5.8 GHz				
Freq	Channel	Data Rate	Antenna	Power
5745	149	6	Ant 1	12.69
5765	153	6	Ant 1	12.65
5785	157	6	Ant 1	13.12
5805	161	6	Ant 1	13.07
5825	165	6	Ant 1	12.85
5745	149	6	Ant 2	12.67
5765	153	6	Ant 2	12.69
5785	157	6	Ant 2	13.08
5805	161	6	Ant 2	13.01
5825	165	6	Ant 2	12.87

SAR Data Summary – 2450 MHz Body

MEASUREMENT RESULTS								
Antenna	EUT Position	Transmit Band	Frequency		Modulation	End Power		SAR (W/kg)
			MHz	Ch.		(dBm)	Battery	
Ant 1	Bottom Face	802.11b	2437	6	DSSS	15.69	Standard	0.214
	Side 'A'	802.11b	2437	6	DSSS	15.69	Standard	0.120
Ant 2	Bottom Face	802.11b	2437	6	DSSS	15.67	Standard	0.473
	Side 'B'	802.11b	2437	6	DSSS	15.67	Standard	0.390
	Side 'C'	802.11b	2437	6	DSSS	15.67	Standard	0.585
Ant 1	Bottom Face	802.11g	2437	6	OFDM	17.58	Standard	0.197
	Side 'A'	802.11g	2437	6	OFDM	17.58	Standard	0.096
Ant 2	Bottom Face	802.11g	2437	6	OFDM	17.52	Standard	0.411
	Side 'B'	802.11g	2437	6	OFDM	17.52	Standard	0.349
	Side 'C'	802.11g	2437	6	OFDM	17.52	Standard	0.479


Muscle
1.6 W/kg (mW/g)
averaged over 1 gram

1. Battery is fully charged for all tests.
 Power Measured Conducted ERP EIRP

2. SAR Measurement
 Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body

3. Test Signal Call Mode Test Code Base Station Simulator

4. Test Configuration With Belt Clip Without Belt Clip N/A



 Jay M. Moulton
 Vice President

Note: When the mid channel is 3 dB or more below the limit the remaining channels are not required to be tested per KDB 447498 section 1) e). The testing was conducted on Bottom Face and edges closest to each antenna. See the photo in Appendix C for a pictorial of the setups, labeling of the sides tested and antenna locations.

SAR Data Summary – 5200 MHz Body

MEASUREMENT RESULTS								
Antenna	EUT Position	Transmit Band	Frequency		Modulation	End Power		SAR (W/kg)
			MHz	Ch.		(dBm)	Battery	
Ant 1	Bottom Face	5.1a	5180	36	OFDM	13.38	Standard	0.505
	Side 'A'	5.1a	5180	36	OFDM	13.38	Standard	0.507
Ant 2	Bottom Face	5.1a	5180	36	OFDM	13.39	Standard	0.404
	Side 'B'	5.1a	5180	36	OFDM	13.39	Standard	0.404
	Side 'C'	5.1a	5180	36	OFDM	13.39	Standard	0.377

Muscle
1.6 W/kg (mW/g)
averaged over 1 gram

1. Battery is fully charged for all tests.
 Power Measured Conducted ERP EIRP

2. SAR Measurement
 Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body

3. Test Signal Call Mode Test Code Base Station Simulator

4. Test Configuration With Belt Clip Without Belt Clip N/A



Jay M. Moulton
 Vice President

Note: When the tested channel is 3 dB or more below the limit the remaining channels are not required to be tested per KDB 447498 section 1) e). The testing was conducted on Bottom Face and edges closest to each antenna. See the photo in Appendix C for a pictorial of the setups, labeling of the sides tested and antenna locations.

SAR Data Summary – 5800 MHz Body

MEASUREMENT RESULTS								
Antenna	EUT Position	Transmit Band	Frequency		Modulation	End Power		SAR (W/kg)
			MHz	Ch.		(dBm)	Battery	
Ant 1	Bottom Face	5.8a	5745	149	OFDM	13.12	Standard	0.473
	Side 'A'	5.8a	5745	149	OFDM	13.12	Standard	0.454
Ant 2	Bottom Face	5.8a	5745	149	OFDM	13.08	Standard	0.537
	Side 'B'	5.8a	5745	149	OFDM	13.08	Standard	0.536
	Side 'C'	5.8a	5745	149	OFDM	13.08	Standard	0.529


Muscle
1.6 W/kg (mW/g)
averaged over 1 gram

1. Battery is fully charged for all tests.
 Power Measured Conducted ERP EIRP

2. SAR Measurement
 Phantom Configuration Left Head Uniphantom Right Head
 SAR Configuration Head Body

3. Test Signal Call Mode Test Code Base Station Simulator

4. Test Configuration With Belt Clip Without Belt Clip N/A



Jay M. Moulton
 Vice President

Note: When the tested channel is 3 dB or more below the limit the remaining channels are not required to be tested per KDB 447498 section 1) e). The testing was conducted on Bottom Face and edges closest to each antenna. See the photo in Appendix C for a pictorial of the setups, labeling of the sides tested and antenna locations.

10. Test Equipment List

Table 10.1 Equipment Specifications

Type	Calibration Due Date	Serial Number
ThermoCRS Robot	N/A	RAF0338198
ThermoCRS Controller	N/A	RCF0338224
ThermoCRS Teach Pendant (Joystick)	N/A	STP0334405
IBM Computer, 2.66 MHz P4	N/A	8189D8U KCPR08N
Apral E-Field Probe ALS-E020	09/22/2011	RFE-215
Apral E-Field Probe ALS-E030	07/12/2011	E030-001
Apral Dummy Probe	N/A	023
Apral Left Phantom	N/A	RFE-267
Apral Right Phantom	N/A	RFE-268
Apral UniPhantom	N/A	RFE-273
Apral Valid. Dipole ALS-D-450-S-2 – Head	01/12/2012	RFE-362
Apral Valid. Dipole ALS-D-450-S-2 – Body	01/19/2012	RFE-362
Apral Valid. Dipole ALS-D-835-S-2 – Head	01/14/2012	180-00561
Apral Valid. Dipole ALS-D-835-S-2 – Body	11/16/2011	180-00561
Apral Valid. Dipole ALS-D-900-S-2 – Head	01/12/2012	RFE-275
Apral Valid. Dipole ALS-D-900-S-2 – Body	11/19/2011	RFE-275
Apral Valid. Dipole ALS-D-1900-S-2 – Head	01/15/2012	210-00713
Apral Valid. Dipole ALS-D-1900-S-2 – Body	11/16/2011	210-00713
Apral Valid. Dipole ALS-D-2450-S-2 – Head	01/12/2012	RFE-278
Apral Valid. Dipole ALS-D-2450-S-2 – Body	11/18/2011	RFE-278
Apral Valid. Dipole RFE-D-2600-S-2 – Body	01/18/2012	RFE-121
Apral Valid. Dipole RFE-D-BB-S-2 – Body	01/19/2012	235-00801
Agilent (HP) 437B Power Meter	03/24/2011	3125U08837
Agilent (HP) 8481B Power Sensor	03/24/2011	3318A05384
Advantest R3261A Spectrum Analyzer	03/24/2011	31720068
Agilent (HP) 8350B Signal Generator	04/19/2011	2749A10226
Agilent (HP) 83525A RF Plug-In	04/19/2011	2647A01172
Agilent (HP) 8753C Vector Network Analyzer	03/25/2011	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/25/2011	2904A00595
Agilent (HP) E55125C Base Station Sim.	03/25/2012	MY48360364
Apral Dielectric Probe Assembly	N/A	0011
Head Equivalent Matter (450 MHz)	N/A	N/A
Head Equivalent Matter (835 MHz)	N/A	N/A
Head Equivalent Matter (1900 MHz)	N/A	N/A
Head Equivalent Matter (2450 MHz)	N/A	N/A
Body Equivalent Matter (450 MHz)	N/A	N/A
Body Equivalent Matter (835 MHz)	N/A	N/A
Body Equivalent Matter (1900 MHz)	N/A	N/A
Body Equivalent Matter (2450 MHz)	N/A	N/A
Body Equivalent Matter (5200 MHz)	N/A	N/A
Body Equivalent Matter (5800 MHz)	N/A	N/A

11. Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body is a very complex phenomena that depends on the mass, shape, and size of the body; the orientation of the body with respect to the field vectors; and, the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

12. References

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radio Frequency Radiation, August 1996
- [2] ANSI/IEEE C95.1 – 1992, American National Standard Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300kHz to 100GHz, New York: IEEE, 1992.
- [3] ANSI/IEEE C95.3 – 1992, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave, New York: IEEE, 1992.
- [4] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, June 2001.
- [5] IEEE Standard 1528 – 2003, IEEE Recommended Practice for Determining the Peak-Spatial Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques, October 2003.
- [6] Industry Canada, RSS – 102e, Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), March 2010.
- [7] Health Canada, Safety Code 6, Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz, 2009.

Appendix A – System Validation Plots and Data

```

*****
Test Result for UIM Dielectric Parameter
Wed 02/Mar/2011 07:53:25
Freq  Frequency(GHz)
FCC_eH      FCC Bulletin 65 Supplement C ( June 2001) Limits for Head Epsilon
FCC_sH      FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB      FCC Limits for Body Epsilon
FCC_sB      FCC Limits for Body Sigma
Test_e      Epsilon of UIM
Test_s      Sigma of UIM
*****
Freq      FCC_eB      FCC_sB      Test_e      Test_s
2.4200    52.74      1.92      54.23      1.94
2.4300    52.73      1.93      54.21      1.95
2.4400    52.71      1.94      54.19      1.97
2.4500    52.70      1.95      54.17      1.98
2.4600    52.69      1.96      54.15      1.99
2.4700    52.67      1.98      54.11      2.00
2.4800    52.66      1.99      54.09      2.02

```

```

*****
Test Result for UIM Dielectric Parameter
Thu 03/Mar/2011 07:08:22
Freq  Frequency(GHz)
FCC_eH      FCC Bulletin 65 Supplement C ( June 2001) Limits for Head Epsilon
FCC_sH      FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB      FCC Limits for Body Epsilon
FCC_sB      FCC Limits for Body Sigma
Test_e      Epsilon of UIM
Test_s      Sigma of UIM
*****
Freq      FCC_eB      FCC_sB      Test_e      Test_s
5.2200    48.99      5.32      47.79      5.37
5.2300    48.97      5.33      47.75      5.39
5.2400    48.96      5.35      47.73      5.41
5.2500    48.95      5.36      48.71      5.42
5.2600    48.93      5.37      47.68      5.43
5.2700    48.92      5.38      47.66      5.44
5.2800    48.91      5.39      47.63      5.45

```

Test Result for UIM Dielectric Parameter

Fri 04/Mar/2011 07:12:42

Freq Frequency(GHz)

FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon

FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma

FCC_eB FCC Limits for Body Epsilon

FCC_sB FCC Limits for Body Sigma

Test_e Epsilon of UIM

Test_s Sigma of UIM

Freq	FCC_eB	FCC_sB	Test_e	Test_s
5.7550	48.26	5.95	48.18	5.95
5.7650	48.25	5.96	48.16	5.96
5.7750	48.23	5.97	48.14	5.98
5.7850	48.22	5.98	48.12	5.99
5.7950	48.21	5.99	48.10	6.01
5.8050	48.19	6.01	48.07	6.02
5.8150	48.18	6.02	48.05	6.03

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 07:59:21 AM
End Time : 02-Mar-2011 08:12:20 AM
Scanning Time : 779 secs

Product Data

Device Name : Validation
Serial No. : 2450
Type : Dipole
Model : ALS-D-2450-S-2
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 51.5 mm
Width : 3.6 mm
Depth : 30.4 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 6.280 W/kg
Power Drift-Finish: 6.193 W/kg
Power Drift (%) : -1.375

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 45.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

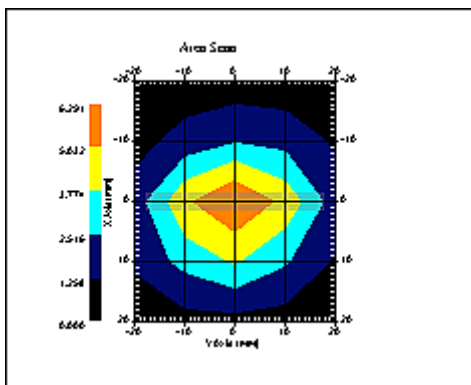
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 7:40:13 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

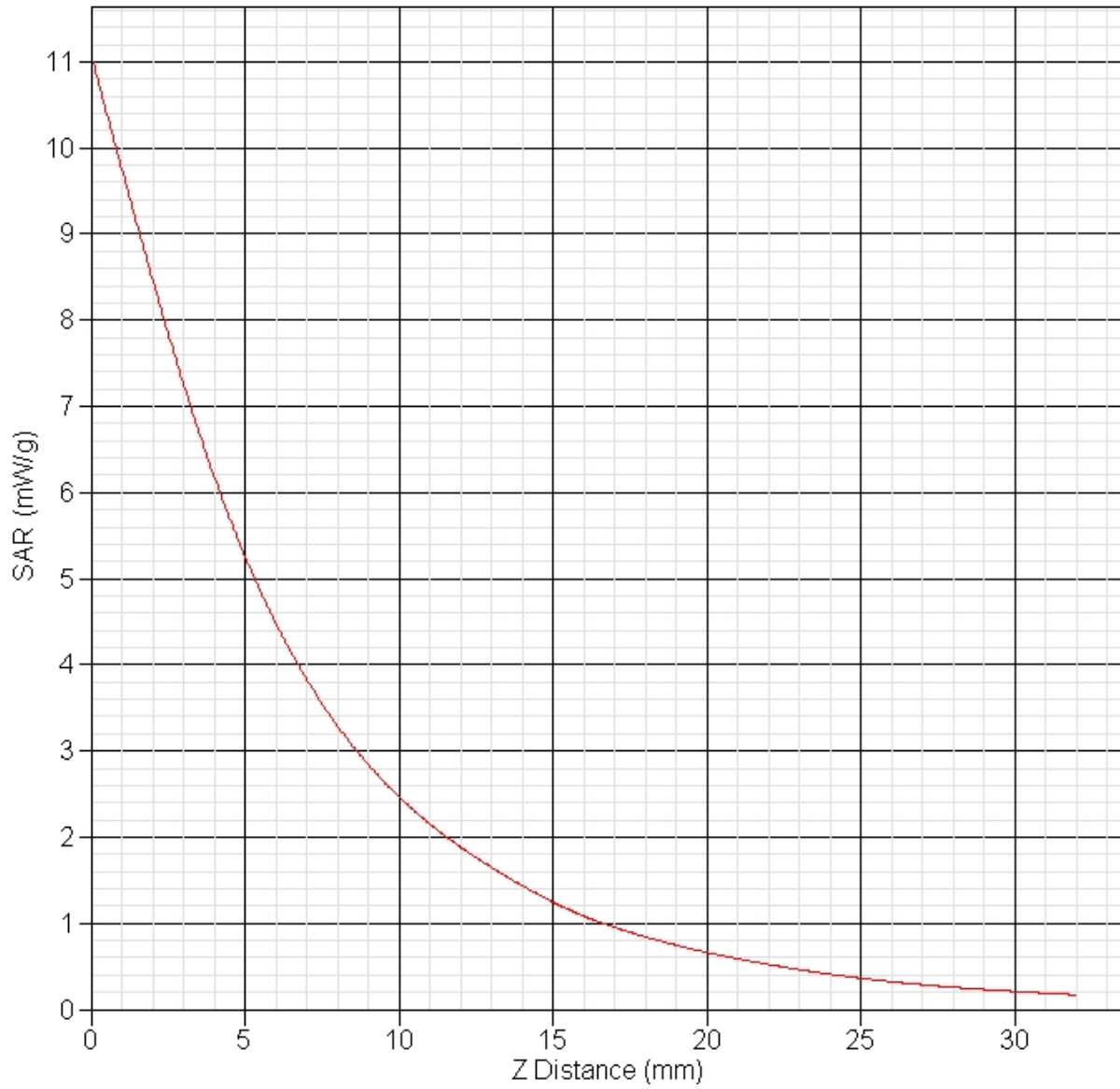
Other Data

DUT Position : Touch
Separation : 10 mm
Channel : Mid



1 gram SAR value : 5.324 W/kg
10 gram SAR value : 2.414 W/kg
Area Scan Peak SAR : 6.291 W/kg
Zoom Scan Peak SAR : 11.090 W/kg

SAR-Z Axis
at Hotspot x:0.23 y:-0.15



SAR Test Report

By Operator : Jay
Measurement Date : 03-Mar-2011
Starting Time : 03-Mar-2011 07:09:43 AM
End Time : 03-Mar-2011 07:32:59 AM
Scanning Time : 1396 secs

Product Data

Device Name : Validation
Serial No. : 5200
Type : Dipole
Model : ALS-D-BB-S-2
Frequency : 5200.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 23.1 mm
Width : 3.6 mm
Depth : 20.7 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 8.662 W/kg
Power Drift-Finish: 8.729 W/kg
Power Drift (%) : 0.776

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5200
Frequency : 5200.00 MHz
Last Calib. Date : 03-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.71 F/m
Sigma : 5.42 S/m
Density : 1000.00 kg/cu. m

Probe Data

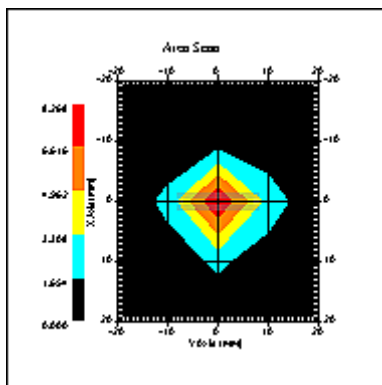
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5200.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 0.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 03-Mar-2011
Set-up Time : 9:00:47 AM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

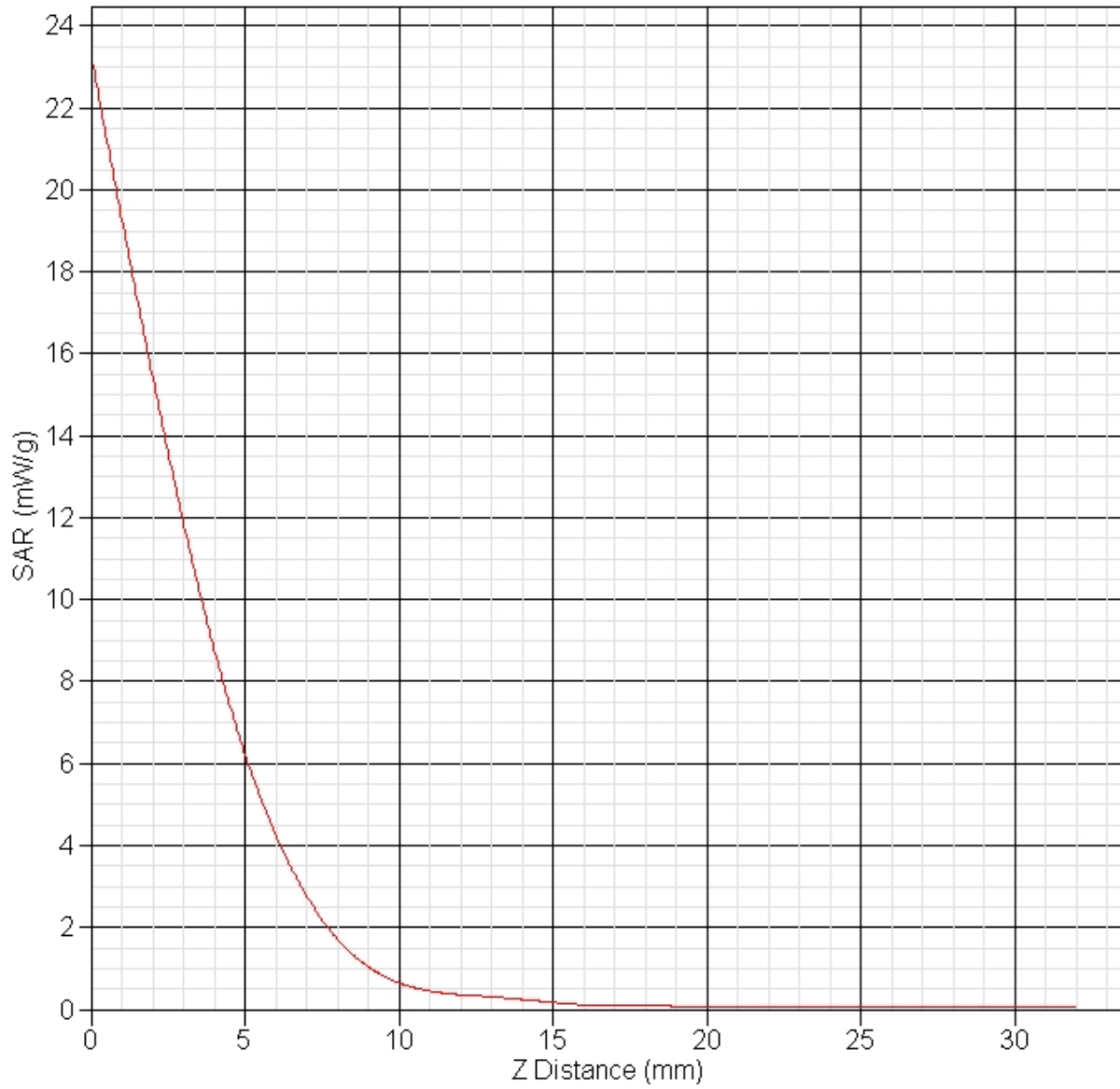
Other Data

DUT Position : Touch
Separation : 10 mm
Channel : Mid



1 gram SAR value : 6.227 W/kg
10 gram SAR value : 1.983 W/kg
Area Scan Peak SAR : 8.268 W/kg
Zoom Scan Peak SAR : 23.318 W/kg

SAR-Z Axis
at Hotspot x:0.41 y:-0.22



SAR Test Report

By Operator : Jay
Measurement Date : 04-Mar-2011
Starting Time : 04-Mar-2011 07:23:39 AM
End Time : 04-Mar-2011 07:46:30 AM
Scanning Time : 1371 secs

Product Data

Device Name : Validation
Serial No. : 5800
Type : Dipole
Model : ALS-D-BB-S-2
Frequency : 5800.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 23.1 mm
Width : 3.6 mm
Depth : 20.7 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 7.479 W/kg
Power Drift-Finish: 7.493 W/kg
Power Drift (%) : 0.189

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5800
Frequency : 5800.00 MHz
Last Calib. Date : 04-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.12 F/m
Sigma : 5.99 S/m
Density : 1000.00 kg/cu. m

Probe Data

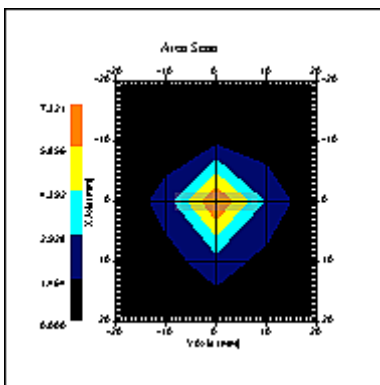
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5800.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.2
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 0.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Mar-2011
Set-up Time : 4:10:18 PM
Area Scan : 5x5x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

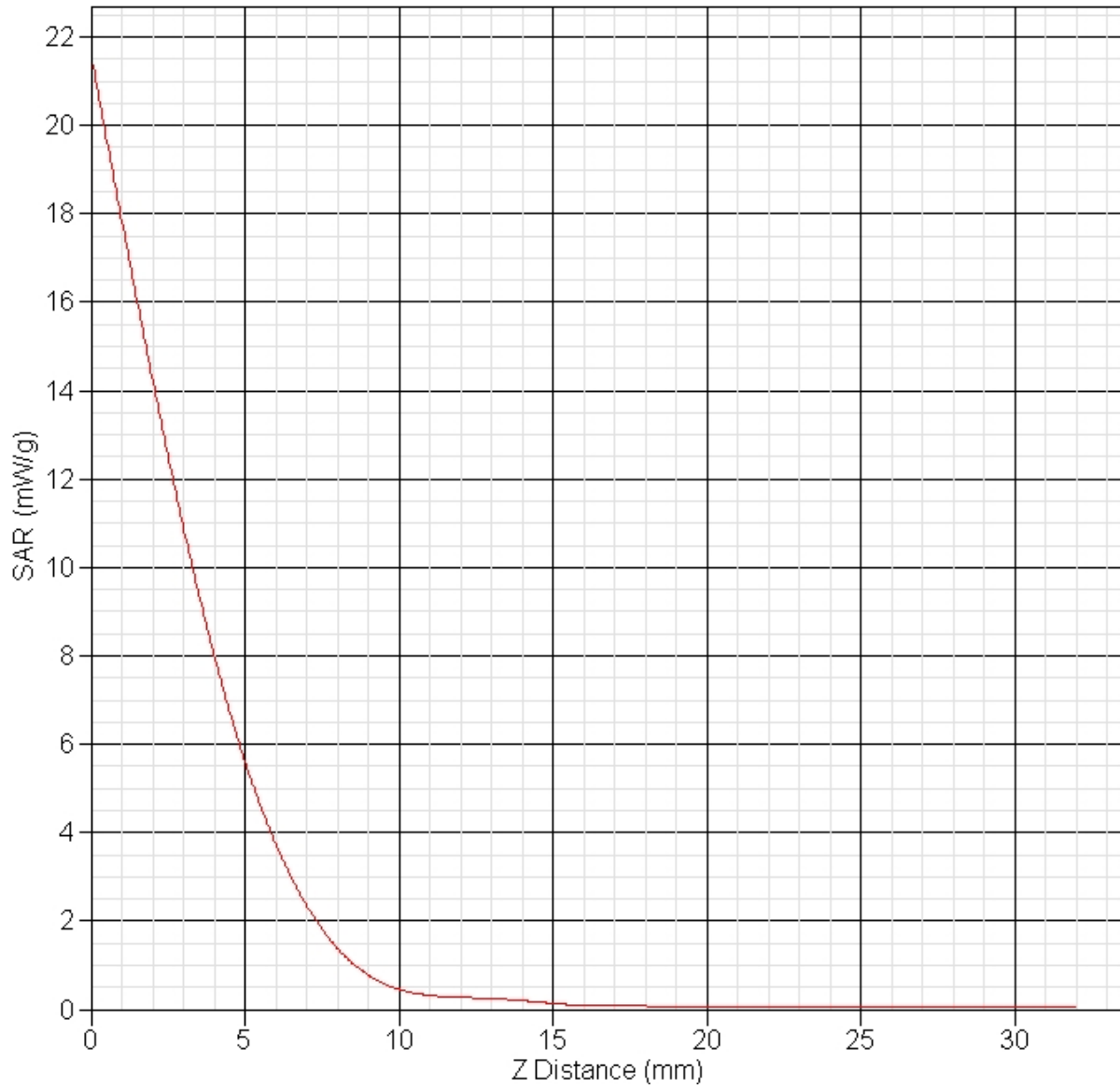
Other Data

DUT Position : Touch
Separation : 10 mm
Channel : Mid



1 gram SAR value : 6.008 W/kg
10 gram SAR value : 1.997 W/kg
Area Scan Peak SAR : 7.321 W/kg
Zoom Scan Peak SAR : 21.617 W/kg

SAR-Z Axis
at Hotspot x:0.32 y:-0.18



Appendix B – SAR Test Data Plots

Note: In all data sheets in Appendix B, the frequency noted in the ‘Product Data’ section is the frequency band which the device was transmitting. This frequency does not refer to the actual frequency and channel of the test. The channel is listed in the ‘Other Data’ section of the data sheet as Low, Mid or High. The actual test frequency is listed in Section 12 in each of the data summary sheets.

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 12:08:55 PM
End Time : 02-Mar-2011 12:23:44 PM
Scanning Time : 889 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11b
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.047 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 1
Orientation : Bottom Face
Power Drift-Start : 0.221 W/kg
Power Drift-Finish: 0.222 W/kg
Power Drift (%) : 0.259

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

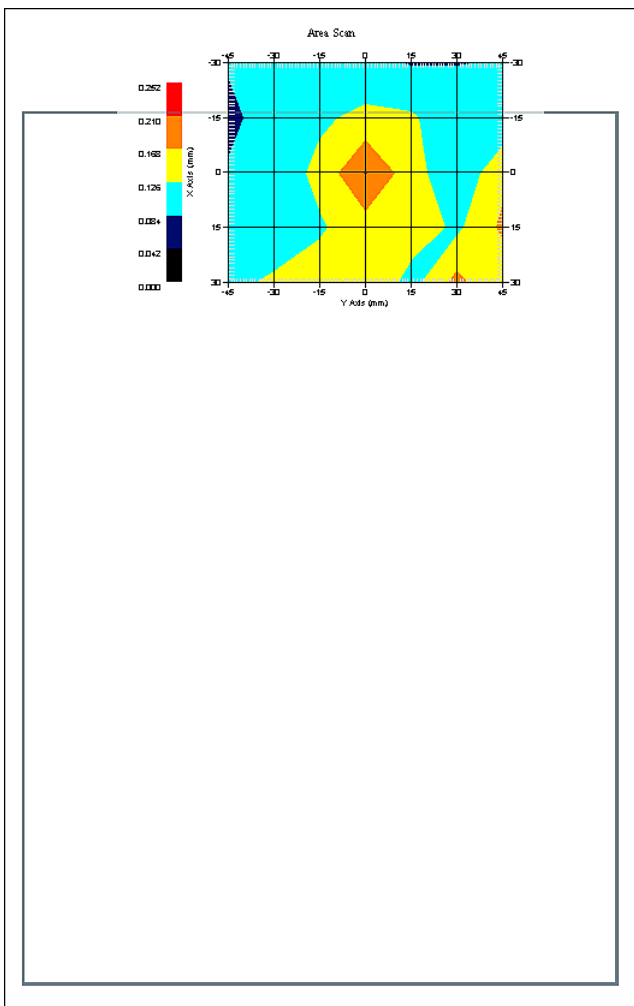
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.214 W/kg
10 gram SAR value : 0.154 W/kg
Area Scan Peak SAR : 0.212 W/kg
Zoom Scan Peak SAR : 0.410 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 01:38:04 PM
End Time : 02-Mar-2011 01:52:46 PM
Scanning Time : 882 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11b
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.047 W
Drift Time : 0 min(s)
Length : 30 mm
Width : 192 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 1
Orientation : Side A
Power Drift-Start : 0.094 W/kg
Power Drift-Finish: 0.094 W/kg
Power Drift (%) : -0.320

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

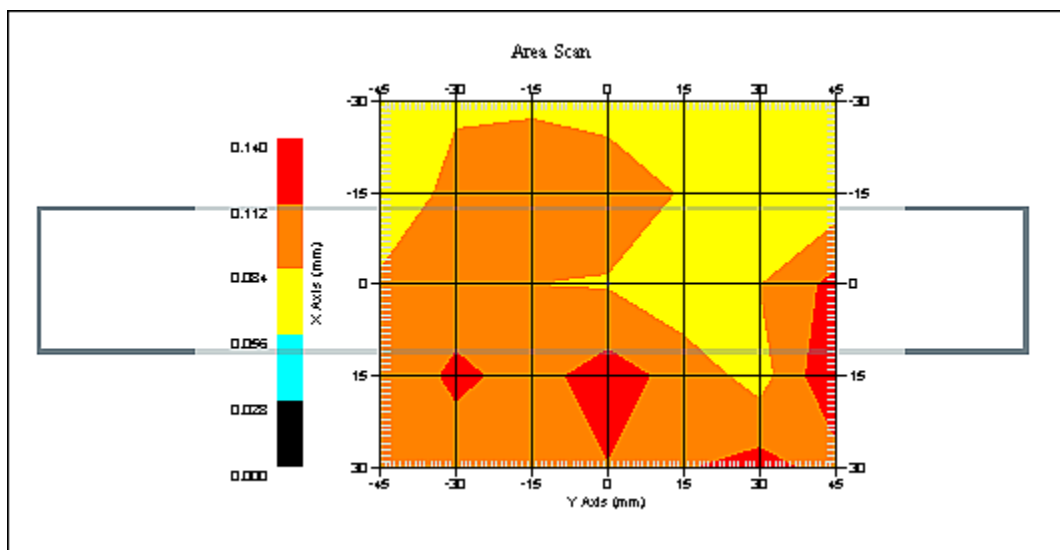
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Side A
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.120 W/kg
10 gram SAR value : 0.101 W/kg
Area Scan Peak SAR : 0.140 W/kg
Zoom Scan Peak SAR : 0.000 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 08:29:24 AM
End Time : 02-Mar-2011 08:44:36 AM
Scanning Time : 912 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11b
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.047 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 2
Orientation : Bottom Face
Power Drift-Start : 0.366 W/kg
Power Drift-Finish: 0.382 W/kg
Power Drift (%) : 4.438

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

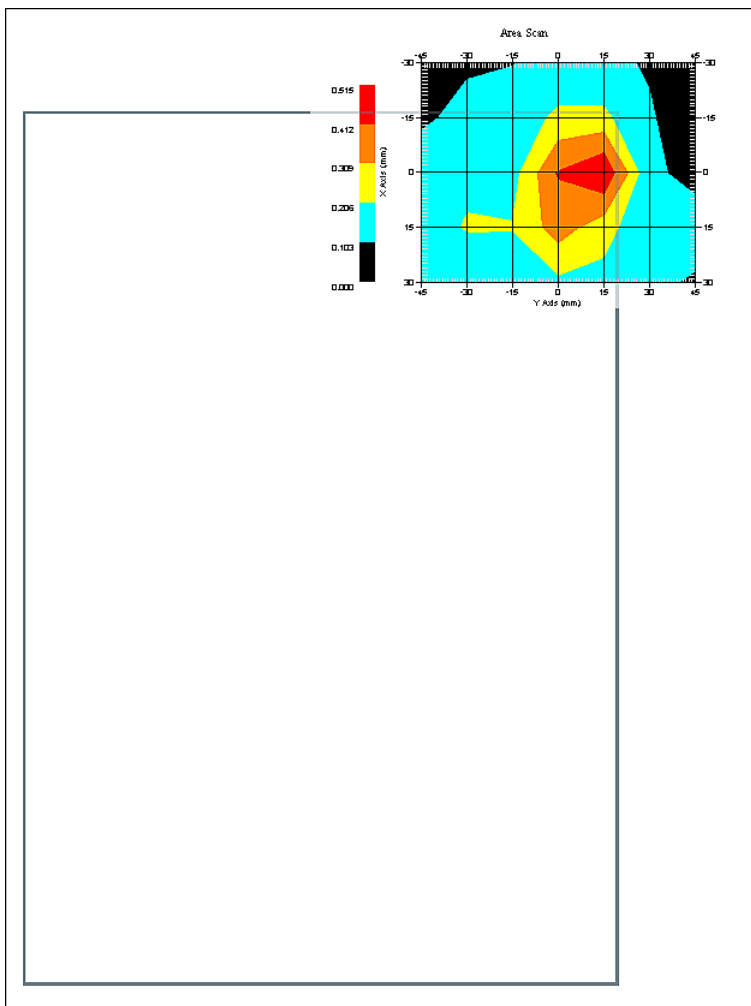
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.473 W/kg
10 gram SAR value : 0.255 W/kg
Area Scan Peak SAR : 0.513 W/kg
Zoom Scan Peak SAR : 0.870 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 09:22:47 AM
End Time : 02-Mar-2011 09:37:37 AM
Scanning Time : 890 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11b
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.047 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 30 mm
Depth : 192 mm
Antenna Type : Internal - Antenna 2
Orientation : Side B
Power Drift-Start : 0.361 W/kg
Power Drift-Finish: 0.357 W/kg
Power Drift (%) : -1.153

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

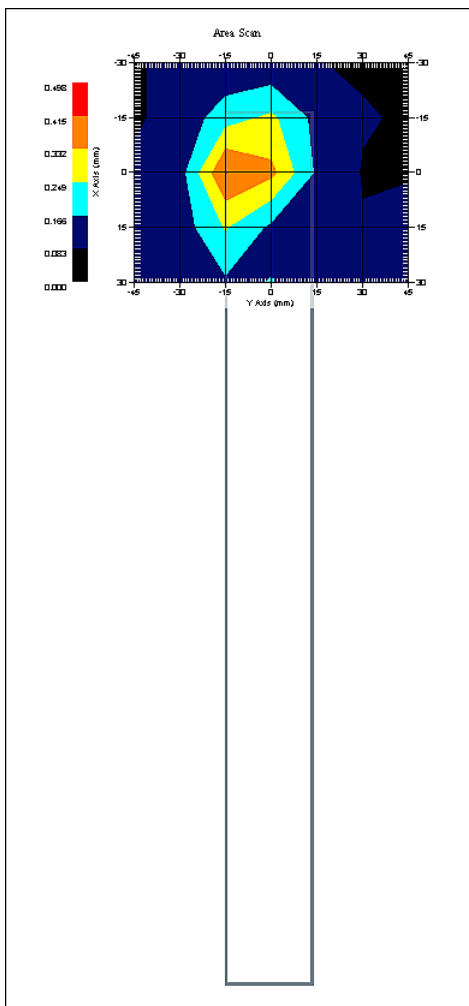
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Side B
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.390 W/kg
10 gram SAR value : 0.224 W/kg
Area Scan Peak SAR : 0.416 W/kg
Zoom Scan Peak SAR : 0.680 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 09:39:59 AM
End Time : 02-Mar-2011 09:54:47 AM
Scanning Time : 888 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11b
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.047 W
Drift Time : 0 min(s)
Length : 192 mm
Width : 30 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 2
Orientation : Side C
Power Drift-Start : 0.526 W/kg
Power Drift-Finish: 0.528 W/kg
Power Drift (%) : 0.279

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

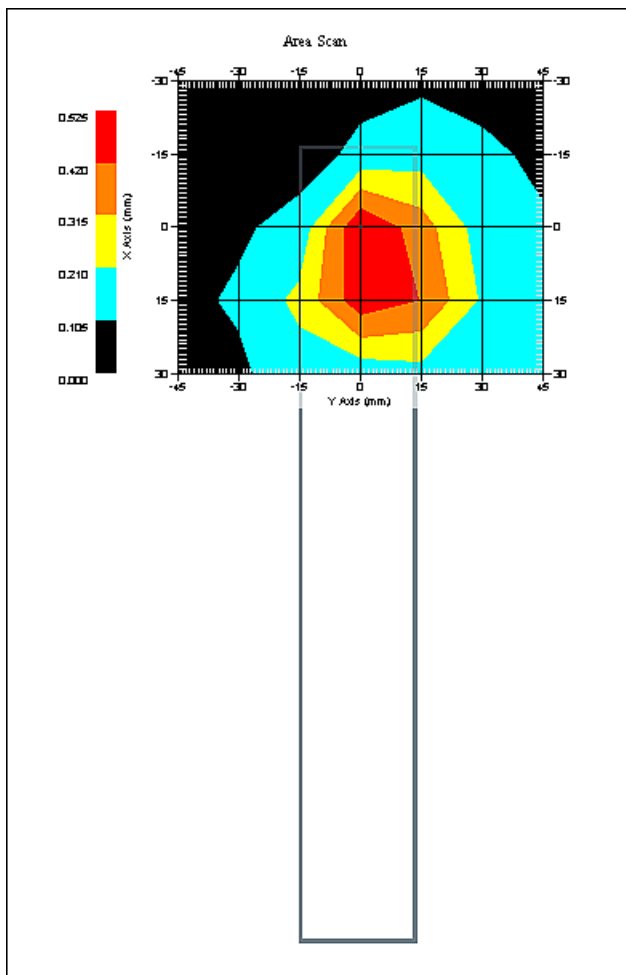
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

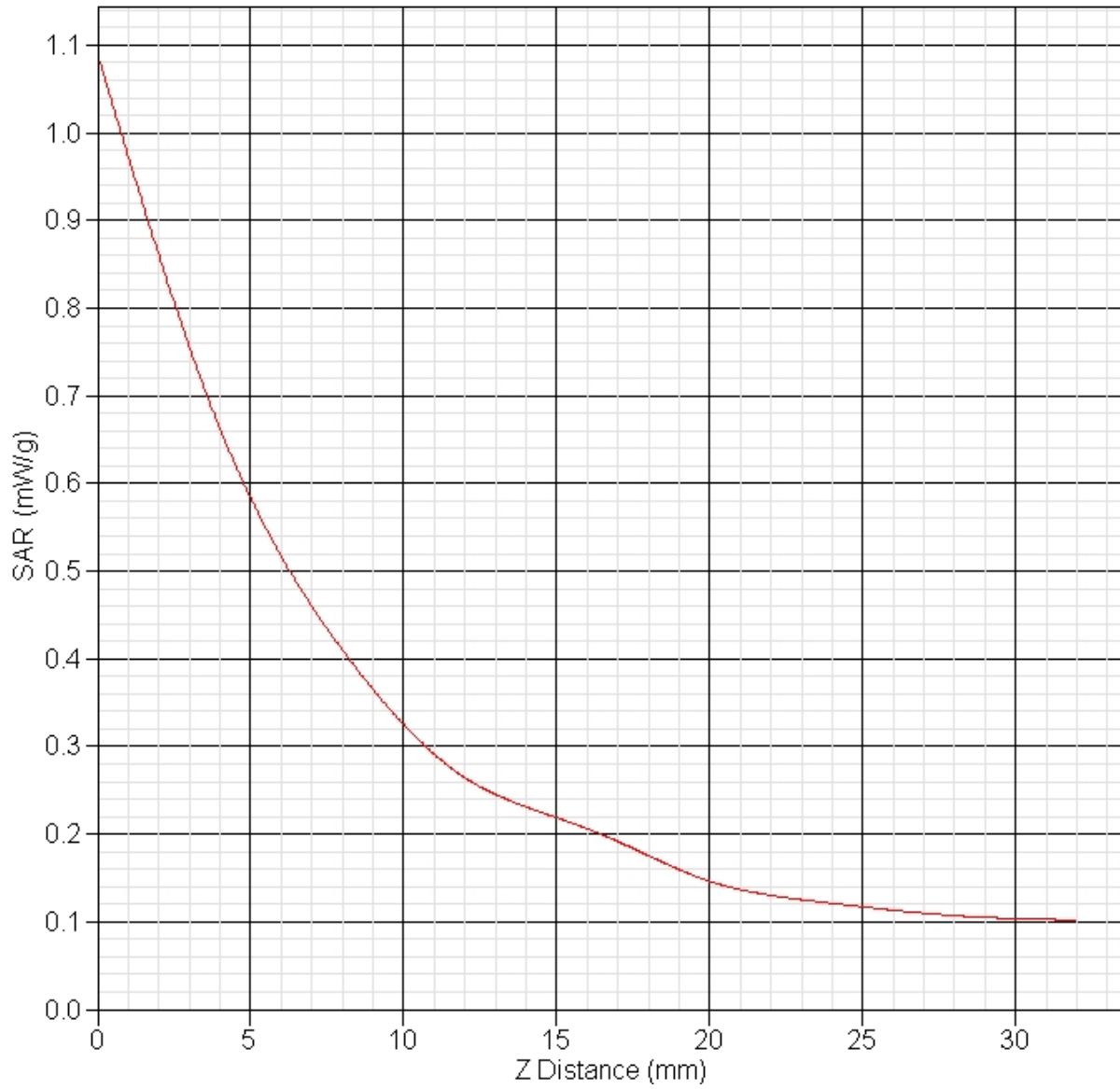
Other Data

DUT Position : Side C
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.585 W/kg
10 gram SAR value : 0.313 W/kg
Area Scan Peak SAR : 0.524 W/kg
Zoom Scan Peak SAR : 1.090 W/kg

SAR-Z Axis
at Hotspot x:8.05 y:-0.11



SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 02:00:40 PM
End Time : 02-Mar-2011 02:15:19 PM
Scanning Time : 879 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11g
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.057 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 1
Orientation : Bottom Face
Power Drift-Start : 0.214 W/kg
Power Drift-Finish: 0.206 W/kg
Power Drift (%) : -3.640

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

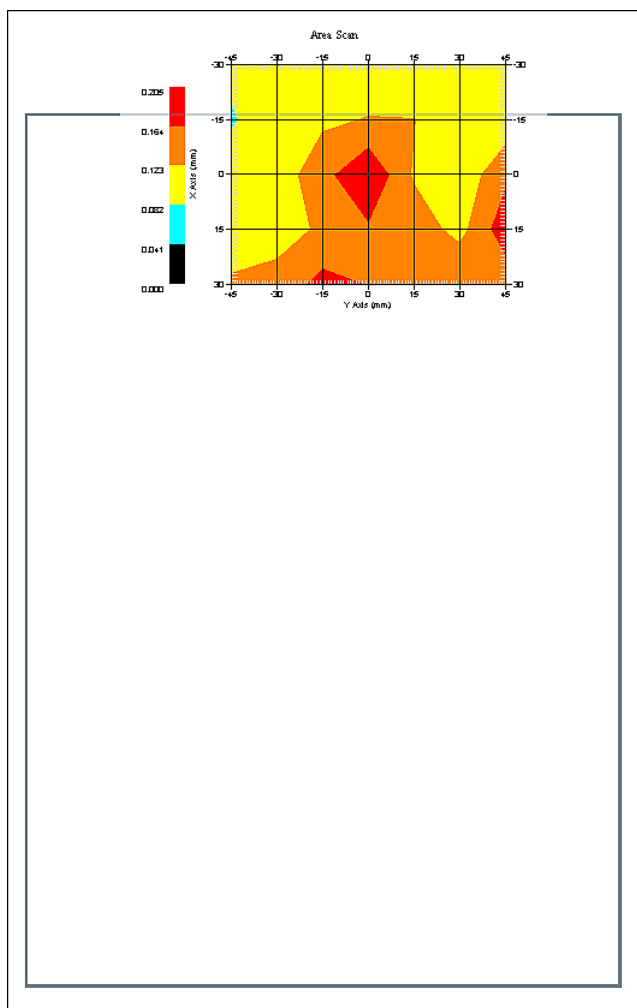
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.197 W/kg
10 gram SAR value : 0.150 W/kg
Area Scan Peak SAR : 0.203 W/kg
Zoom Scan Peak SAR : 0.300 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 02:36:03 PM
End Time : 02-Mar-2011 02:50:56 PM
Scanning Time : 893 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11g
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.057 W
Drift Time : 0 min(s)
Length : 30 mm
Width : 192 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 1
Orientation : Side A
Power Drift-Start : 0.104 W/kg
Power Drift-Finish: 0.105 W/kg
Power Drift (%) : 0.963

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

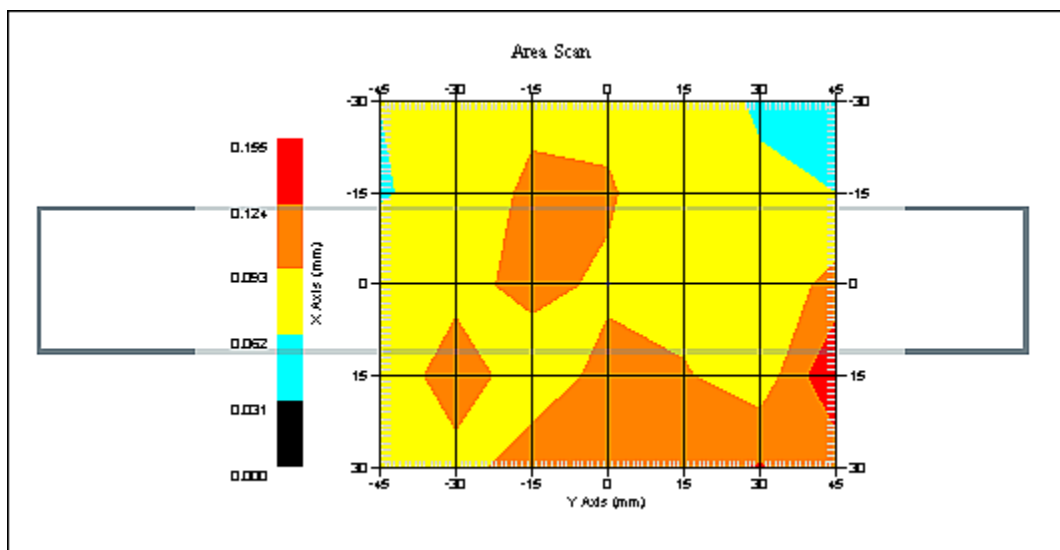
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Side A
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.096 W/kg
10 gram SAR value : 0.095 W/kg
Area Scan Peak SAR : 0.155 W/kg
Zoom Scan Peak SAR : 0.130 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 03:46:38 PM
End Time : 02-Mar-2011 04:01:29 PM
Scanning Time : 891 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11g
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.057 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 2
Orientation : Bottom Face
Power Drift-Start : 0.384 W/kg
Power Drift-Finish: 0.371 W/kg
Power Drift (%) : -3.381

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

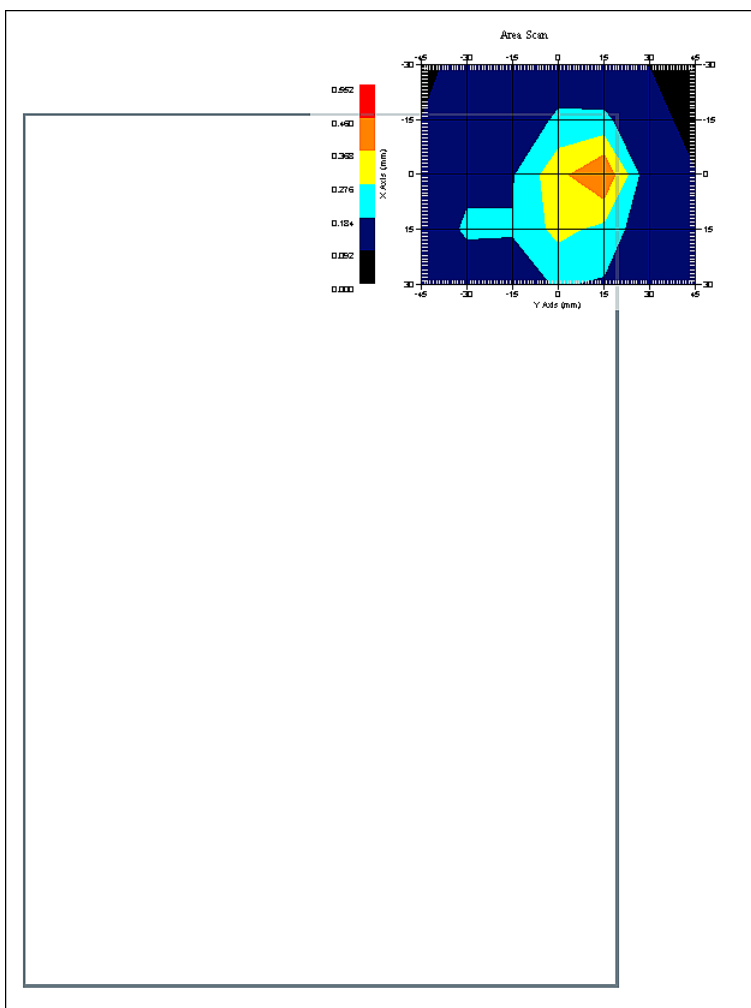
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.411 W/kg
10 gram SAR value : 0.229 W/kg
Area Scan Peak SAR : 0.461 W/kg
Zoom Scan Peak SAR : 0.760 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 04:20:45 PM
End Time : 02-Mar-2011 04:35:39 PM
Scanning Time : 894 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11g
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.057 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 30 mm
Depth : 192 mm
Antenna Type : Internal - Antenna 2
Orientation : Side B
Power Drift-Start : 0.306 W/kg
Power Drift-Finish: 0.308 W/kg
Power Drift (%) : 0.759

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

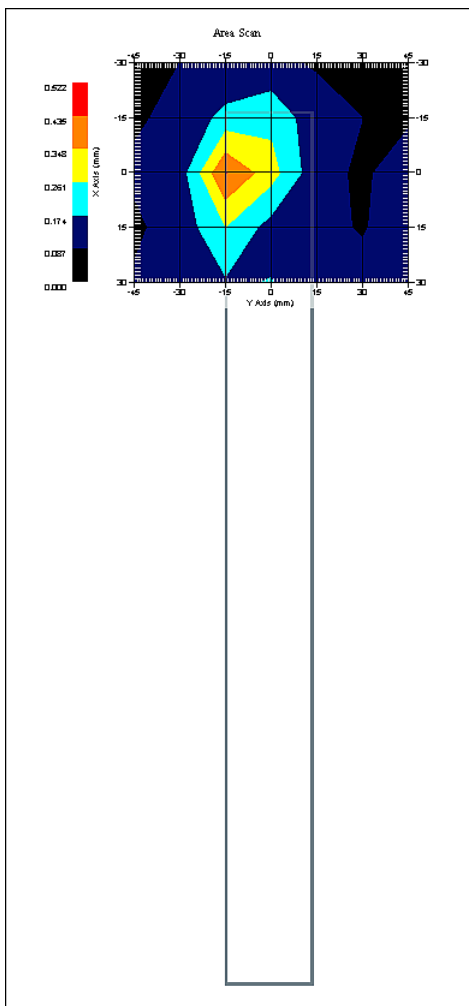
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Side B
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.349 W/kg
10 gram SAR value : 0.206 W/kg
Area Scan Peak SAR : 0.437 W/kg
Zoom Scan Peak SAR : 0.710 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 02-Mar-2011
Starting Time : 02-Mar-2011 04:38:09 PM
End Time : 02-Mar-2011 04:53:01 PM
Scanning Time : 892 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11g
Model : MVP-9000i
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.057 W
Drift Time : 0 min(s)
Length : 192 mm
Width : 30 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 2
Orientation : Side C
Power Drift-Start : 0.376 W/kg
Power Drift-Finish: 0.390 W/kg
Power Drift (%) : 3.728

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 2450
Frequency : 2450.00 MHz
Last Calib. Date : 02-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 54.17 F/m
Sigma : 1.98 S/m
Density : 1000.00 kg/cu. m

Probe Data

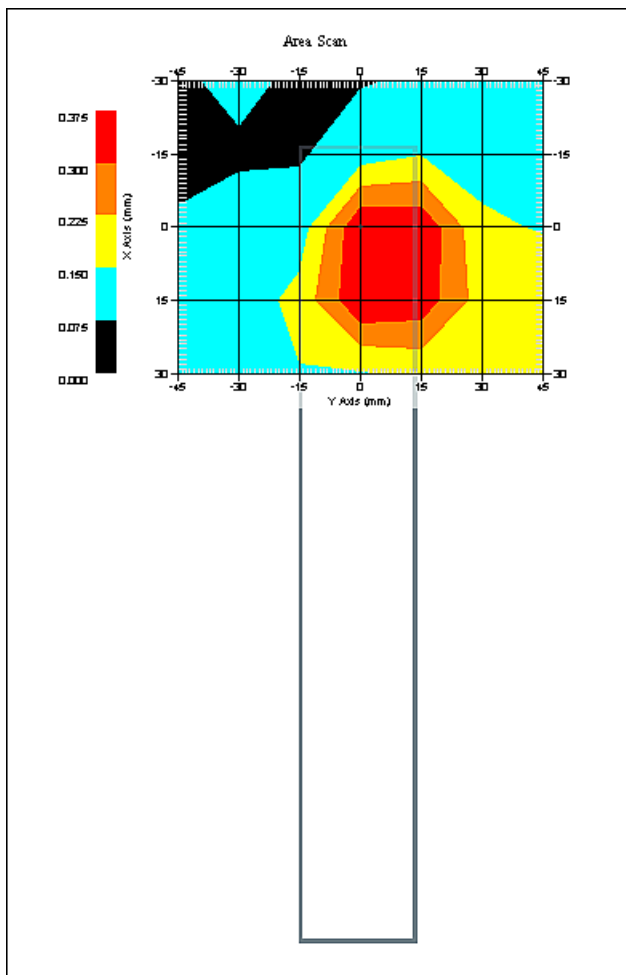
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 2450.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.5
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 02-Mar-2011
Set-up Time : 8:29:19 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data

DUT Position : Side C
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.479 W/kg
10 gram SAR value : 0.266 W/kg
Area Scan Peak SAR : 0.375 W/kg
Zoom Scan Peak SAR : 0.810 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 03-Mar-2011
Starting Time : 03-Mar-2011 11:23:15 AM
End Time : 03-Mar-2011 11:48:12 AM
Scanning Time : 1497 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5200.00 MHz
Max. Transmit Pwr : 0.022 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 1
Orientation : Bottom Face
Power Drift-Start : 0.545 W/kg
Power Drift-Finish: 0.570 W/kg
Power Drift (%) : 4.514

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5200
Frequency : 5200.00 MHz
Last Calib. Date : 03-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.71 F/m
Sigma : 5.42 S/m
Density : 1000.00 kg/cu. m

Probe Data

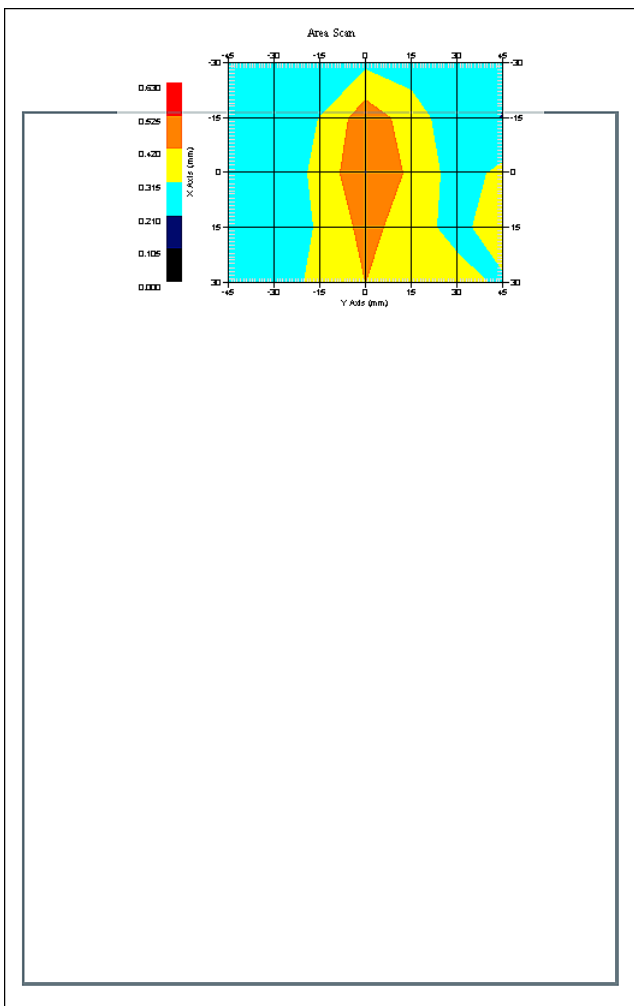
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5200.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 03-Mar-2011
Set-up Time : 7:58:10 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Low



1 gram SAR value : 0.505 W/kg
10 gram SAR value : 0.381 W/kg
Area Scan Peak SAR : 0.526 W/kg
Zoom Scan Peak SAR : 0.640 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 03-Mar-2011
Starting Time : 03-Mar-2011 09:58:49 AM
End Time : 03-Mar-2011 10:23:43 AM
Scanning Time : 1494 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5200.00 MHz
Max. Transmit Pwr : 0.022 W
Drift Time : 0 min(s)
Length : 192 mm
Width : 30 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 1
Orientation : Side A
Power Drift-Start : 0.548 W/kg
Power Drift-Finish: 0.533 W/kg
Power Drift (%) : -2.796

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5200
Frequency : 5200.00 MHz
Last Calib. Date : 03-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.71 F/m
Sigma : 5.42 S/m
Density : 1000.00 kg/cu. m

Probe Data

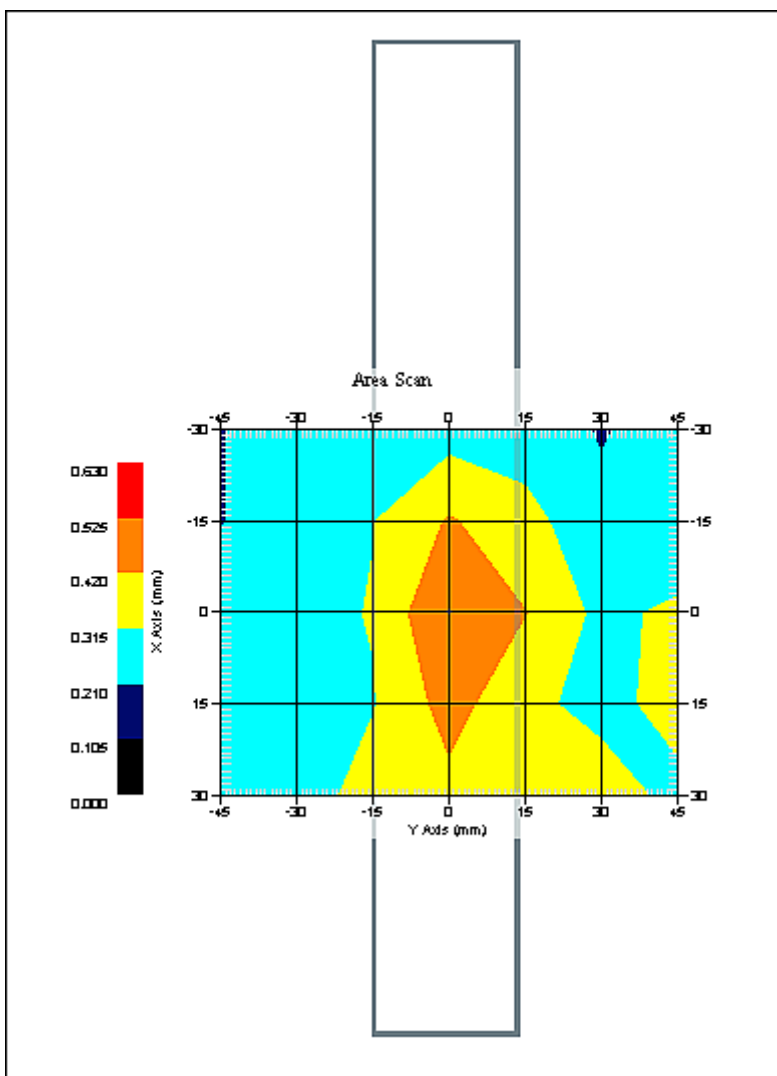
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5200.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 03-Mar-2011
Set-up Time : 7:58:10 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

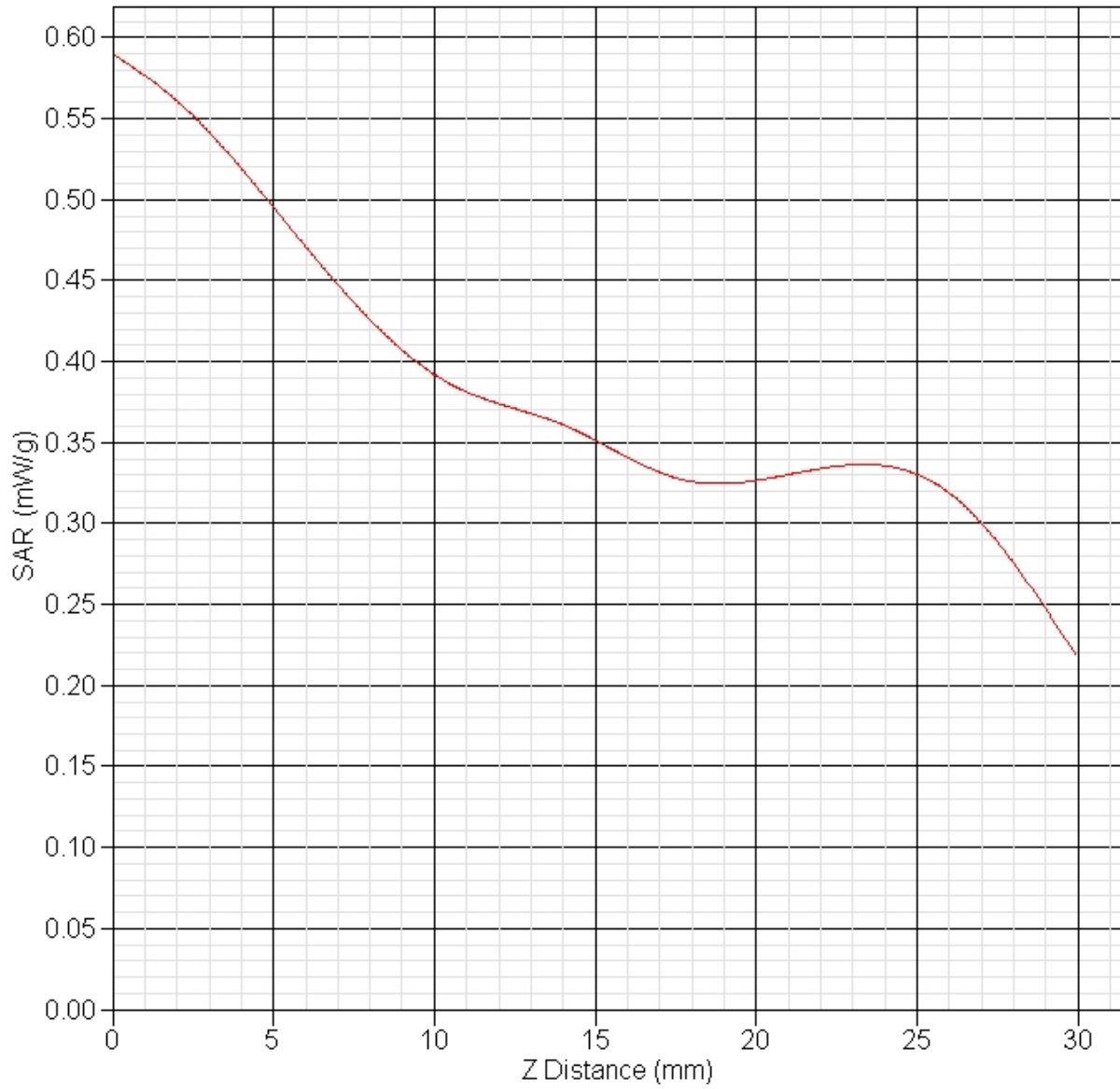
Other Data

DUT Position : Side A
Separation : 0 mm
Channel : Low



1 gram SAR value : 0.507 W/kg
10 gram SAR value : 0.388 W/kg
Area Scan Peak SAR : 0.526 W/kg
Zoom Scan Peak SAR : 0.590 W/kg

SAR-Z Axis
at Hotspot x:16.05 y:-0.13



SAR Test Report

By Operator : Jay
Measurement Date : 03-Mar-2011
Starting Time : 03-Mar-2011 07:41:18 AM
End Time : 03-Mar-2011 08:06:21 AM
Scanning Time : 1503 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5200.00 MHz
Max. Transmit Pwr : 0.022 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 2
Orientation : Bottom Face
Power Drift-Start : 0.435 W/kg
Power Drift-Finish: 0.432 W/kg
Power Drift (%) : -0.682

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5200
Frequency : 5200.00 MHz
Last Calib. Date : 03-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.71 F/m
Sigma : 5.42 S/m
Density : 1000.00 kg/cu. m

Probe Data

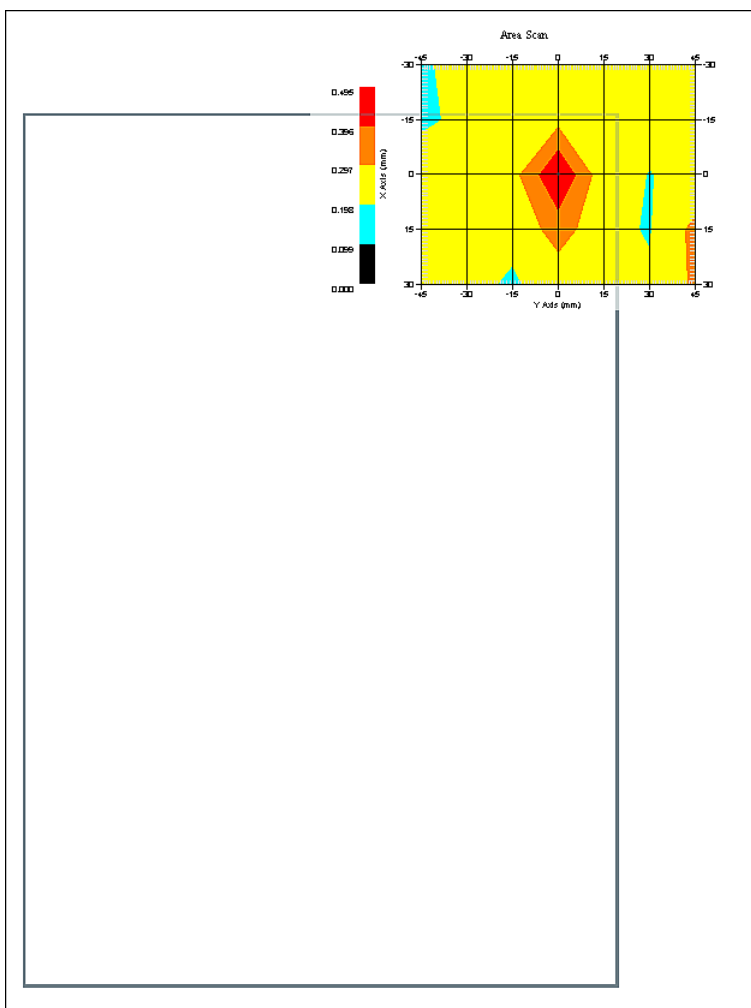
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5200.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 03-Mar-2011
Set-up Time : 7:58:10 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Low



1 gram SAR value : 0.404 W/kg
10 gram SAR value : 0.289 W/kg
Area Scan Peak SAR : 0.493 W/kg
Zoom Scan Peak SAR : 0.750 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 03-Mar-2011
Starting Time : 03-Mar-2011 08:49:36 AM
End Time : 03-Mar-2011 09:14:29 AM
Scanning Time : 1493 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5200.00 MHz
Max. Transmit Pwr : 0.022 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 30 mm
Depth : 192 mm
Antenna Type : Internal - Antenna 2
Orientation : Side B
Power Drift-Start : 0.394 W/kg
Power Drift-Finish: 0.405 W/kg
Power Drift (%) : 2.793

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5200
Frequency : 5200.00 MHz
Last Calib. Date : 03-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.71 F/m
Sigma : 5.42 S/m
Density : 1000.00 kg/cu. m

Probe Data

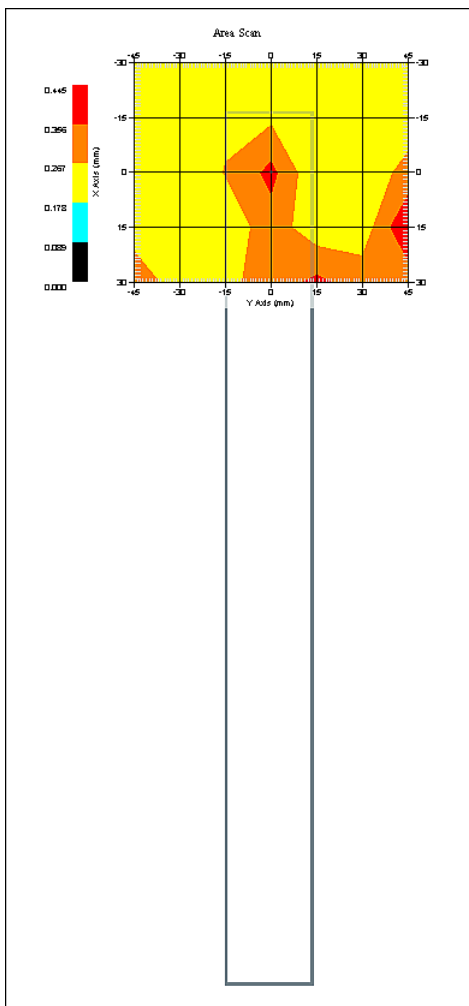
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5200.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 03-Mar-2011
Set-up Time : 7:58:10 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data

DUT Position : Side B
Separation : 0 mm
Channel : Low



1 gram SAR value : 0.400 W/kg
10 gram SAR value : 0.320 W/kg
Area Scan Peak SAR : 0.445 W/kg
Zoom Scan Peak SAR : 0.760 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 03-Mar-2011
Starting Time : 03-Mar-2011 09:22:27 AM
End Time : 03-Mar-2011 09:47:20 AM
Scanning Time : 1493 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5200.00 MHz
Max. Transmit Pwr : 0.022 W
Drift Time : 0 min(s)
Length : 192 mm
Width : 30 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 2
Orientation : Side C
Power Drift-Start : 0.227 W/kg
Power Drift-Finish: 0.229 W/kg
Power Drift (%) : 0.886

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5200
Frequency : 5200.00 MHz
Last Calib. Date : 03-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.71 F/m
Sigma : 5.42 S/m
Density : 1000.00 kg/cu. m

Probe Data

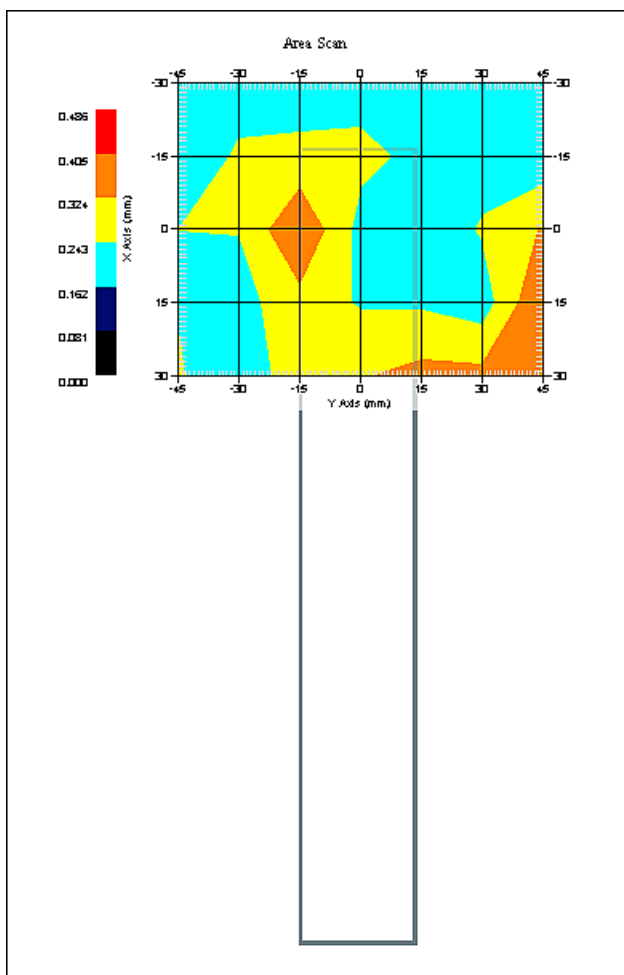
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5200.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 03-Mar-2011
Set-up Time : 7:58:10 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data

DUT Position : Side C
Separation : 0 mm
Channel : Low



1 gram SAR value : 0.377 W/kg
10 gram SAR value : 0.294 W/kg
Area Scan Peak SAR : 0.407 W/kg
Zoom Scan Peak SAR : 0.100 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 04-Mar-2011
Starting Time : 04-Mar-2011 08:10:36 AM
End Time : 04-Mar-2011 08:35:47 AM
Scanning Time : 1511 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5800.00 MHz
Max. Transmit Pwr : 0.021 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 1
Orientation : Bottom Face
Power Drift-Start : 0.463 W/kg
Power Drift-Finish: 0.479 W/kg
Power Drift (%) : 3.451

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5800
Frequency : 5800.00 MHz
Last Calib. Date : 04-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.12 F/m
Sigma : 5.99 S/m
Density : 1000.00 kg/cu. m

Probe Data

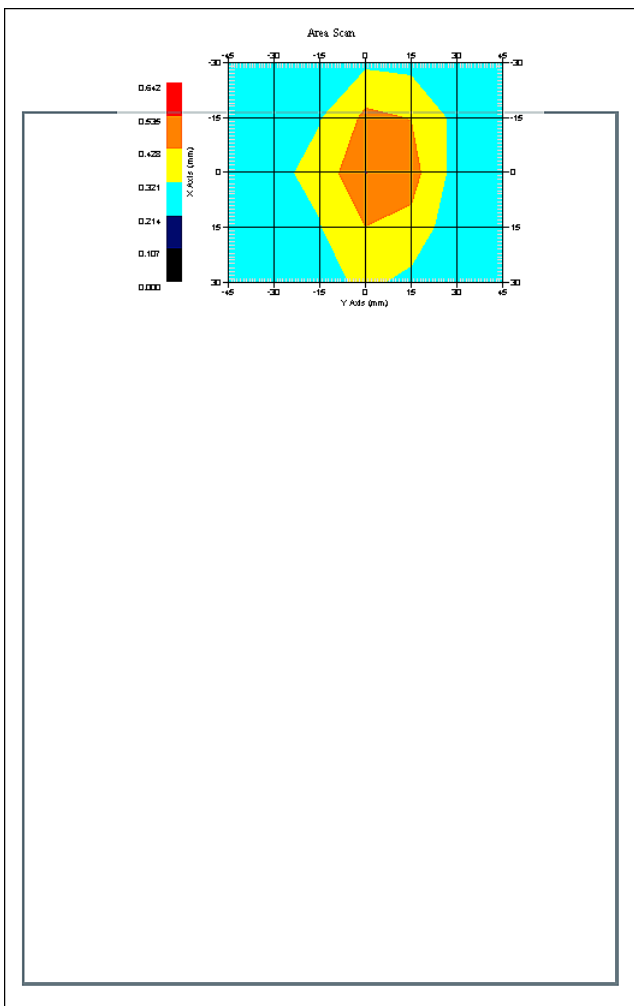
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5800.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.2
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Mar-2011
Set-up Time : 7:20:32 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.473 W/kg
10 gram SAR value : 0.339 W/kg
Area Scan Peak SAR : 0.536 W/kg
Zoom Scan Peak SAR : 0.780 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 04-Mar-2011
Starting Time : 04-Mar-2011 09:25:07 AM
End Time : 04-Mar-2011 09:50:11 AM
Scanning Time : 1504 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5800.00 MHz
Max. Transmit Pwr : 0.021 W
Drift Time : 0 min(s)
Length : 192 mm
Width : 30 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 1
Orientation : Side A
Power Drift-Start : 0.461 W/kg
Power Drift-Finish: 0.482 W/kg
Power Drift (%) : 4.654

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5800
Frequency : 5800.00 MHz
Last Calib. Date : 04-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.12 F/m
Sigma : 5.99 S/m
Density : 1000.00 kg/cu. m

Probe Data

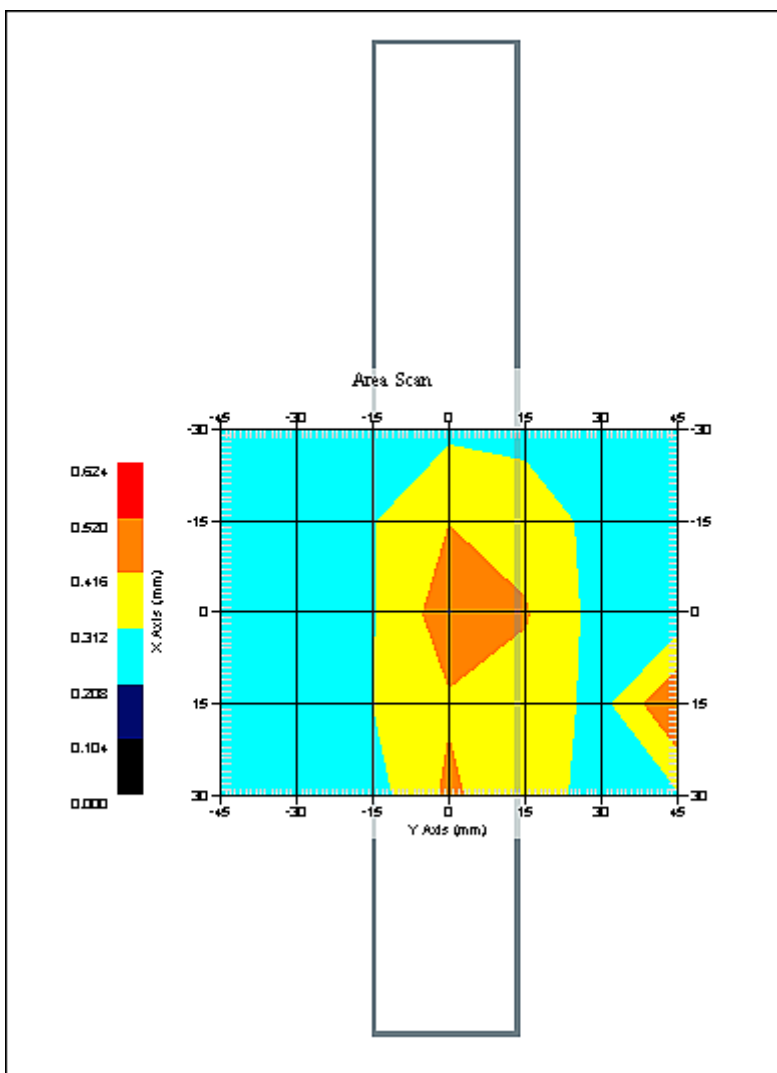
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5800.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.2
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Mar-2011
Set-up Time : 7:20:32 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data

DUT Position : Side A
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.454 W/kg
10 gram SAR value : 0.358 W/kg
Area Scan Peak SAR : 0.522 W/kg
Zoom Scan Peak SAR : 0.670 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 04-Mar-2011
Starting Time : 04-Mar-2011 10:06:24 AM
End Time : 04-Mar-2011 10:31:23 AM
Scanning Time : 1499 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5800.00 MHz
Max. Transmit Pwr : 0.021 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 192 mm
Depth : 30 mm
Antenna Type : Internal - Antenna 2
Orientation : Bottom Face
Power Drift-Start : 0.573 W/kg
Power Drift-Finish: 0.587 W/kg
Power Drift (%) : 2.441

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5800
Frequency : 5800.00 MHz
Last Calib. Date : 04-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.12 F/m
Sigma : 5.99 S/m
Density : 1000.00 kg/cu. m

Probe Data

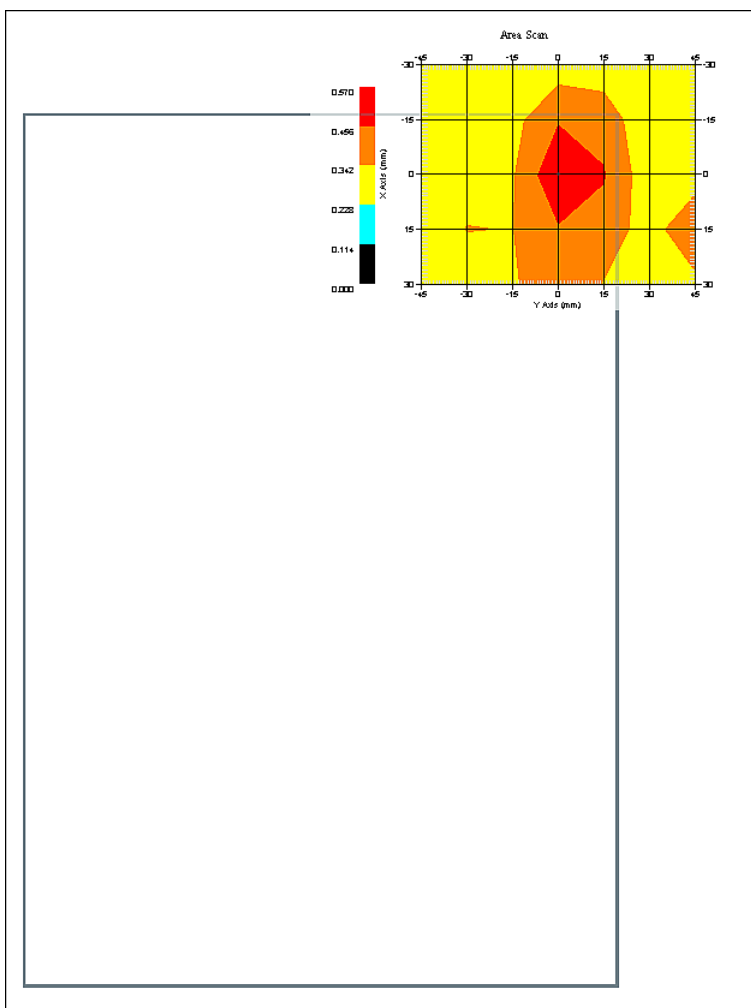
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5800.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.2
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Mar-2011
Set-up Time : 7:20:32 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

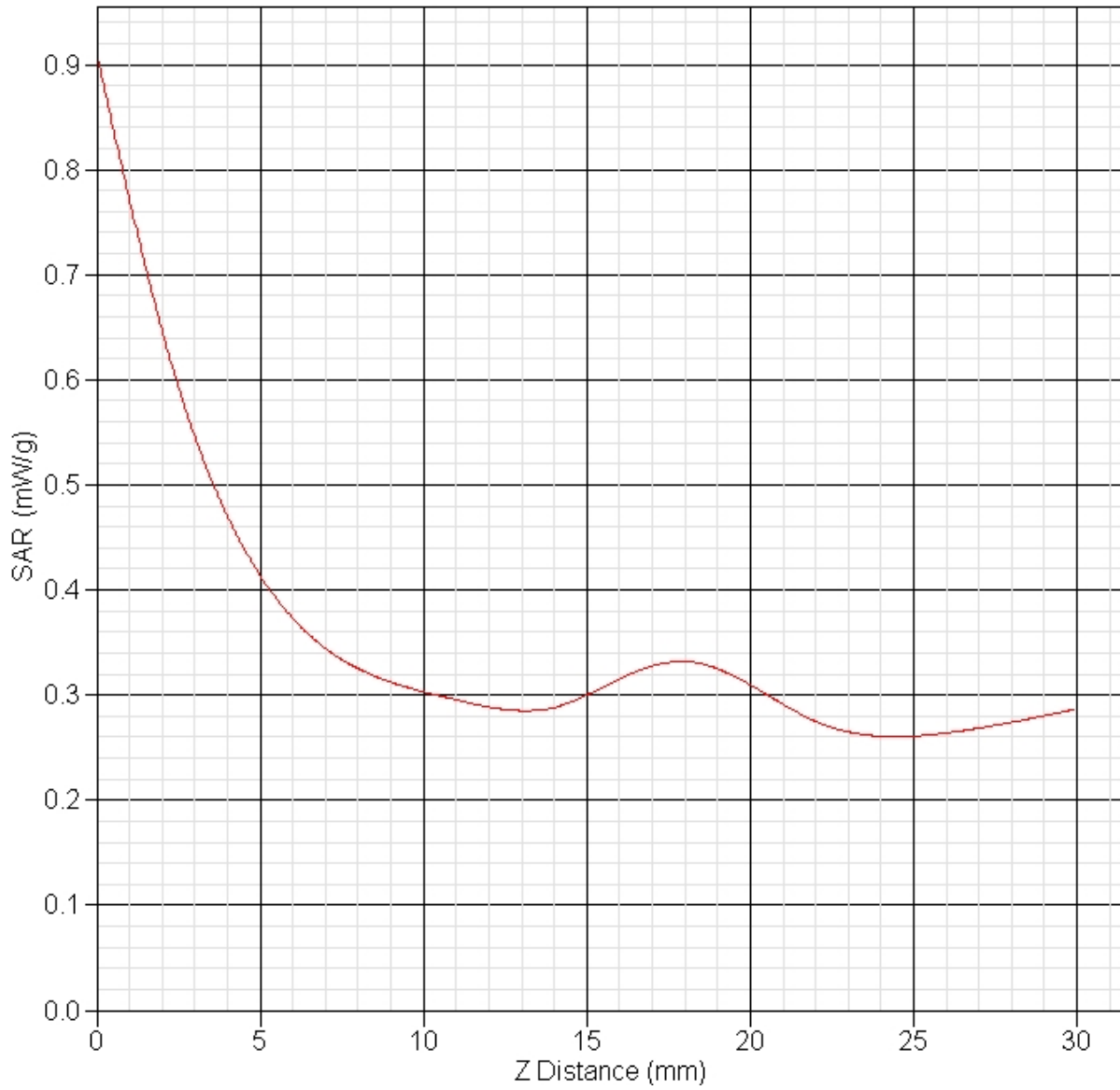
Other Data

DUT Position : Bottom Face
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.537 W/kg
10 gram SAR value : 0.393 W/kg
Area Scan Peak SAR : 0.568 W/kg
Zoom Scan Peak SAR : 0.910 W/kg

SAR-Z Axis
at Hotspot x:8.05 y:-0.14



SAR Test Report

By Operator : Jay
Measurement Date : 04-Mar-2011
Starting Time : 04-Mar-2011 11:22:45 AM
End Time : 04-Mar-2011 11:47:34 AM
Scanning Time : 1489 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5800.00 MHz
Max. Transmit Pwr : 0.021 W
Drift Time : 0 min(s)
Length : 280 mm
Width : 30 mm
Depth : 192 mm
Antenna Type : Internal - Antenna 2
Orientation : Side B
Power Drift-Start : 0.575 W/kg
Power Drift-Finish: 0.574 W/kg
Power Drift (%) : -0.241

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5800
Frequency : 5800.00 MHz
Last Calib. Date : 04-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.12 F/m
Sigma : 5.99 S/m
Density : 1000.00 kg/cu. m

Probe Data

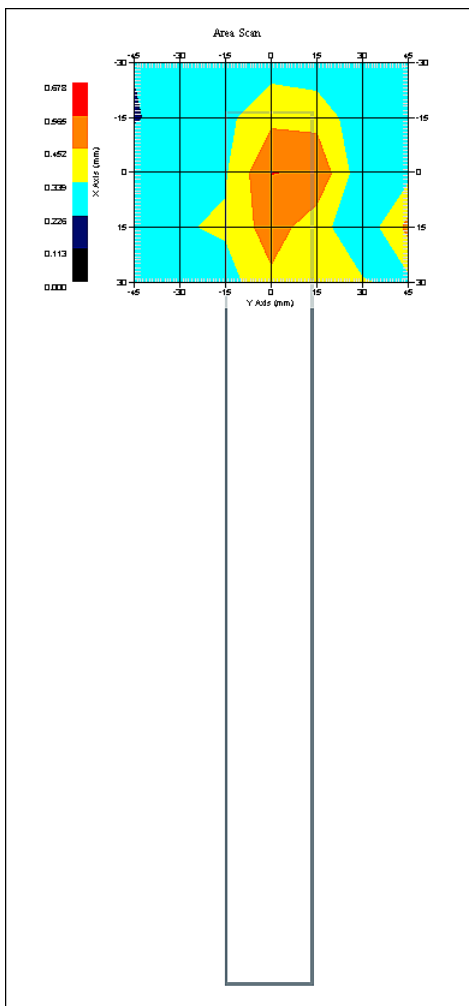
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5800.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.2
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Mar-2011
Set-up Time : 7:20:32 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data

DUT Position : Side B
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.536 W/kg
10 gram SAR value : 0.399 W/kg
Area Scan Peak SAR : 0.567 W/kg
Zoom Scan Peak SAR : 0.790 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 04-Mar-2011
Starting Time : 04-Mar-2011 12:00:47 PM
End Time : 04-Mar-2011 12:25:46 PM
Scanning Time : 1499 secs

Product Data

Device Name : AMX LLC
Serial No. : Beta
Mode : 802.11a
Model : MVP-9000i
Frequency : 5800.00 MHz
Max. Transmit Pwr : 0.021 W
Drift Time : 0 min(s)
Length : 192 mm
Width : 30 mm
Depth : 280 mm
Antenna Type : Internal - Antenna 2
Orientation : Side C
Power Drift-Start : 0.584 W/kg
Power Drift-Finish: 0.609 W/kg
Power Drift (%) : 4.237

Phantom Data

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

Tissue Data

Type : BODY
Serial No. : 5800
Frequency : 5800.00 MHz
Last Calib. Date : 04-Mar-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 50.00 RH%
Epsilon : 48.12 F/m
Sigma : 5.99 S/m
Density : 1000.00 kg/cu. m

Probe Data

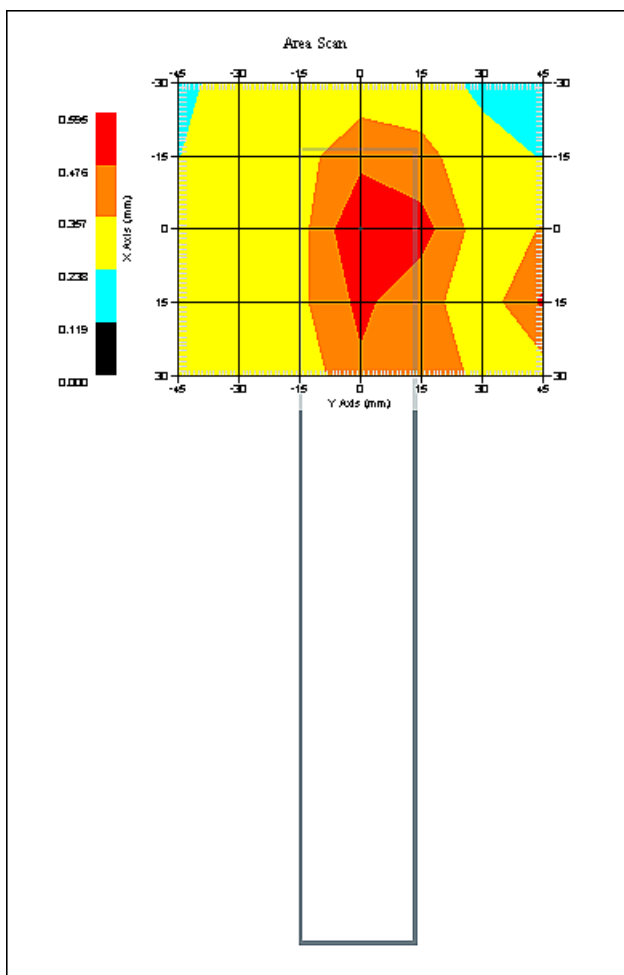
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5800.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.2
Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{m})^2$
Compression Point: 95.00 mV
Offset : 1.06 mm

Measurement Data

Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 04-Mar-2011
Set-up Time : 7:20:32 AM
Area Scan : 5x7x1 : Measurement x=15mm, y=15mm, z=2mm
Zoom Scan : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

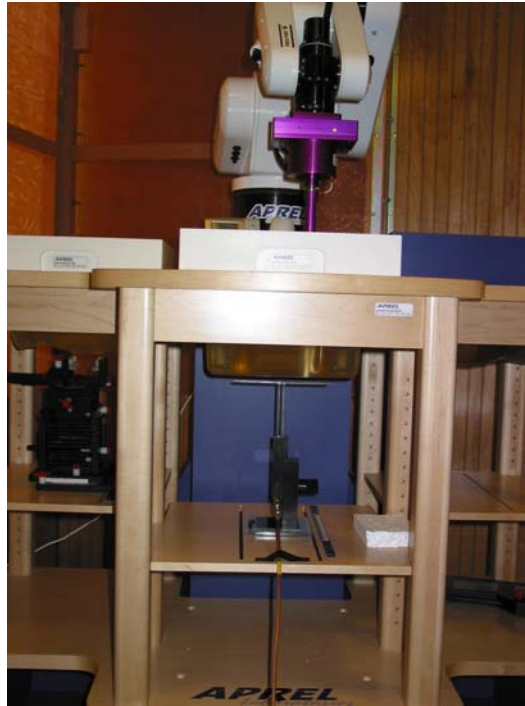
Other Data

DUT Position : Side C
Separation : 0 mm
Channel : Mid

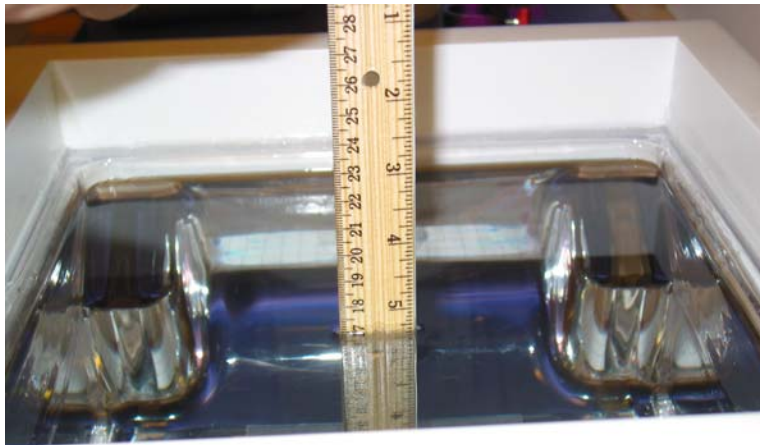


1 gram SAR value : 0.529 W/kg
10 gram SAR value : 0.405 W/kg
Area Scan Peak SAR : 0.595 W/kg
Zoom Scan Peak SAR : 0.740 W/kg

Appendix C – SAR Test Setup Photos



System Body Configuration



Body Tissue Depth



Test Ant 1 Bottom Position



Test Ant 1 Side A Position



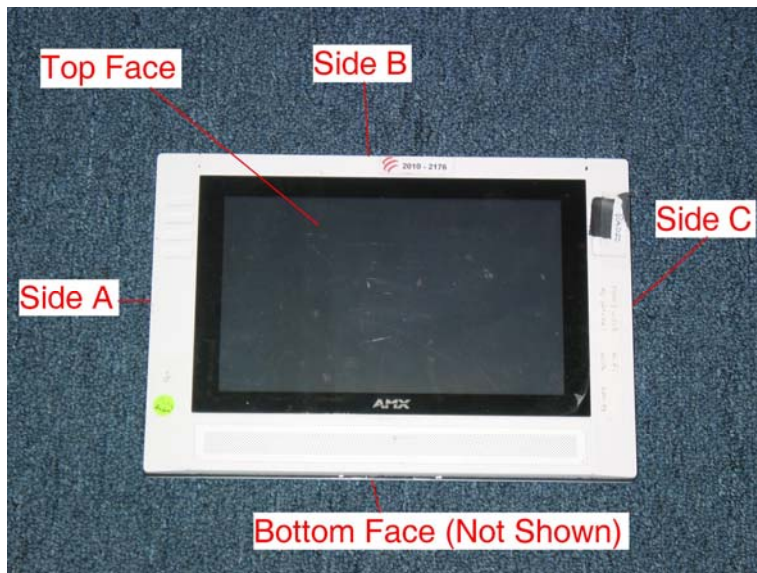
Test Ant 2 Bottom Face Position



Test Ant 2 Side B Position



Test Ant 2 Side C Position



Test Locations



Front of Device



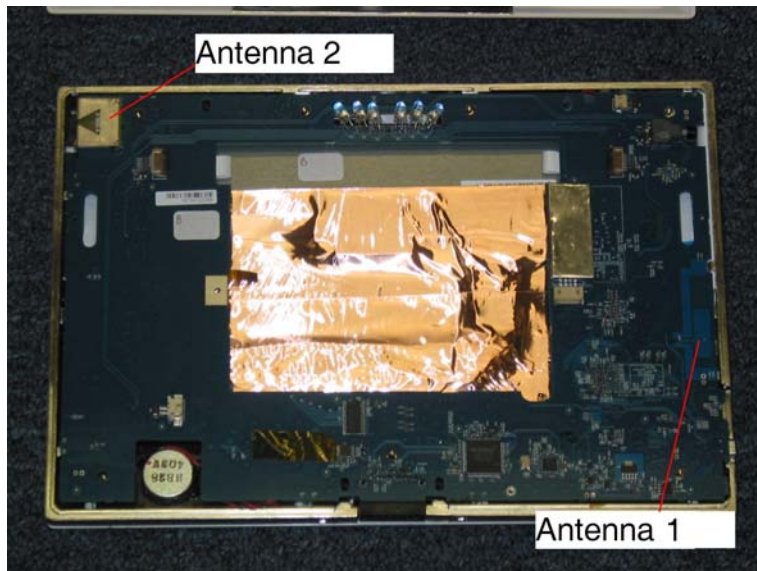
Back of Device



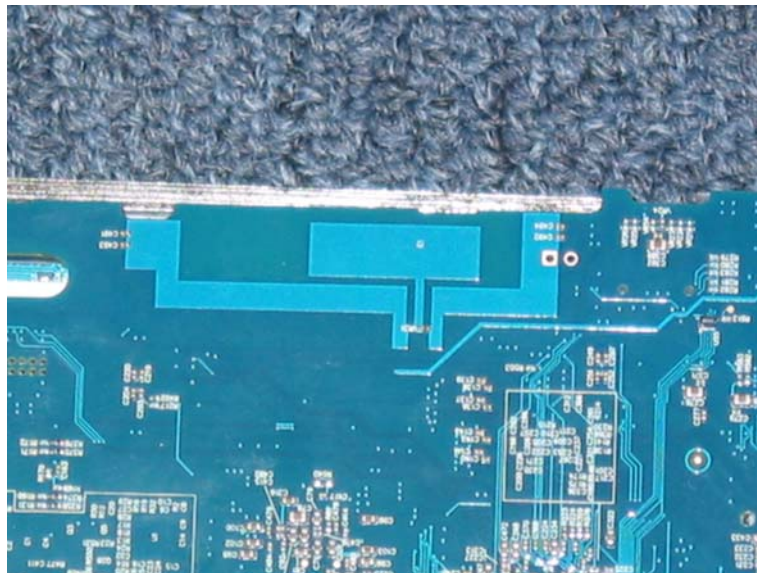
Battery



Unit Opened



Antenna Locations



Antenna 1



Antenna 2

Appendix D – Probe Calibration Data Sheets

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1164

Client.: RFEL

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 2450 MHz

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: 215

Body Calibration

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2

Project No: RFEL-E-020-Cal-5539

Calibrated: 22 September 2010

Released on: 27 September 2010

This Calibration Certificate is Incomplete Unless Accompanied with the Calibration Results Summary
This calibration has been conducted in line with the SCC ISO-IEC 17025 Scope of Accreditation
Accredited Laboratory Number 48

Released By: _____

NCL CALIBRATION LABORATORIES

17 Bentley Ave
NEPEAN, ONTARIO
CANADA K2E 6T7

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E-020 215.

References

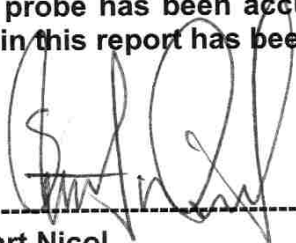
SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure
IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"
IEEE 1309 "IEEE Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9 KHz to 40 GHz" 2005
SSI-TP-011 Tissue Calibration Procedure
IEC 62209 "Human exposure to radio frequency fields from handheld and body-mounted wireless communication devices –Human models, instrumentation and procedures Part 1 & 2: Procedure to determine the Specific Absorption Rate (SAR) for handheld devices used in close proximity of the ear (frequency range of 200MHz to 3GHz)"

Conditions

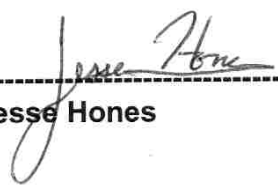
Probe 215 was a re-calibration.

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

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



Stuart Nicol



Jesse Hones

Calibration Results Summary

Probe Type:	E-Field Probe E-020
Serial Number:	215
Frequency:	2450 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	<5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

Sensitivity in Body Tissue Measured

Frequency: 2450 MHz

Epsilon: 53.0 (+/-5%) **Sigma:** 1.98 S/m (+/-5%)

ConvF

Channel X: 4.5

Channel Y: 4.5

Channel Z: 4.5

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

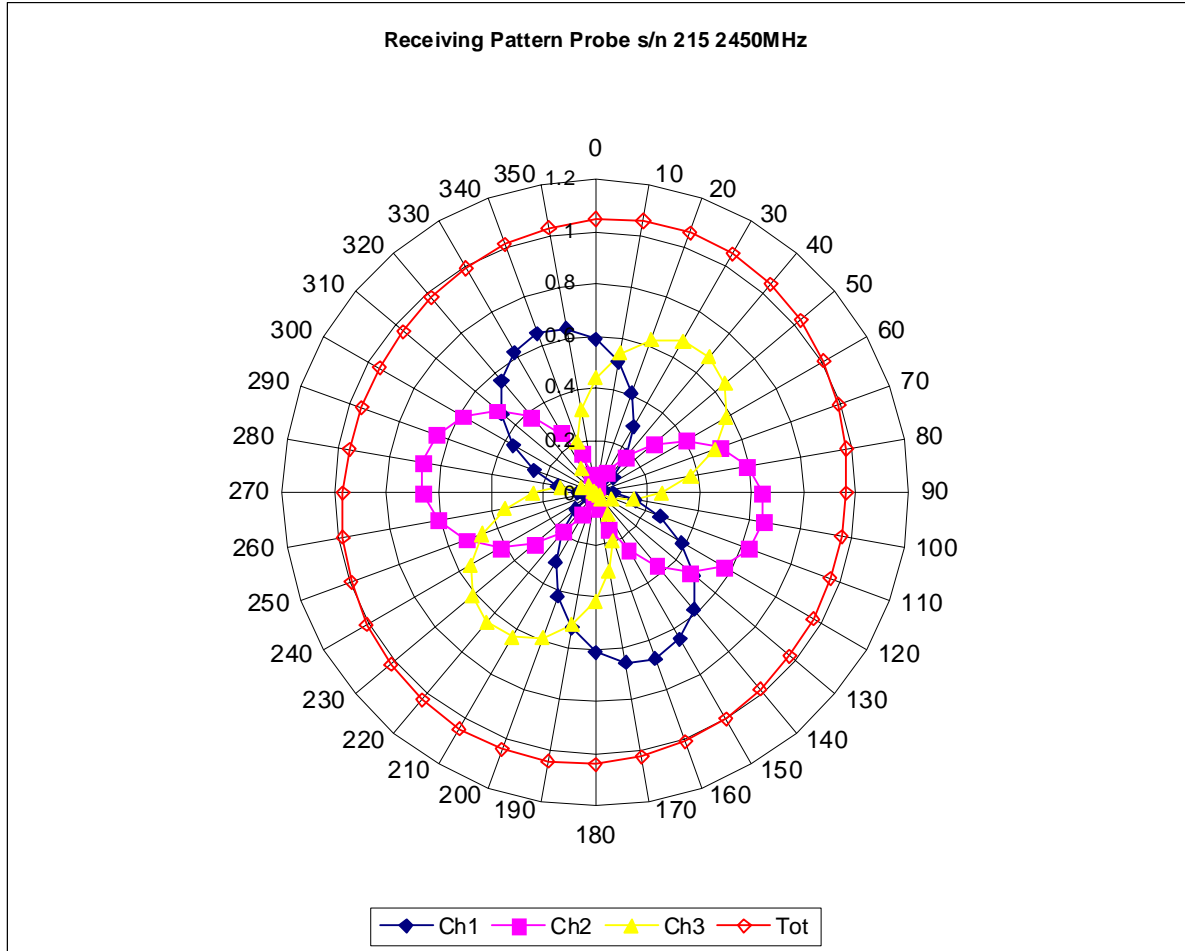
Boundary Effect:

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

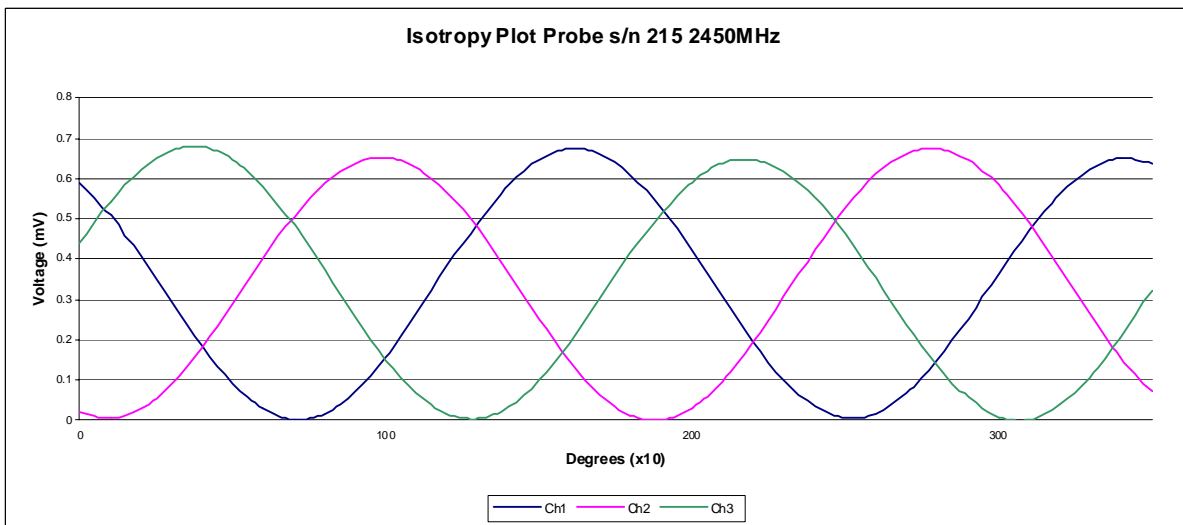
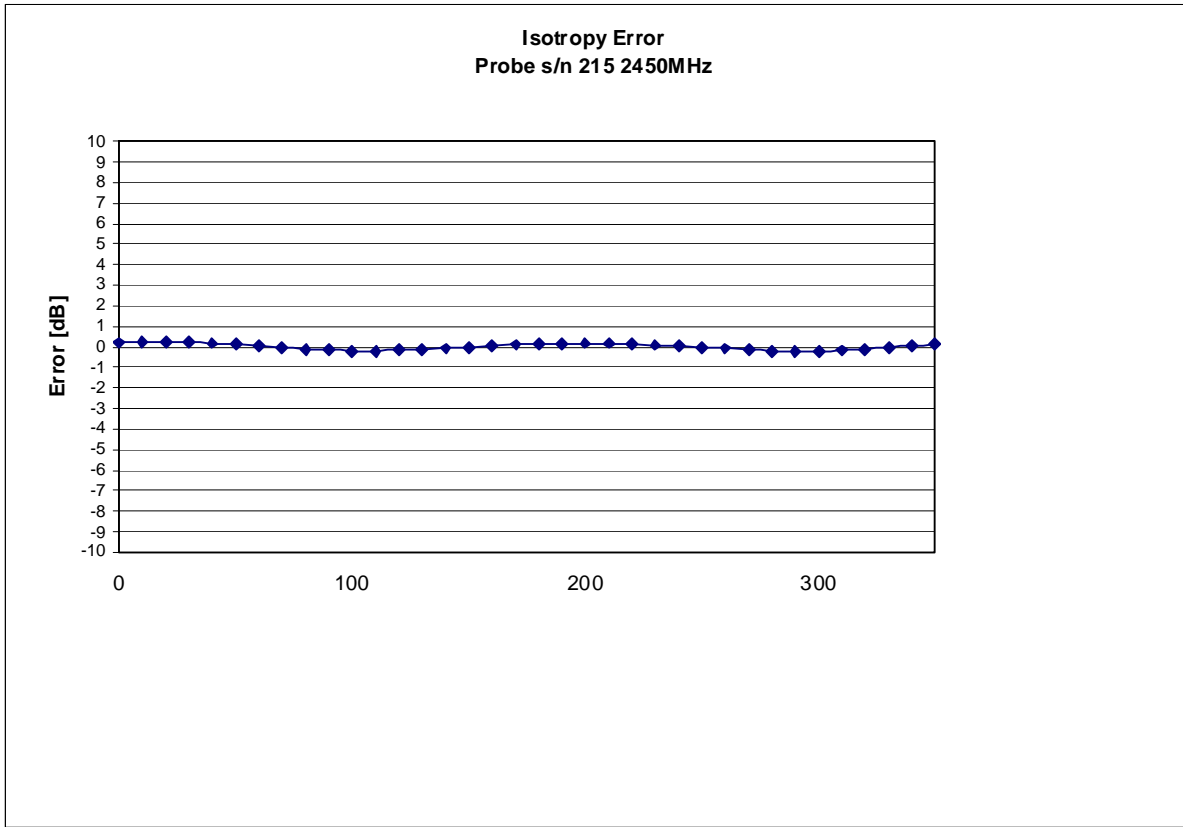
Spatial Resolution:

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

Receiving Pattern 2450 MHz (Air)



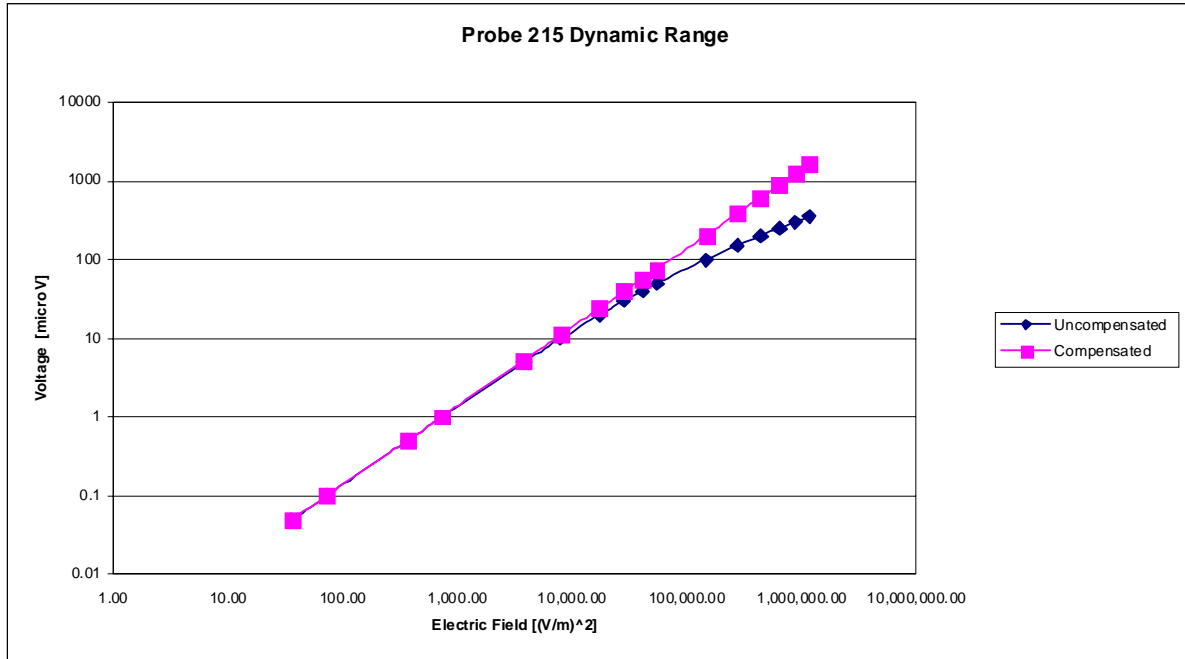
Isotropy Error 2450 MHz (Air)



Isotropicity Tissue:

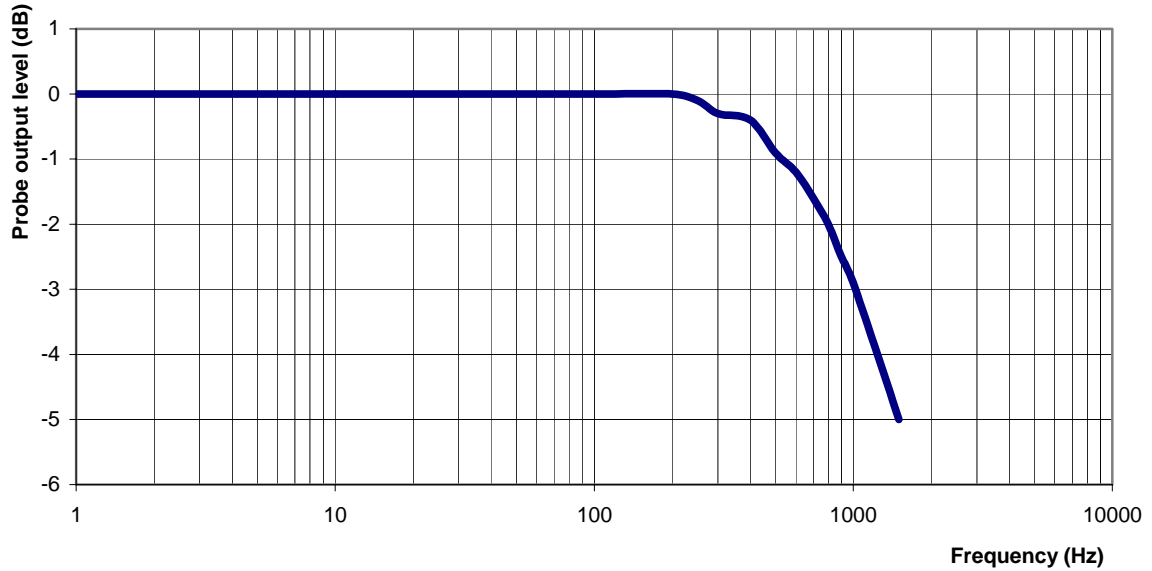
0.10 dB

Dynamic Range



Video Bandwidth

Probe Frequency Characteristics



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

Conversion Factor Uncertainty Assessment

Sensitivity in Body Tissue

Frequency: 2450 MHz
Epsilon: 53.0 (+/-5%) **Sigma:** 1.98 S/m (+/-5%)

ConvF

Channel X: 4.5 7%(K=2)
Channel Y: 4.5 7%(K=2)
Channel Z: 4.5 7%(K=2)

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

Boundary Effect:

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

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 2010.

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1134

Client.: RFEL

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 5200 MHz

BODY Calibration

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: E030-001

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2

Project No: RFEB-ALSE030-cal-5453

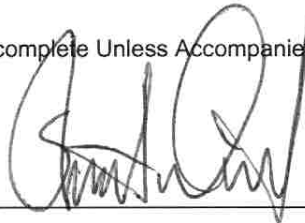
Calibrated: 12^h July 2010

Released on: 14th July 2010

APREL Laboratories Certified Under Laboratory 48 of SCC

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

Released By: _____



NCL CALIBRATION LABORATORIES

51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E030-001.

References

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

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

SSI-TP-011 Tissue Calibration Procedure

IEC 62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1 & 2: 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)"

IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz


Conditions

Probe E030-001 is a re-calibration.

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

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

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



Stuart Nicol



Jesse Hones

Calibration Results Summary

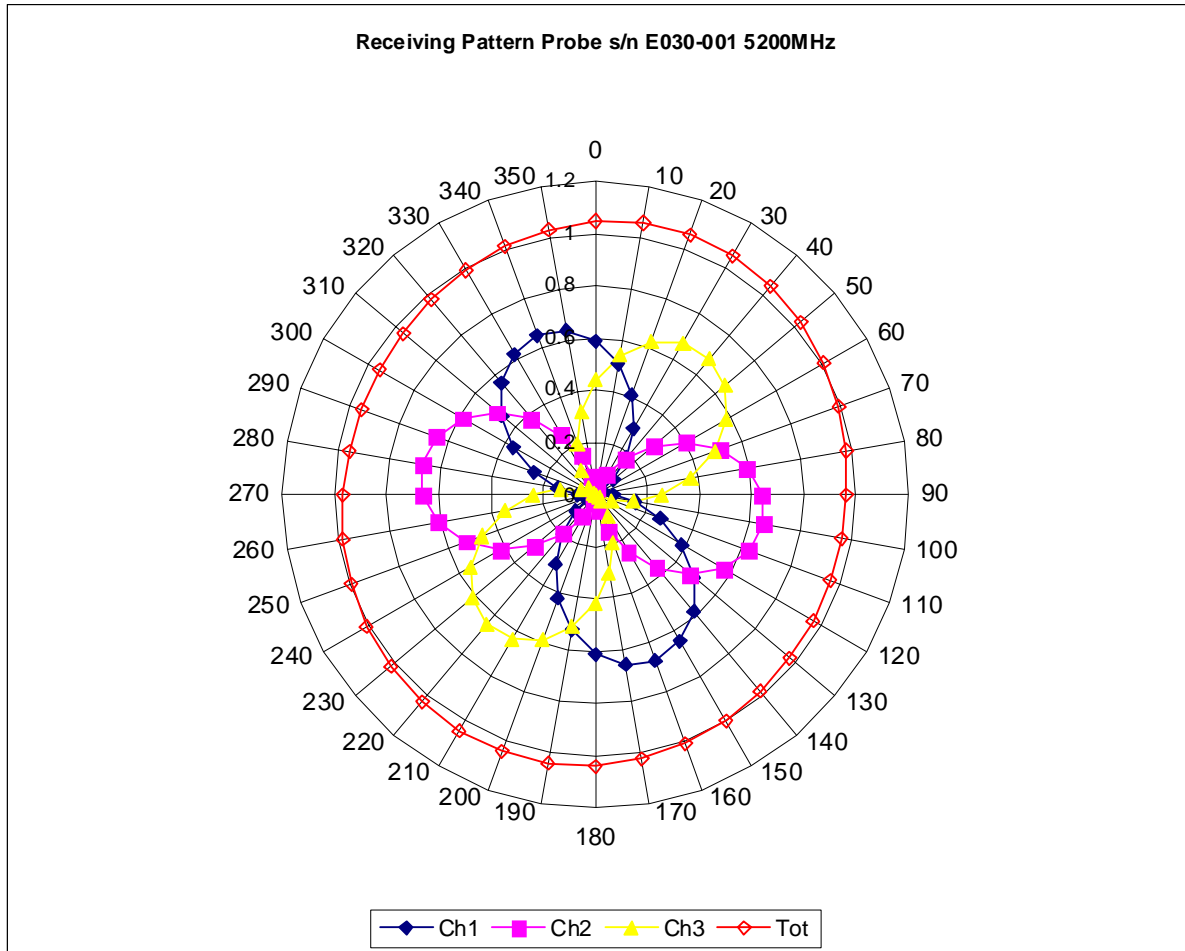
Probe Type:	E-Field Probe E-030
Serial Number:	E030-001
Frequency:	5200 MHz
Sensor Offset:	1.06 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Composite*
Tip Diameter:	<2.5 mm
Tip Length:	55 mm
Total Length:	289 mm

*Resistive to recommended tissue recipes per IEEE-1528

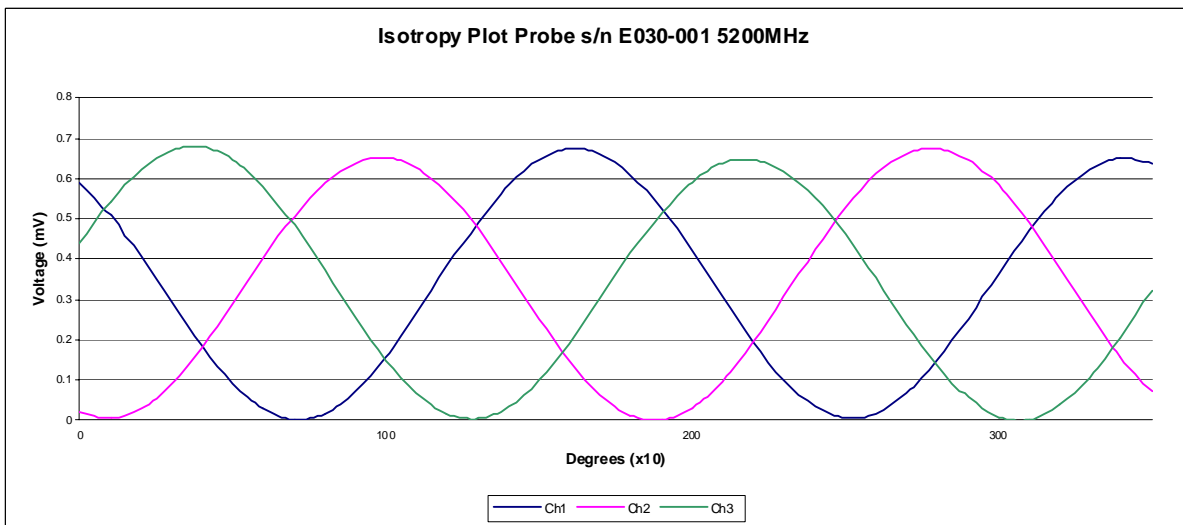
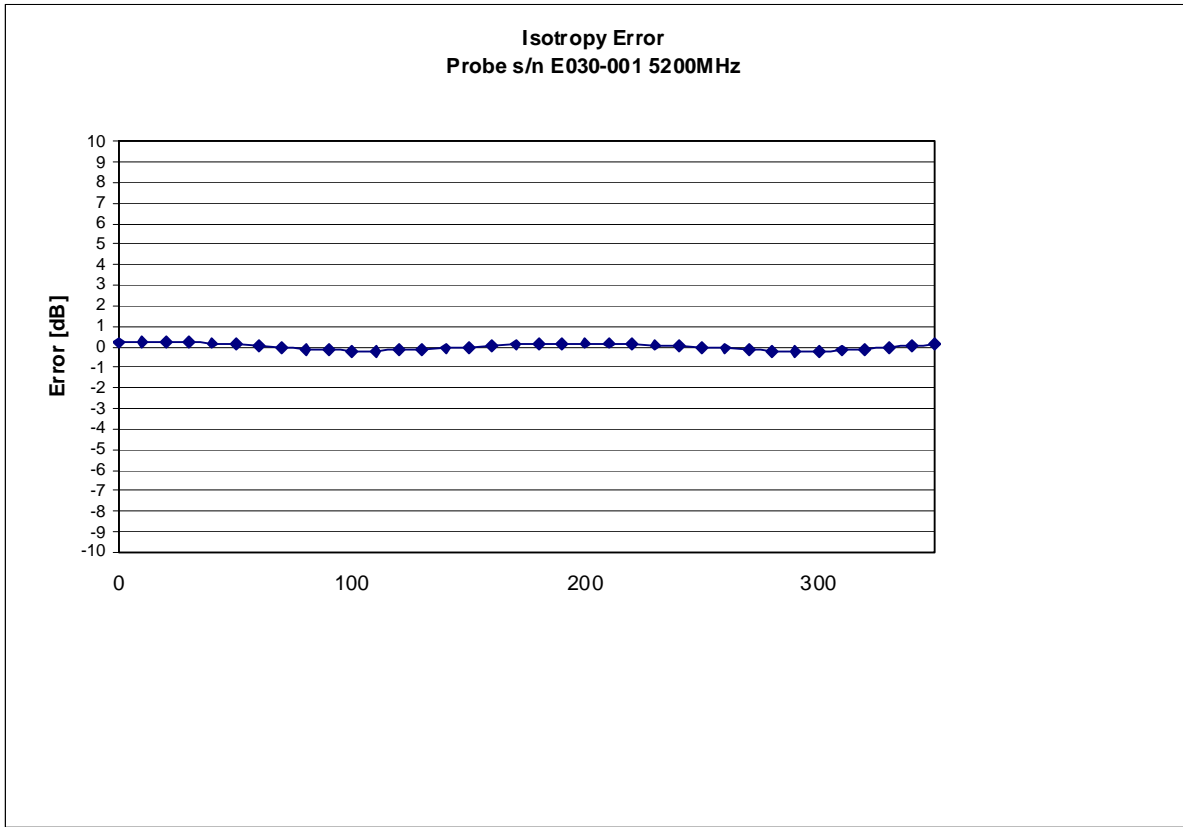
Sensitivity in Air

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

Receiving Pattern 5200 MHz (Air)



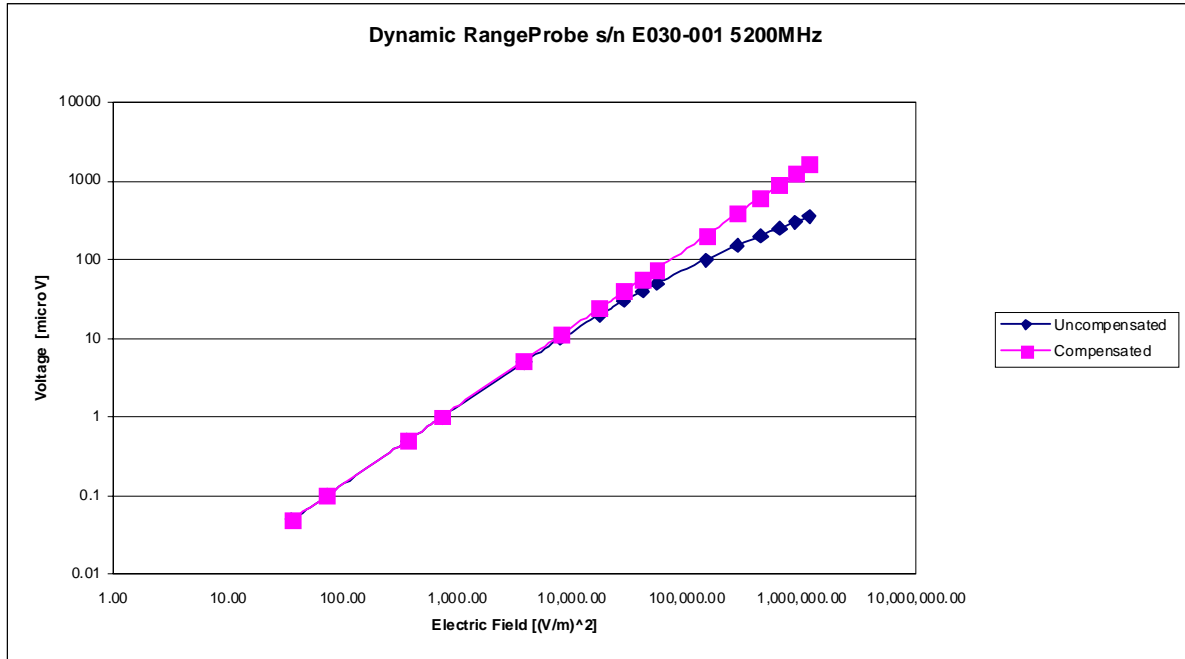
Isotropy Error 5200 MHz (Air)



Isotropicity Tissue:

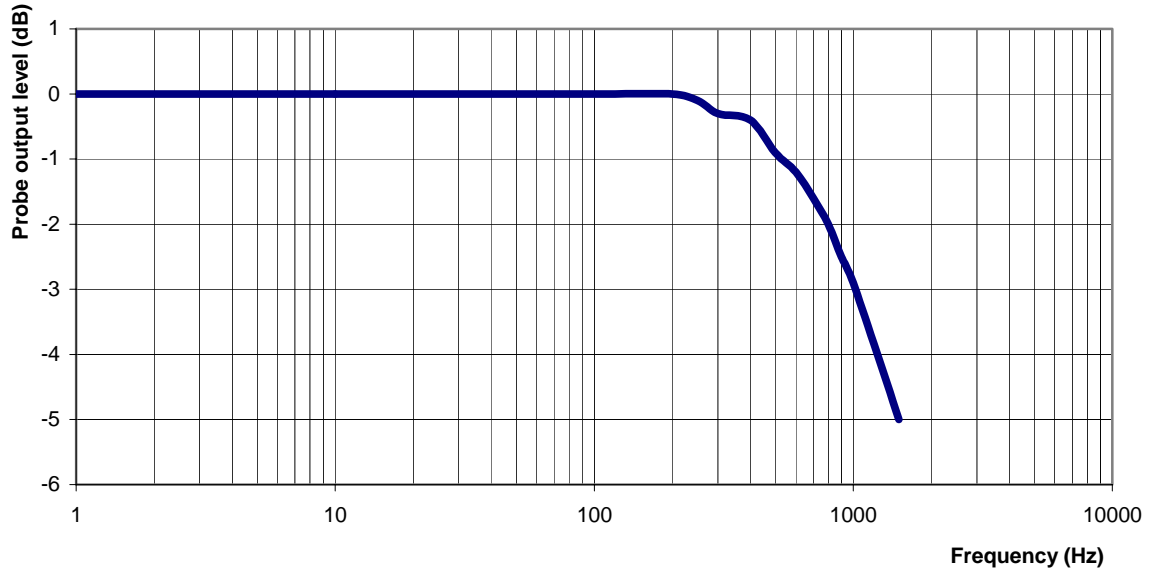
0.10 dB

Dynamic Range



Video Bandwidth

Probe Frequency Characteristics



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

Conversion Factor Uncertainty Assessment

Sensitivity in Body Tissue Measured

Frequency: 5200 MHz

Epsilon: 47.96 **Sigma:** 5.15 S/m

ConvF

Channel X: 4.4 7%(K=2)

Channel Y: 4.4 7%(K=2)

Channel Z: 4.4 7%(K=2)

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

Boundary Effect:

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

Test Equipment

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

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1136

Client.: RFEL

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 5800 MHz

BODY Calibration

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: E030-001

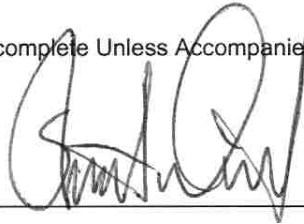
Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2

Project No: RFEB-ALSE030-cal-5453

Calibrated: 12th July 2010
Released on: 14^h July 2010

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

Released By: _____



NCL CALIBRATION LABORATORIES

51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161

Introduction

This Calibration Report reproduces the results of the calibration performed in line with the SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure. The results contained within this report are for APREL E-Field Probe E030-001.

References

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

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

SSI-TP-011 Tissue Calibration Procedure

IEC 62209 "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 1 & 2: 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)"

IEEE 1309 Draft Standard for Calibration of Electromagnetic Field Sensors and Probes, Excluding Antennas, from 9kHz to 40GHz

Conditions

Probe E030-001 was a new probe.

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

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

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



Stuart Nicol



Jesse Hones

Calibration Results Summary

Probe Type:	E-Field Probe E-030
Serial Number:	E030-001
Frequency:	5800 MHz
Sensor Offset:	1.06 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Composite*
Tip Diameter:	<2.5 mm
Tip Length:	55 mm
Total Length:	289 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

Sensitivity in Body Tissue Measured

Frequency: 5800 MHz

Epsilon: 46.28 **Sigma:** 6.22 S/m

ConvF:

Channel X: 4.2

Channel Y: 4.2

Channel Z: 4.2

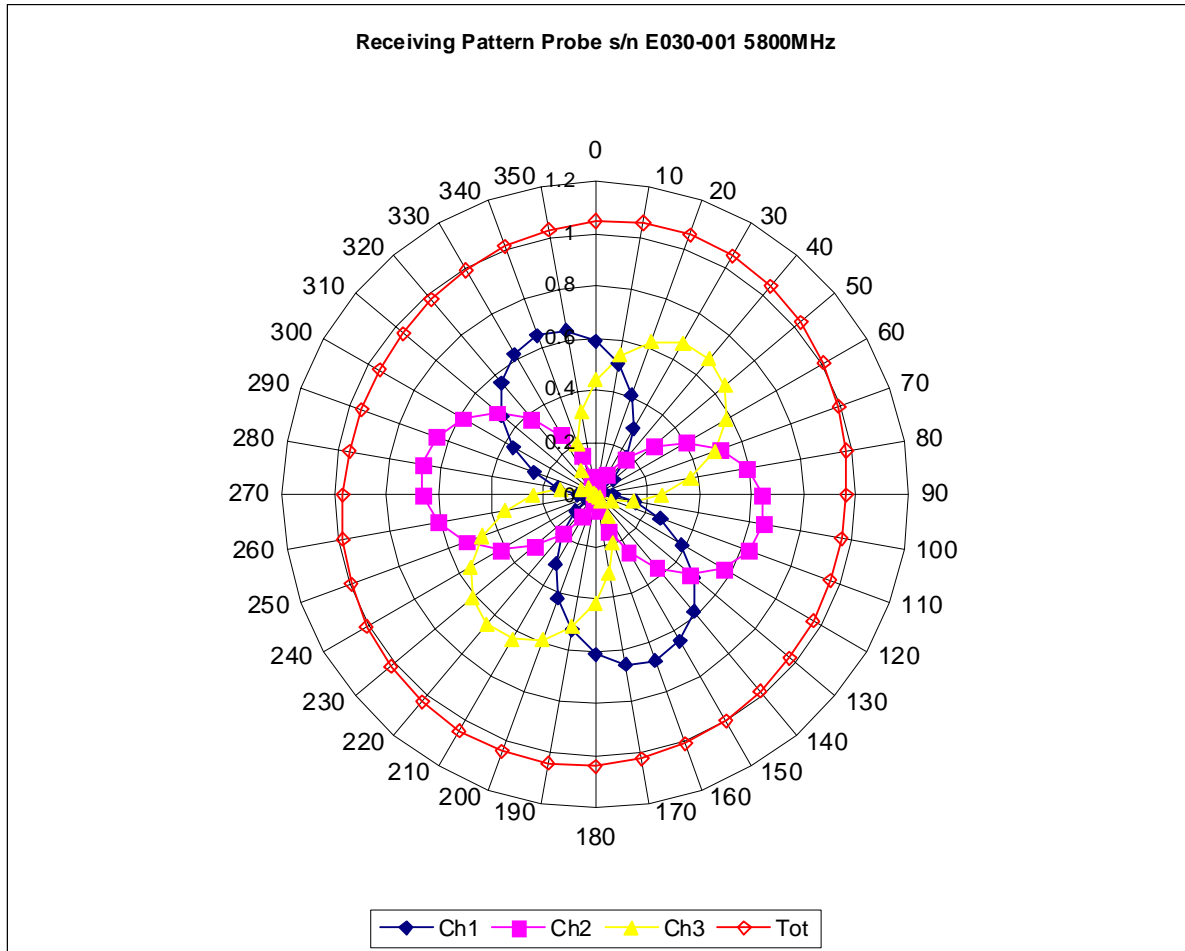
Boundary Effect:

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.

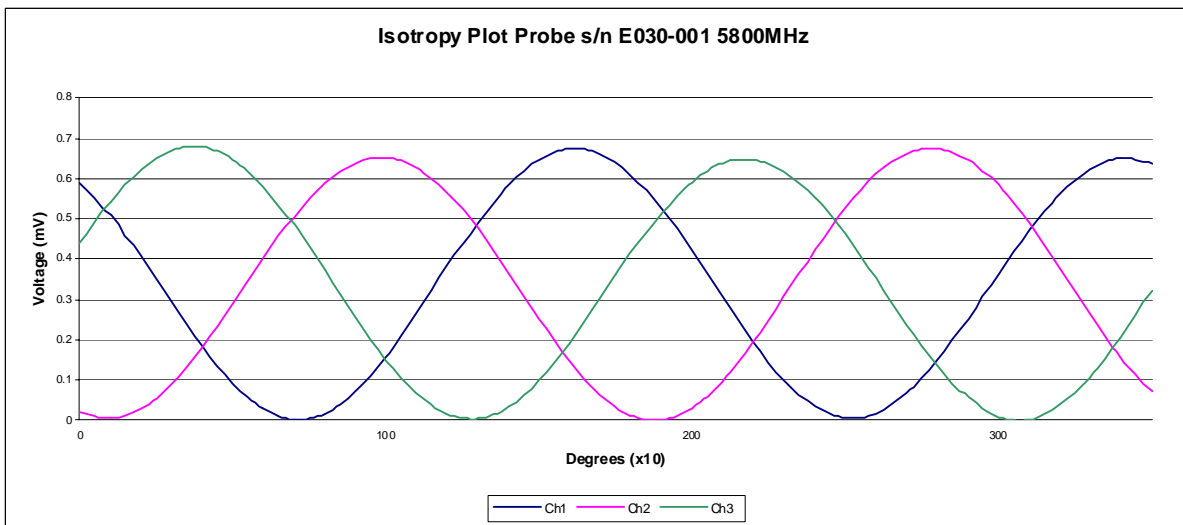
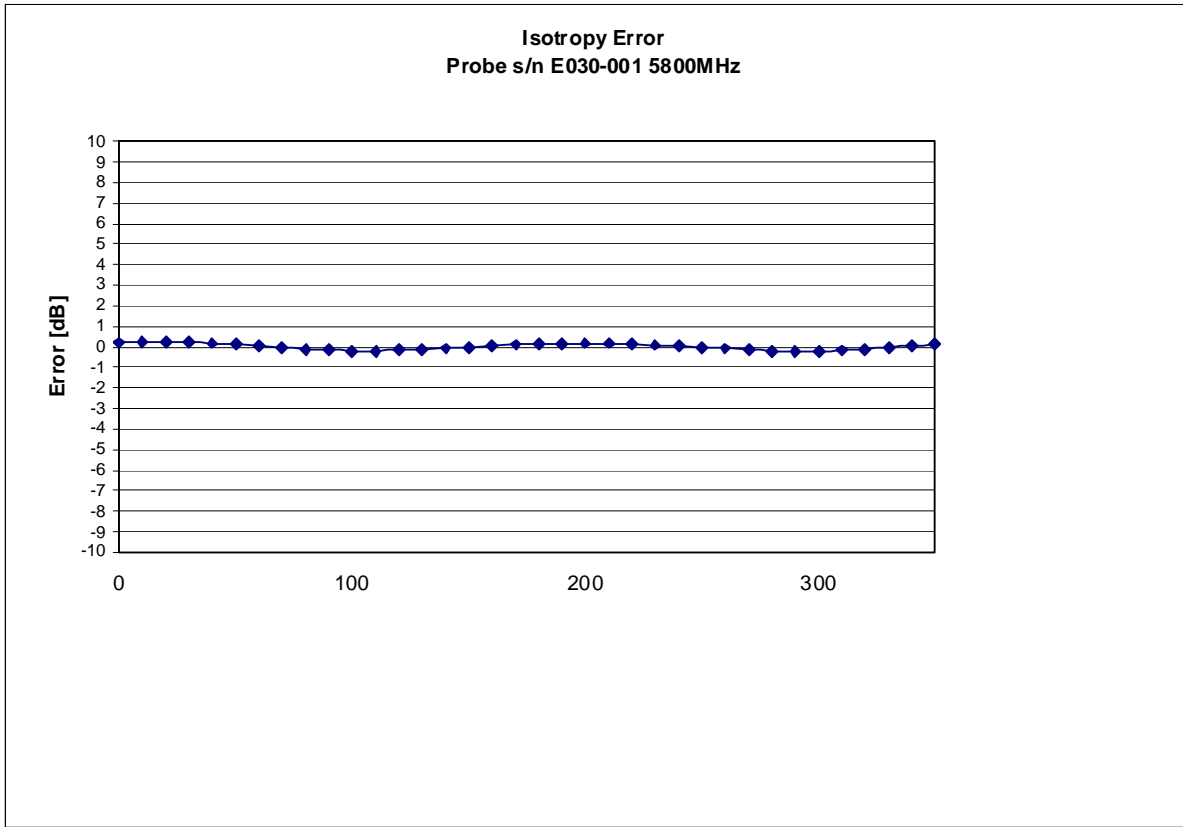
Spatial Resolution:

The measured probe tip diameter is 2.5mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 5800 MHz (Air)



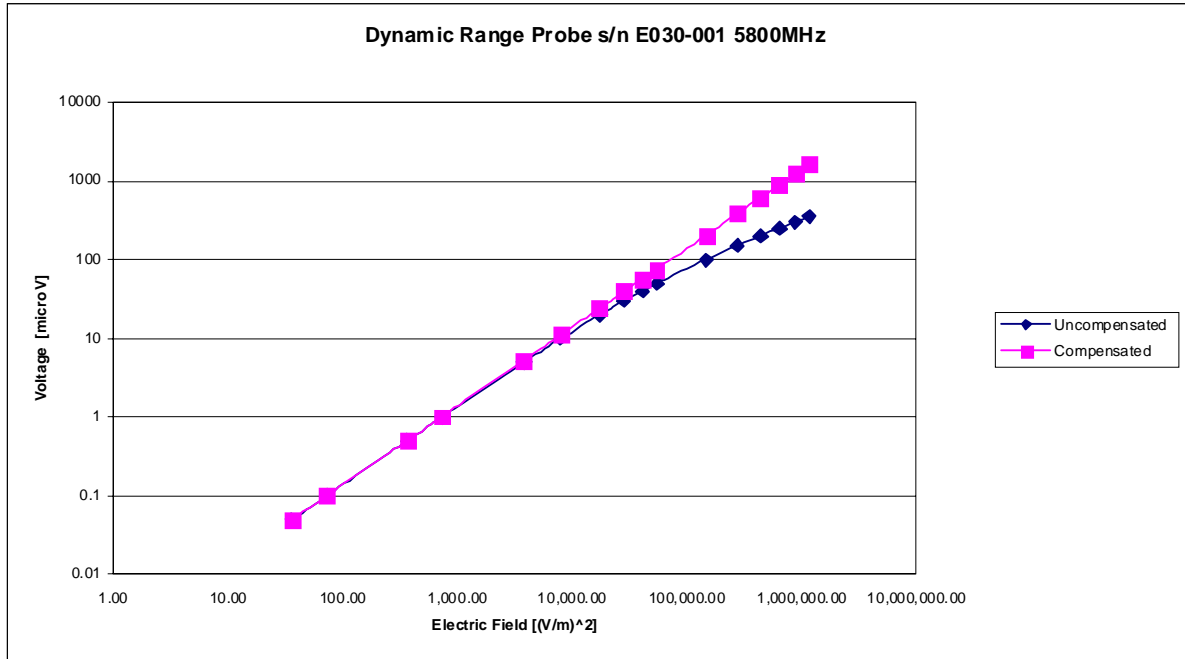
Isotropy Error 5800 MHz (Air)



Isotropicity Tissue:

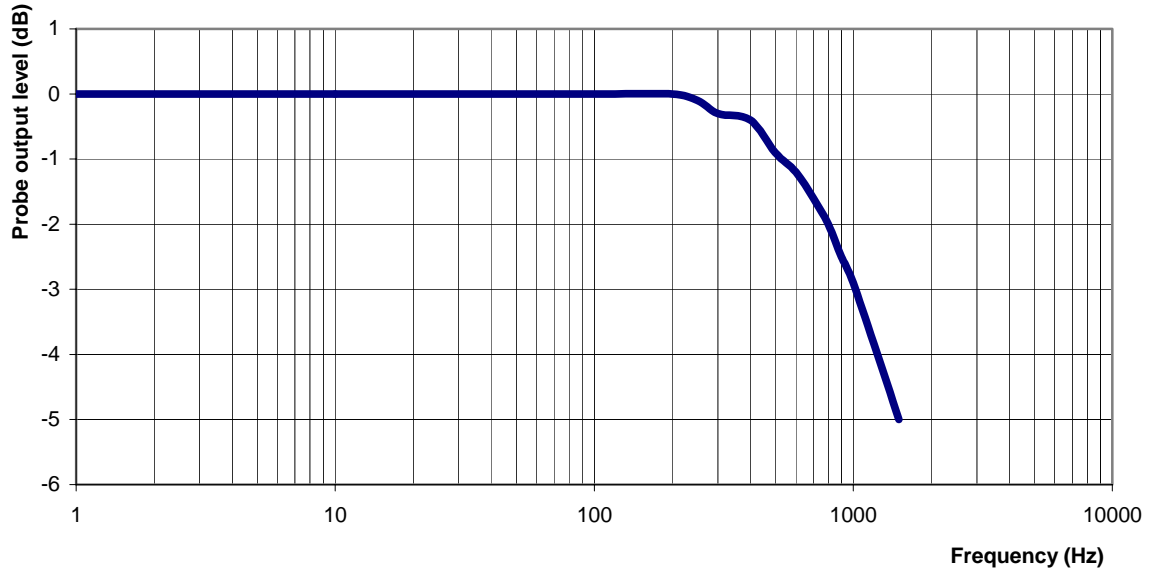
0.10 dB

Dynamic Range



Video Bandwidth

Probe Frequency Characteristics



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

Conversion Factor Uncertainty Assessment

Sensitivity in Body Tissue Measured

Frequency: 5800 MHz

Epsilon: 46.28

Sigma: 6.22 S/m

ConvF

Channel X: 4.2 7%(K=2)

Channel Y: 4.2 7%(K=2)

Channel Z: 4.2 7%(K=2)

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

Boundary Effect:

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

Test Equipment

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

Appendix E – Dipole Calibration Data Sheets

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1182

Project Number: RFEB-5552

CERTIFICATE OF CALIBRATION

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

Validation Dipole

Manufacturer: APREL Laboratories

Part number: ALS-D-2450-S-2

Frequency: 2450 MHz

Serial No: RFE-278

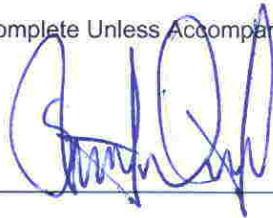
Customer: RFEL

Body Calibration

Calibrated: 18th November 2010
Released on: 19th November 2010

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

Released By: _____



NCL CALIBRATION LABORATORIES

51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4162

NCL Calibration Laboratories

Division of APREL Laboratories.

Conditions

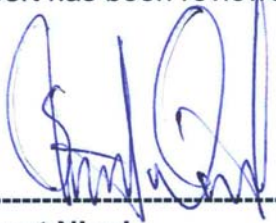
Dipole RFE-278 was a new calibration.

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

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

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

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



Stuart Nicol



C. Teodorian

Calibration Results Summary

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

Mechanical Dimensions

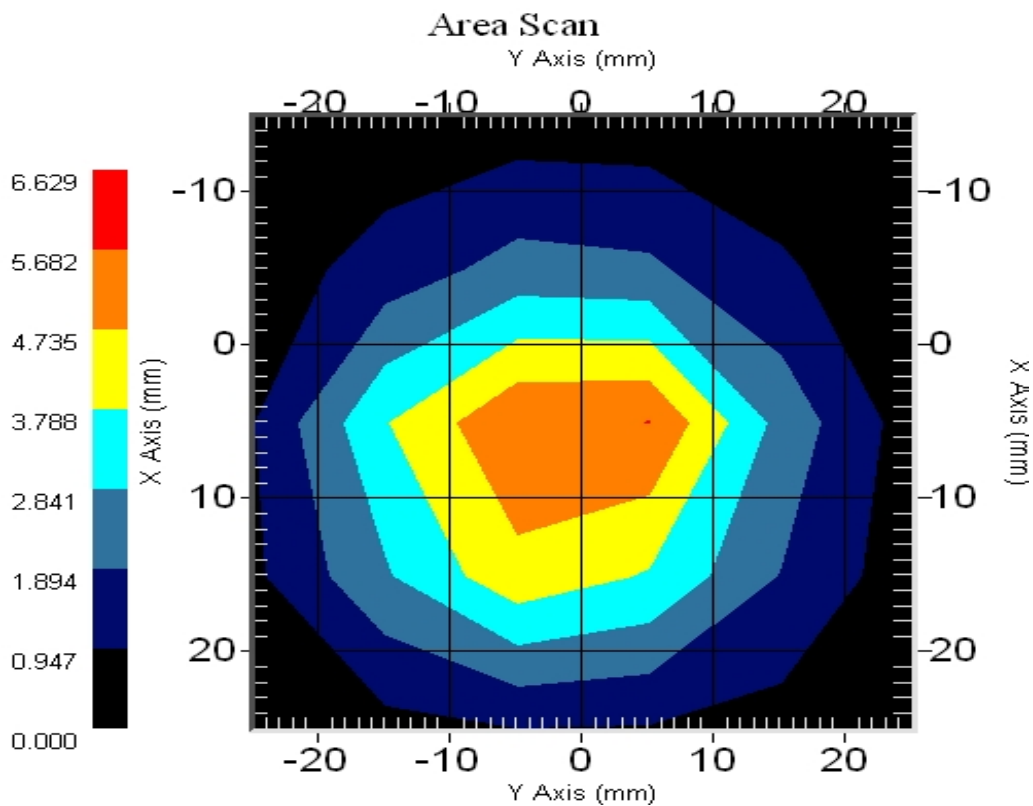
Length: 51.5 mm
Height: 30.4 mm

Electrical Specification

SWR: 1.249 U
Return Loss: -19.170 dB
Impedance: 42.223 Ω

System Validation Results @ 100mW

Frequency	1 Gram	10 Gram	Peak
2450 MHz	5.15	2.31	10.01



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 RFE-278. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 226.

References

SSI-TP-018-ALSAS Dipole Calibration Procedure

SSI-TP-016 Tissue Calibration Procedure

IEEE 1528 "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques"

Conditions

Dipole RFE-278 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 Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
51.5 mm	30.4 mm	52.1 mm	31.0 mm

Tissue Validation

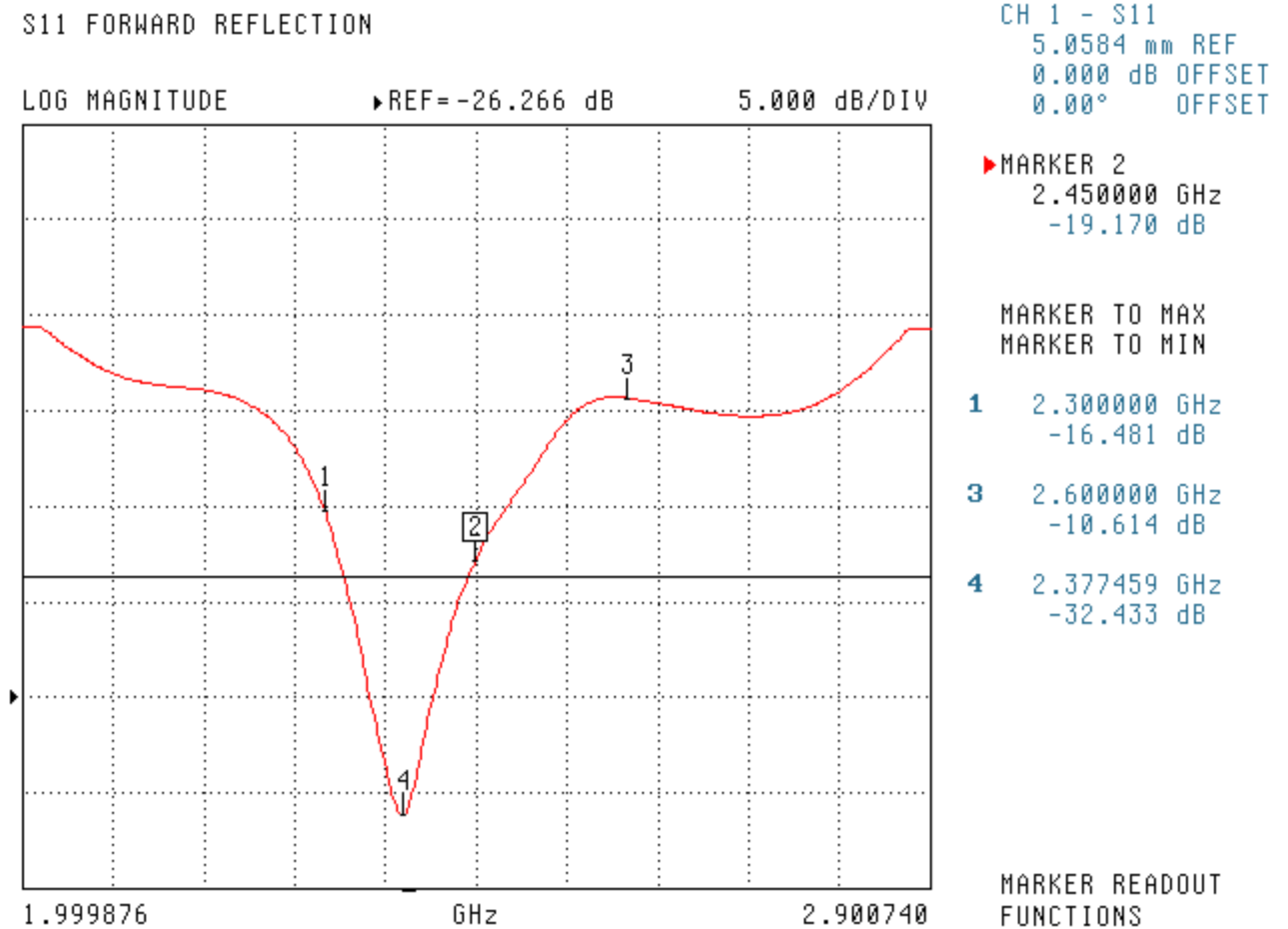
Body Tissue 2450 MHz	Measured
Dielectric constant, ϵ_r	52.0
Conductivity, σ [S/m]	1.92

Electrical Calibration

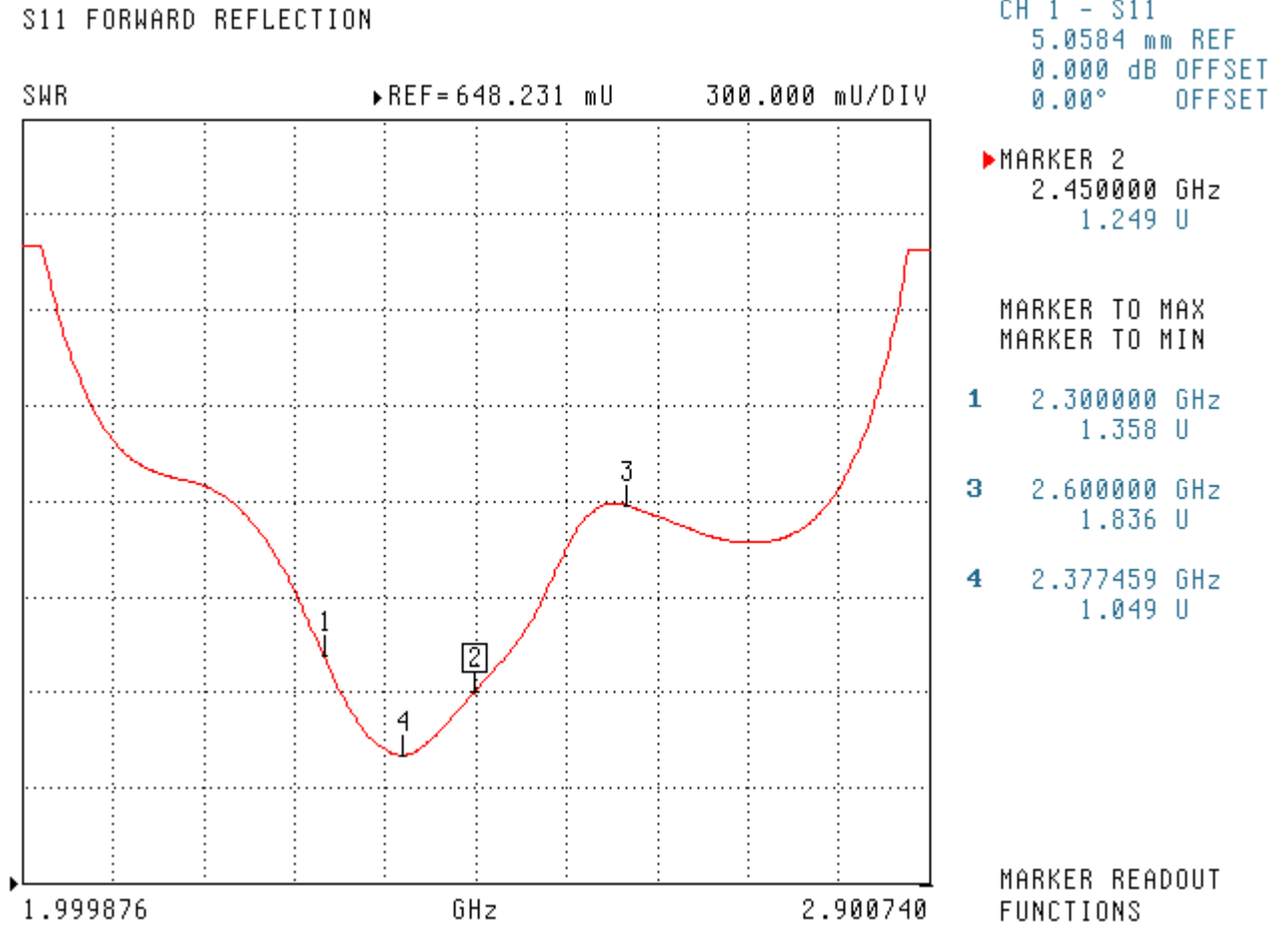
Test	Result
S11 R/L	-19.170 dB
SWR	1.249 U
Impedance	42.223 Ω

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

S11 Parameter Return Loss

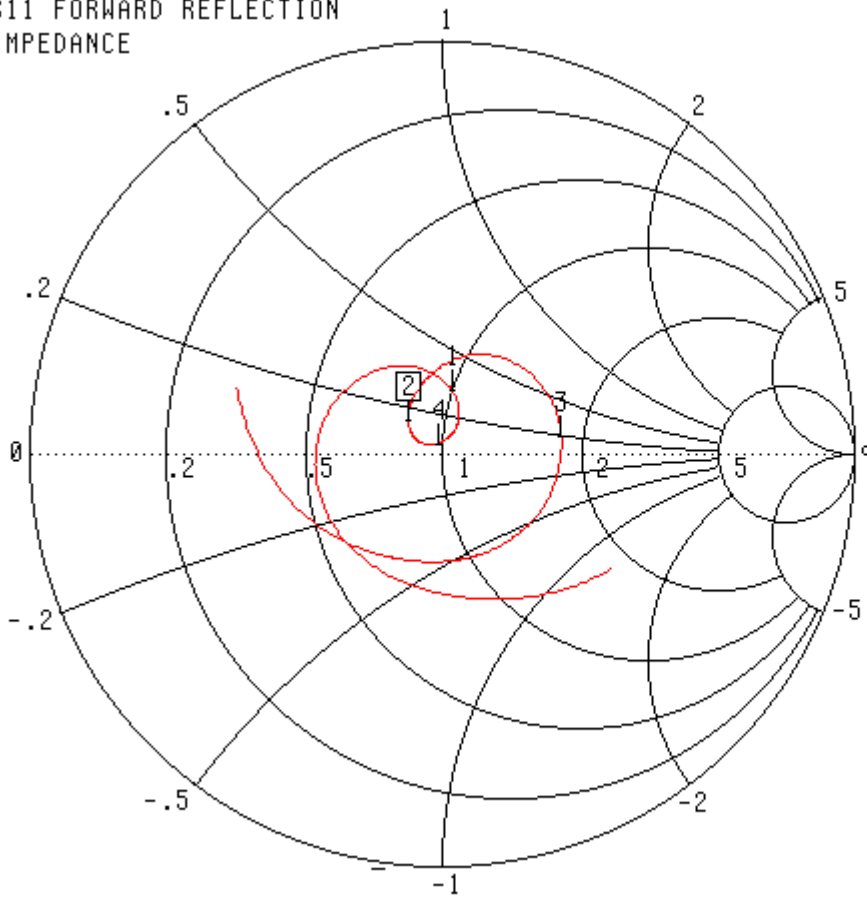


SWR



Smith Chart Dipole Impedance

S11 FORWARD REFLECTION
IMPEDANCE



CH 1 - S11
5.0584 mm REF
0.000 dB OFFSET
0.00° OFFSET

▶ MARKER 2
2.450000 GHz
42.223 Ω
6.687 jΩ

MARKER TO MAX
MARKER TO MIN

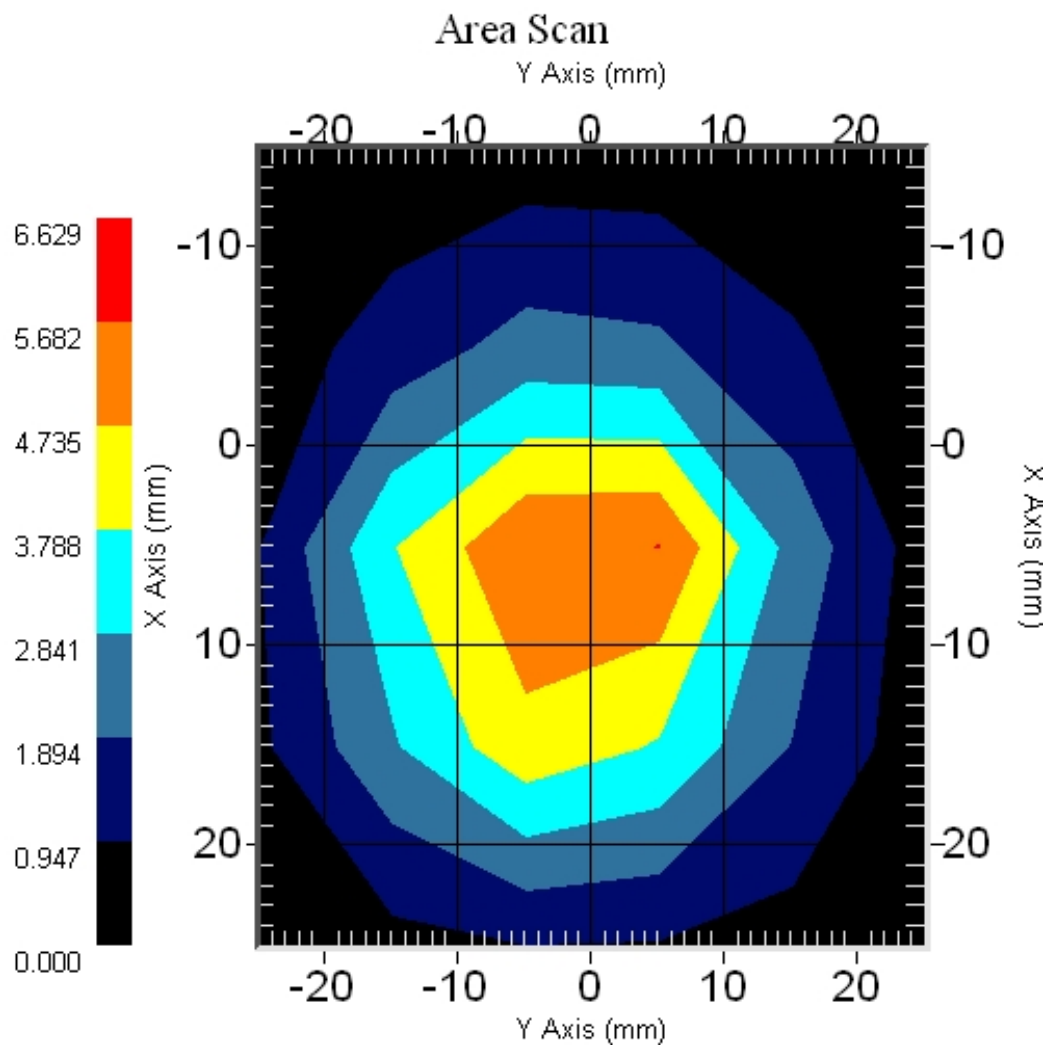
- 1 2.300000 GHz
50.520 Ω
15.426 jΩ
- 3 2.600000 GHz
90.912 Ω
7.723 jΩ
- 4 2.377459 GHz
49.380 Ω
2.028 jΩ

MARKER READOUT
FUNCTIONS

System Validation Results Using the Electrically Calibrated Dipole

Results @ 100mW

Body Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
2450 MHz	5.15	2.31	10.01



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 2010.

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1191
Project Number: RFEB-5556

CERTIFICATE OF CALIBRATION

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

Validation Dipole

Manufacturer: APREL Laboratories

Part number: ALS-D-BB-S-2

Frequency: 5200-5800 MHz

Serial No: 235-00801

Customer: RFEL

Calibrated: 16th December 2010
Released on: 9th February 2011

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

Released By: _____

NCL CALIBRATION LABORATORIES

51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4162

NCL Calibration Laboratories

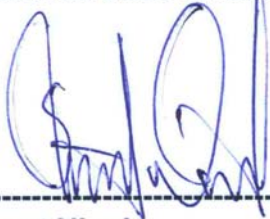
Division of APREL Laboratories.

Conditions

Dipole 235-00801 was new and taken from stock prior to calibration.

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

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



Stuart Nicol



C. Teodorian

Calibration Results Summary

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

Mechanical Dimensions

Length: 23 mm
Height: 21 mm

Electrical Specification 5200MHz

SWR: 1.013 U
Return Loss: -44.267 dB
Impedance: 49.892 Ω

Electrical Specification 5600MHz

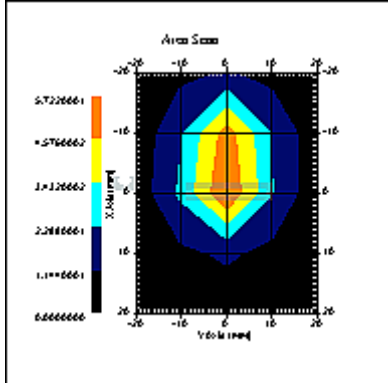
SWR: 1.006 U
Return Loss: -50.321 dB
Impedance: 50.247 Ω

Electrical Specification 5800MHz

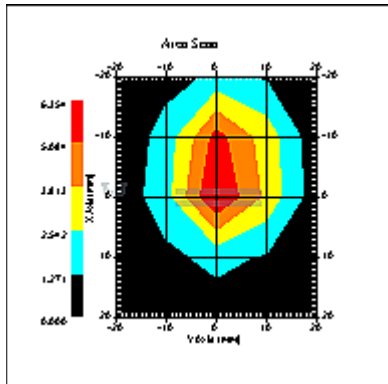
SWR: 1.021 U
Return Loss: -39.852 dB
Impedance: 49.261 Ω

System Validation Results

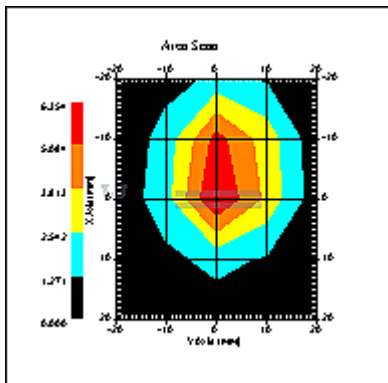
Frequency	1 Gram	10 Gram	Peak
5200 MHz	59.81	19.01	-
5600 MHz	63.10	20.60	-
5800 MHz	61.36	19.73	-



5200MHz



5600MHz



5800MHz

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 235-00801. 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

Dipole 235-00801 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 Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
23 mm	21 mm	23 mm	21 mm

Tissue Validation

Body Tissue 5200 MHz	Measured
Dielectric constant, ϵ_r	48.40
Conductivity, σ [S/m]	5.12

Body Tissue 5600 MHz	Measured
Dielectric constant, ϵ_r	47.31
Conductivity, σ [S/m]	5.80

Body Tissue 5800 MHz	Measured
Dielectric constant, ϵ_r	46.72
Conductivity, σ [S/m]	6.18

Electrical Calibration

Electrical Specification 5200MHz

SWR: 1.013 U
Return Loss: -44.267 dB
Impedance: 49.892 Ω

Electrical Specification 5600MHz

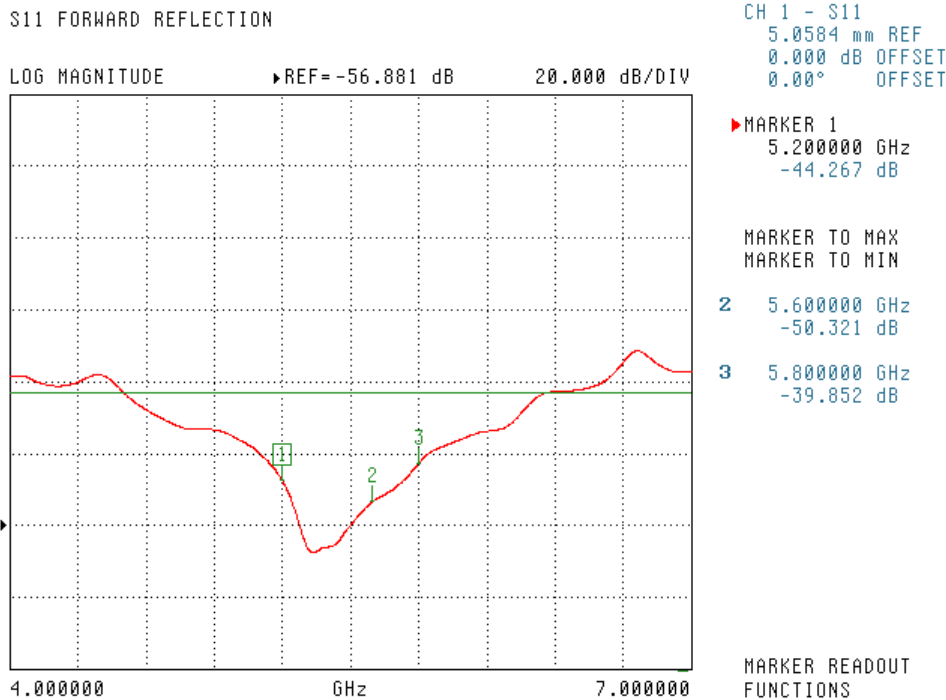
SWR: 1.006 U
Return Loss: -50.321 dB
Impedance: 50.247 Ω

Electrical Specification 5800MHz

SWR: 1.021 U
Return Loss: -39.852 dB
Impedance: 49.261 Ω

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

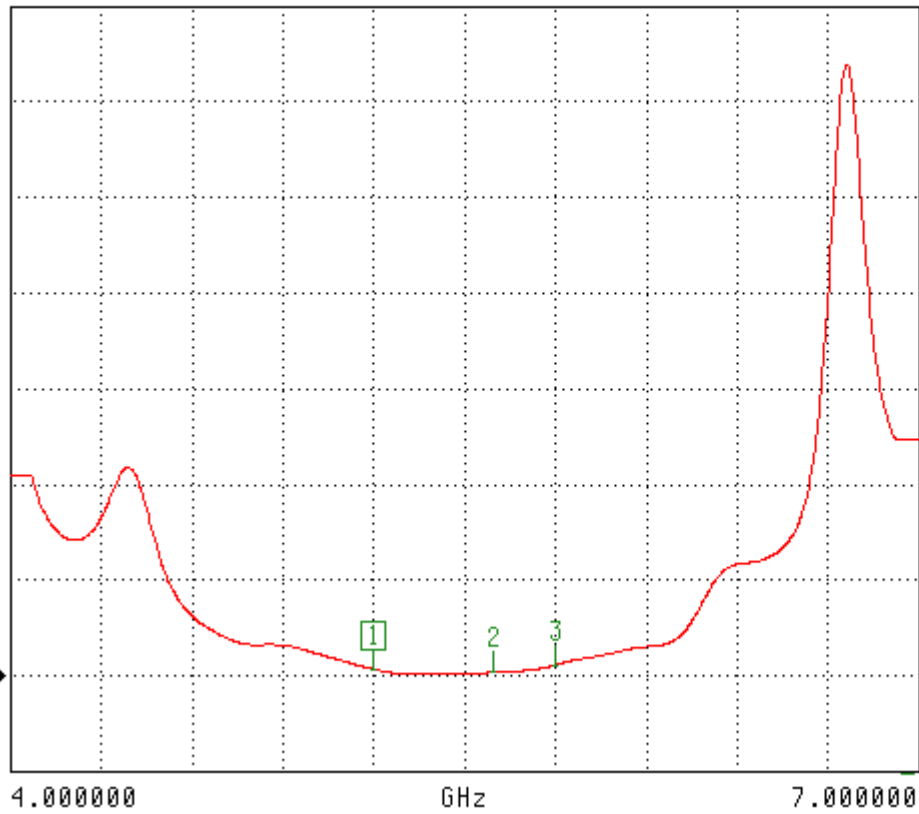
S11 Parameter Return Loss



SWR

S11 FORWARD REFLECTION

SWR REF=1.000 U 200.000 mU/DIV



CH 1 - S11
5.0584 mm REF
0.000 dB OFFSET
0.00° OFFSET

MARKER 1
5.200000 GHz
1.013 U

MARKER TO MAX
MARKER TO MIN

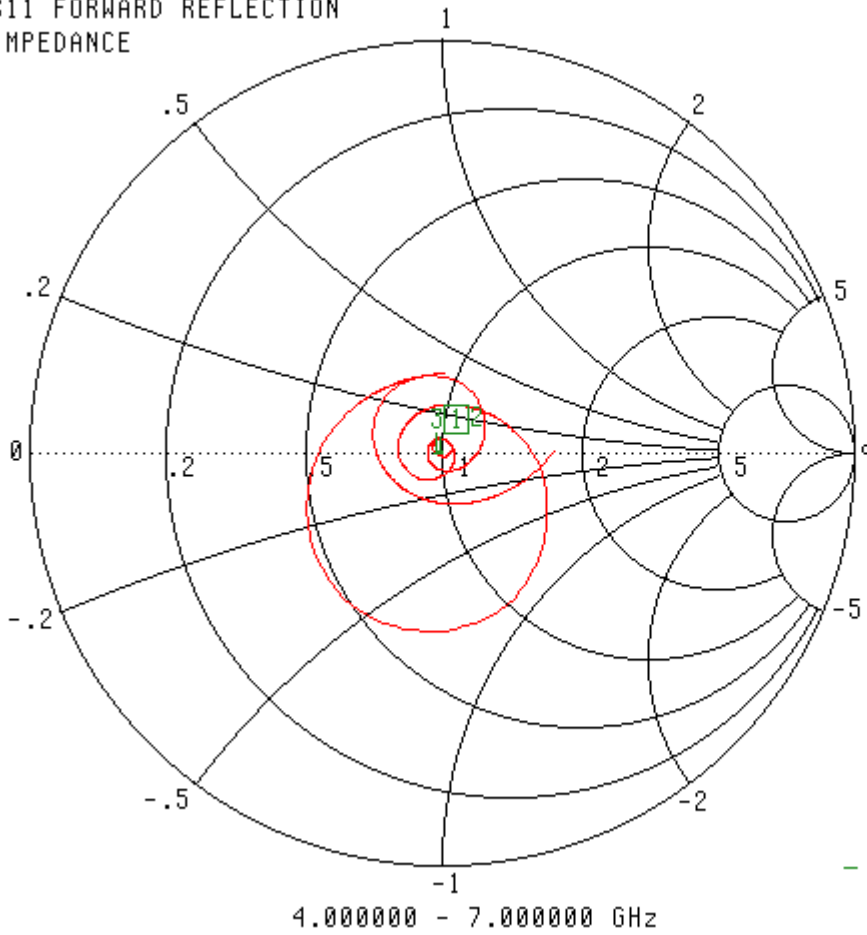
2 5.600000 GHz
1.006 U

3 5.800000 GHz
1.021 U

MARKER READOUT
FUNCTIONS

Smith Chart Dipole Impedance

S11 FORWARD REFLECTION
IMPEDANCE



CH 1 - S11
5.0584 mm REF
0.000 dB OFFSET
0.00° OFFSET

▶ MARKER 1
5.200000 GHz
49.892 Ω
-638.836 jΩ

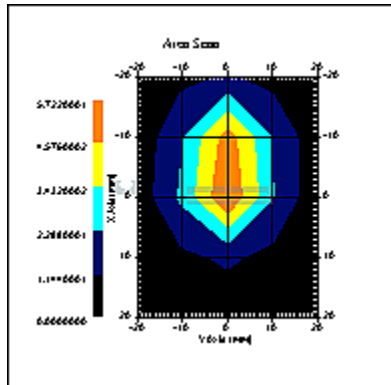
MARKER TO MAX
MARKER TO MIN

2 5.600000 GHz
50.247 Ω
205.375 jΩ
3 5.800000 GHz
49.261 Ω
-706.432 jΩ

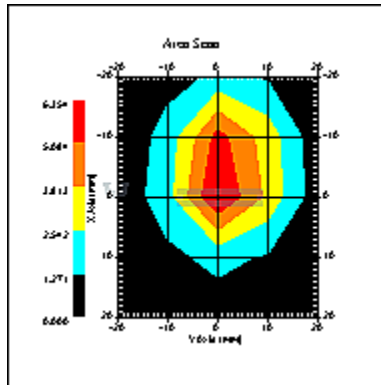
MARKER READOUT
FUNCTIONS

System Validation Results Using the Electrically Calibrated Dipole

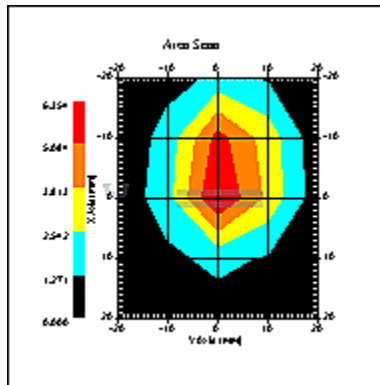
Frequency	1 Gram	10 Gram	Peak
5200 MHz	59.81	19.01	-
5600 MHz	63.10	20.60	-
5800 MHz	61.36	19.73	-



5200MHz



5600MHz



5800MHz

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 2010.

Appendix F – Phantom Calibration Data Sheets

NCL CALIBRATION LABORATORIES

Calibration File No.: RFE-273

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 National Standards.

Thickness of the UniPhantom is 2 mm \pm 10%
Pinna thickness is 6 mm \pm 10%

Resolution:	0.01 mm	Calibrated to:	0.0 mm
Stability:	OK	Accuracy:	< 0.1 mm

Calibrated By: Karen K. Feb 17/04.

NCL CALIBRATION LABORATORIES

51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6

Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4161