RF Exposure Lab

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CERTIFICATE OF COMPLIANCE
SAR EVALUATION

DRS Tactical Systems
1110 W. Hibiscus Blvd.
Melbourne, FL 32901

Dates of Test: May 27 – June 3, 2011
Test Report Number: SAR.20110602
Revision B

FCC ID:	UGLGOBI2 and UGL633ANH
IC Certificate:	7888B-GOBI2 and 7888B-633ANH
Model(s):	X10gx
WWAN Module:	Sierra Wireless Gobi2000 FCC ID: UGLGOBI2 IC: 7888B-GOBI2
WLAN Module:	Intel WiFi Link 6300 FCC ID: UGL633ANH IC: 7888B-633ANH
BT Module:	Castle Tech. BTC04R200B FCC ID: RK9-BTC04R IC: 4729A-BTC04R
Test Sample:	Engineering Unit same as Production
Serial No.:	9146M01009G103000EFM000
Equipment Type:	Wireless Tablet PC
Classification:	Portable Transmitter Next to Body
TX Frequency Range:	824.2–848.8 MHz, 1850.2–1909.8 MHz, 2402–2480 MHz, 2412–2462 MHz, 5180 – 5240 MHz, 5260 – 5320 MHz, 5500 – 5700 MHz, 5745 – 5825 MHz
Frequency Tolerance:	± 25 ppm
Maximum RF Output:	850 MHz (GSM) – 31.4 dBm, 850 MHz (CDMA) – 24.55 dBm, 850 MHz (WCDMA) – 23.32 dBm, 1900 MHz (GSM) – 29.2 dBm, 1900 MHz (CDMA) – 24.19 dBm, 1900 MHz (WCDMA) – 23.78 dBm, 2450 Mhz (b) – 19.71 dBm, 2450 MHz (g) – 18.99 dBm, 5200 MHz – 16.52 dBm, 5600 MHz – 16.67 dBm, 5800 MHz – 16.61 dBm Conducted
Signal Modulation:	GMSK, 8-PSK, CDMA, WCDMA, OFDM, DSSS
Antenna Type (Length):	Internal (Yageo WWAN/WLAN Main P/N CAN43139GWWI01201, WWAN/WLAN Aux P/N CAN43139GWWI01202, WLAN MIMO CAN43139GWWI01203
Battery:	Std. (DRS Tactical P/N 0300-15663-2400) Battery Pack
Application Type:	Certification
FCC Rule Parts:	Part 22, 24, Sec. 15.247, Sec 15.407
Industry Canada:	RSS-102, Safety Code 6

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. C95.1-1999 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 has been denied 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

ACCREDITED
Certificate # 2387.01

Table of Contents

1. Introduction

This measurement report shows compliance of the DRS Tactical Systems Model X10gx Wireless Tablet PC FCC ID: UGLGOBI2 and UGL633ANH with FCC Part 2, 1093, ET Docket 93-62 Rules for mobile and portable devices and IC Certificate: 7888B-GOBI2 and 7888B-633ANH 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 – 1999 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [2], ANSI C95.3 – 2002 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

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

where:

σ = conductivity of the tissue (S/m)

ρ = mass density of the tissue (kg/m^3)

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 pendent 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.

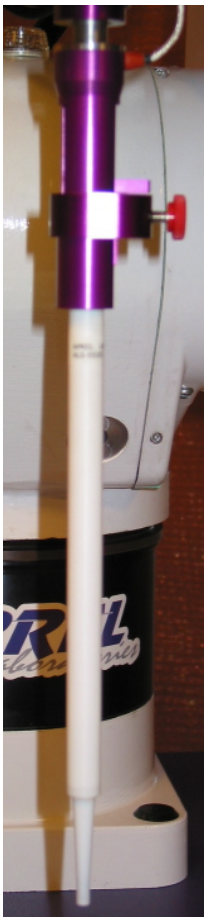
System Description

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 Aprel 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).

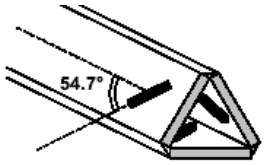
The overall uncertainty for the methodology and algorithms the ALSAS-10-U used during the SAR calculation was evaluated using the data from IEEE 1528 f3 algorithm:

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

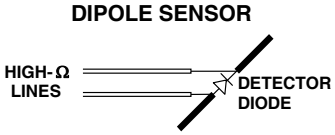
The probe used during the measurement process has been assessed to provide values for diode compression. These values are calculated during the probe calibration exercise and are used in the mathematical calculations for the assessment of SAR.

E-Field Probe ALS-E-020

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 5mm 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 5mm 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 mm^3. For devices >3 GHz and <4.5 GHz, the cube scan of 9x9x9 yields a volume of 32x32x24 mm^3. For devices ≥4.5 GHz, the cube scan of 7x7x12 yields a volume of 24x24x22 mm^3.

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

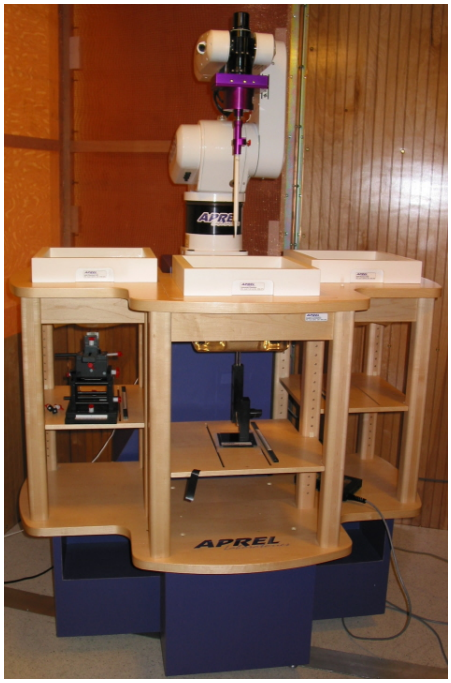
Features:	Signal Amplifier, End Effector, DAC
Software:	ALSAS 10-U Software

E-Field Probe

Model:	ALS-E-020
Serial Number:	RFE-217
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 sagittai 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]. See photos in Appendix C.

Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a glycol based chemical and saline solution. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following tables. Other head and body tissue parameters that have not been specified in P1528 are derived from the issue dielectric parameters computed from the 4-Cole-Cole equations.

Table 5.1 Typical Composition of Ingredients for Tissue

Ingredients		Simulating Tissue					
		850 MHz Muscle	1900 MHz Muscle	2450 MHz Muscle	5250 MHz Muscle	5600 MHz Muscle	5785 MHz Muscle
Mixing Percentage							
Water		52.40	69.91	73.20	58.85	59.00	59.00
Sugar		45.00	0.00	0.00	41.00	40.60	40.60
Salt		1.40	0.13	0.04	0.00	0.00	0.00
HEC		1.00	0.00	0.00	0.10	0.30	0.30
Bactericide		0.10	0.00	0.00	0.05	0.10	0.10
DGBE		0.00	29.96	26.70	0.00	0.00	0.00
Dielectric Constant	Target	55.20	53.30	52.70	48.96	48.47	48.25
Conductivity (S/m)	Target	0.97	1.52	1.95	5.35	5.77	5.96

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).

6. ANSI/IEEE C95.1 – 1999 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 8.1 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] Brain	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) %
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	√3	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	√3	√cp	√cp	4.4	4.4
Boundary Effect	1.0	rectangular	√3	1	1	0.6	0.6
Linearity	4.7	rectangular	√3	1	1	2.7	2.7
Detection Limit	1.0	rectangular	√3	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	√3	1	1	0.5	0.5
Integration Time	1.7	rectangular	√3	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	√3	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	√3	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	√3	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	√3	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	4.2	rectangular	√3	1	1	2.4	2.4
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	√3	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	√3	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.5	normal	1	0.7	0.5	0.4	0.3
Liquid Permittivity(target)	5.0	rectangular	√3	0.6	0.5	1.7	1.4
Liquid Permittivity(meas.)	1.0	normal	1	0.6	0.5	0.6	0.5
Combined Uncertainty		RSS				9.6	9.4
Combined Uncertainty (coverage factor=2)		Normal(k=2)				19.1	18.8

8. System Validation

Tissue Verification

Table 8.1 Measured Tissue Parameters

		835 MHz Body		1900 MHz Body		2450 MHz Body	
Date(s)		May 31, 2011		May 27, 2011		Jun. 1, 2011	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		55.20	55.59	53.30	52.56	52.70	52.17
Conductivity: σ		0.97	0.99	1.52	1.54	1.95	1.98
		5250 MHz Body		5600 MHz Body		5785 MHz Body	
Date(s)		Jun. 2, 2010		Jun. 17, 2010		Jun. 18, 2010	
Liquid Temperature (˚C)	20.0	Target	Measured	Target	Measured	Target	Measured
Dielectric Constant: ε		48.96	47.41	48.47	48.35	48.25	48.12
Conductivity: σ		5.35	5.42	5.77	5.92	5.96	5.99

See Appendix A for data printout.

Test System Verification

Prior to assessment, the system is verified to the ±10% of the specifications at 2450 MHz by using the system kit. Power is extrapolated 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 (%)
31-May-2011	850 MHz	9.81	9.58	- 2.34
27-May-2011	1900 MHz	40.90	40.01	- 2.18
01-Jun-2011	2450 MHz	51.50	53.24	+ 3.38
02-Jun-2011	5250 MHz	59.81	62.27	+ 4.11
03-Jun-2011	5600 MHz	63.10	62.28	- 1.30
03-Jun-2011	5785 MHz	61.36	60.08	- 2.09

See Appendix A for data plots.

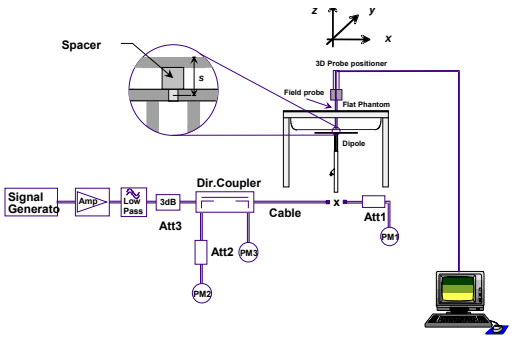


Figure 8.1 Dipole Validation Test Setup

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 placed into simulated transmit mode using the manufacturer's test codes. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. When test modes are not available or inappropriate for testing a device, 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

The device is battery operated. Each SAR measurement was taken with a fully charged battery. 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 unit was required to be disassembled to measure the conducted power. To insure that the integrity of the device was not compromised, the power measurements were conducted at the completion of all testing.

This device is capable of operating in 850/1900 GSM/GPRS/EDGE frequency bands. In GSM/GPRS mode, the device is in Class 4 for 850 MHz and Class 1 for 1900 MHz. In EDGE mode, the device is in Class E2 for 850/1900 MHz. The GSM/GPRS testing was conducted in the GPRS mode. The GPRS mode has 2-slot and 4-slot configurations. The power measured is peak power. The average power in GSM is 1 to 1½ dB lower than the average power in GPRS 2-slot which is 1½ to 2 dB higher than 4-slot . The EDGE mode is 3 dB lower than its equivalent slot configuration for GPRS. Therefore, the device was only tested in the highest power configuration which was 2-slot GPRS.

The WCDMA testing was conducted using 12.2 kbps RMC configured in Test Loop Mode 1. The HSPA testing was conducted with HS-DPCCH, E-DPCCH and E-DPDCH all enabled and a 12.2 kbps RMC. FRC was configured according to HS-DPCCH Sub-Test 1 using H-set 1 and QPSK.

The 1xRTT testing was conducted in RC3 with the device configured using TDSO/SO32 with FCH transmitting at full rate. The power control was set to "All Bits Up." Multiple code channels were not tested due to the conducted power measured was less than ¼ dB higher than with FCH only.

The Rev. 0 and Rev. A Subtype 0/1 testing was conducted with the Reverse Data Channel rate of 153.6 kbps. The Forward Traffic Channel data rate is set to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. The power control

was set to “All Bits Up.” Other rates were not tested due to the conducted power measured was less than ¼ dB higher than 153.6 kbps.

The Rev. A Subtype 2 testing was conducted with the Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots. The Forward Traffic Channel data rate is set to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. The power control was set to “All Bits Up.” Other rates were not tested due to the conducted power measured was less than ¼ dB higher than 4096 bits.

Per KDB 941225, SAR testing is required for HSPA only when the average conducted power is at least ¼ dB higher than WCDMA(Rel. 99) or when the SAR value is greater than 75% of the SAR limit. Since neither of these issues are present, SAR is required only for WCDMA(Rel. 99).

Per KDB 941225, SAR testing is required for Rev. 0. Rev. A testing is required if the average conducted power is greater than Rev. 0. 1x is required only if conducted power is ¼ dB higher than Rev. 0. Since none of these exist, Rev. 0 is the only configuration tested.

10. Conducted Power Measurement Procedures

Power measurements were performed using a base station simulator under average power.

10.1 Procedures Used to Establish RF Signal for SAR

The device was placed into a simulated call using a base station simulator in a screen room. Such test signals offer a consistent means for testing SAR and re recommended for evaluating SAR. SAR measurements were taken with a fully charged battery. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5% occurred, the tests were repeated.

10.2 SAR Measurement Conditions for CDMA2000, 1xEV-DO

10.2.1 Output Power Verification 1xRTT

Use CDMA2000 Rev 6 protocol in the call box.

1) Test for Reverse/Forward TCH RC1, Reverse/Forward TCH RC2, and RC3 Reverse FCH and demodulation of RC 3, 4 and 5.
    a. Set up a call using Fundamental Channel Test Mode 1 (RC1, SO 2) with 9600 bps data rate only.
    b. As per C.S0011 or TIA/EIA-98-F Table 4.4.5.2-1, set the test parameters.
    c. Send continuously ‘0’ power control bits to the UNDP-1.
    d. Measure the output power at UNDP-1 antenna connector as recorded on the power meter with values corrected for cables losses.
    e. Repeat step b through d for Fundamental Channel Test Mode:
        i. RC1, SO55
        ii. RC2, SO9
        iii. RC2, SO55
        iv. RC3, SO55
2) Test for RC 3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC 3, 4 and 5.
    a. Set up a call using Supplemental Channel Test Mode 3 (RC 3, SO 32) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
    b. As per C.S0011 or TIA/EIA-98-F Table 4.4.5.2-2, set the test parameters.
    c. Send alternating ‘0’ and ‘1’ power control bit to the UNDP-1
    d. Determine the active channel configuration. If the desired channel configuration is not the active channel configuration, increase Îor by 1 dB and repeat the verification. Repeat this step until the desired channel configuration becomes active.
    e. Measure the output power at the UNDP-1 antenna connector.
    f. Decrease Îor by 0.5 dB.
    g. Determine the active channel configuration. If the active channel configuration is the desired channel configuration, measure the output power at the UNDP-1 antenna connector.
    h. Repeat step f and g until the output power no longer increases or the desired channel configuration is no longer active. Record the highest output power achieved with the desired channel configuration active.
    i. Repeat step a through h ten times and average the result.

10.2.2 Output Power Verification 1xRTT

1) Use 1xEV-DO Rel 0 protocol in the call box 8960.
   a. FTAP
      - Select Test Application Protocol to FTAP
      - Set FTAP Rate to 307.2 kbps (2 Slot, QPSK)
      - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
      - Set Îor to -60 dBm/1.23 MHz
      - Send continuously '0' power control bits
      - Measure the power at UNDP-1 antenna connector
   b. RTAP
      - Select Test Application Protocol to RTAP
      - Set RTAP Rate to 9.6 kbps
      - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
      - Set Îor to -60 dBm/1.23 MHz
      - Send continuously '0' power control bits
      - Measure the power at UNDP-1 antenna connector
      - Repeat above steps for RTAP Rate = 19.2 kbps, 38.4 kbps, 76.8 kbps and 153.6 kbps respectively
2) Use 1xEV-DO Rev A protocol in the call box 8960
   a. FETAP
      - Select Test Application Protocol to FETAP
      - Set FETAP Rate to 307.2 kbps (2 Slot, QPSK)
      - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots
      - Set Îor to -60 dBm/1.23 MHz
      - Send continuously '0' power control bits
      - Measure the power at UNDP-1 antenna connector
   b. RETAP
      - Select Test Application Protocol to RETAP
      - F-Traffic Format -> 4 (1024, 2, 128) Canonical (307.2k, QPSK) • Set R-Data Pkt Size to 128
      - Protocol Subtype Config -> Release A Physical Layer Subtype -> Subtype 2 ->PL Subtype 2 Access Channel MAC Subtype -> Default (Subtype 0)
      - Generator Info -> Termination Parameters -> Max Forward Packet Duration -> 16 Slots ->ACK R-Data After -> Subpacket 0 (All ACK)
      - Set Îor to -60 dBm/1.23 MHz
      - Send continuously '0' power control bits
      - Measure the power at UNDP-1 antenna connector
      - Repeat above steps for R-Data Pkt Size = 256, 512, 768, 1024, 1536, 2048, 3072, 4096, 6144, 8192, 12288 respectively.

10.3 SAR Measurement Conditions for WCDMA/HSDPA/HSUPA

Configure the call box 8960 to support all WCDMA tests in respect to the 3GPP 34.121 (listed in Table below). Measure the power at Ch4132, 4182 and 4233 for US cell; Ch9262, 9400 and 9538 for US PCS band.

For Rel99

- Set a Test Mode 1 loop back with a 12.2kbps Reference Measurement Channel (RMC).

- Set and send continuously Up power control commands to the UNDP-1
- Measure the power at the UNDP-1 antenna connector using the power meter with average detector.

For HSDPA Rel 6

- Establish a Test Mode 1 look back with both 1 12.2kbps RMC channel and a H-Set1 Fixed Reference Channel (FRC). With the 8820 this is accomplished by setting the signal Channel Coding to "Fixed Reference Channel" and configuring for HSET-1 QKSP.
- Set beta values and HSDPA settings for HSDPA Subtest1 according to Table below.
- Send continuously Up power control commands to the UNDP-1
- Measure the power at the UNDP-1 antenna connector using the power meter with modulated average detector.
- Repeat the measurement for the HSDPA Subtest2, 3 and 4 as given in Table below.

For HSUPA Rel 6

- Use UL RMC 12.2kbps and FRC H-Set1 QPSK, Test Mode 1 loop back. With the 8960 this is accomplished by setting the signal Channel Coding to "E-DCH Test Channel" and configuring the equipment category to Cat5_10ms.
- Set the Absolute Grant for HSUPA Subtest1 according to Table below.
- Set the UNDP power to be at least 5dB lower than the Maximum output power
- Send power control bits to give one TPC_cmd = +1 command to the UNDP. If UNDP doesn't send any E-DPCH data with decreased E-TFCI within 500ms, then repeat this process until the decreased E-TFCI is reported.
- Confirm that the E-TFCI transmitted by the UNDP is equal to the target E-TFCI in Table below. If the E-TFCI transmitted by the UNDP is not equal to the target E-TFCI, then send power control bits to give one TPC_cmd = -1 command to the UE. If UE sends any E-DPCH data with decreased E-TFCI within 500 ms, send new power control bits to give one TPC_cmd = -1 command to the UE. Then confirm that the E-TFCI transmitted by the UE is equal to the target E-TFCI in Table below.
- Measure the power using the power meter with modulated average detector.
- Repeat the measurement for the HSUPA Subtest2, 3, 4 and 5 as given in Table below.

10.4 SAR Measurement Conditions for GSM/GPRS/EDGE

Configure the 8960 box to support GMSK and 8PSK call respectively, and set one timeslot and two timeslot transmission GMSK modulation MCS4 for GSM/GPRS and 8PSK modulation MCS9 for EDGE. Measure and record power outputs for both modulations.

1xRTT Power Measurements

IS-2000	Channel	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDo Rev. 0 [dBm]	1x EvDo Rev. A [dBm]
	F-RC	FCH+SCH	FCH	RTAP	RETAP
Band	Vocoder Rate	Full	Full	Full	Full
Cellular	1013	24.51	24.52	24.55	24.53
	384	24.52	24.52	24.53	24.51
	777	24.53	24.51	24.52	24.53
PCS	25	23.59	23.56	24.10	23.59
	600	23.57	23.42	24.19	23.68
	1175	23.56	23.42	24.16	23.75

EvDo Rev 0 Power Measurements

1x EvDo Rev. 0 [dBm] - FTAP rate = 2 Slot Version 307.2 kbps						
	RTAP Rate	9.6 kbps	19.2 kbps	38.4 kbps	76.8 kbps	153.6 kbps
Band	Channel					
Cellular	1013	24.36	24.42	24.37	24.41	24.49
	384	24.42	24.48	24.51	24.47	24.55
	777	24.31	24.36	24.28	24.37	24.40
PCS	25	24.09	24.01	23.99	24.05	24.11
	600	23.90	23.85	23.89	23.87	23.93
	1175	24.02	24.03	24.06	23.98	24.07

EvDo Rev A Power Measurements

1x EvDo Rev. A Type 2 [dBm] - FETAP rate = 2 Slot Version 307.2 kbps													
	RETAP Payload	128 bits	256 bits	512 bits	768 bits	1024 bits	1536 bits	2048 bits	3072 bits	4096 bits	6144 bits	8192 bits	12288 bits
Band	Channel												
Cellular	1013	23.98	24.01	24.08	24.12	24.07	24.03	23.99	24.11	24.16	24.05	24.07	23.97
	384	24.10	24.05	24.13	24.09	24.12	24.15	24.19	24.07	24.20	24.02	24.13	24.18
	777	24.10	24.24	24.21	24.30	24.25	24.16	24.19	24.13	24.32	24.22	24.26	24.27
PCS	25	23.82	23.79	23.75	23.81	23.71	23.76	23.71	23.79	23.85	23.82	23.84	23.80
	600	23.72	23.76	23.70	23.75	23.80	23.69	23.75	23.81	23.81	23.80	23.74	23.78
	1175	23.80	23.86	23.88	23.85	23.83	23.79	23.84	23.89	23.90	23.87	23.85	23.89

Power Control was set in "All Bits Up" for all measurements.

3GPP Release Version	Mode	Cellular Band [dBm]			Sub-Test (See Table Below)	MPR
		4132	5183	4233		
99	WCDMA	23.32	23.31	23.28	-	-
6	HSDPA	23.29	23.24	23.24	1	0
6		23.27	23.28	23.26	2	0
6		22.75	22.77	22.79	3	0.5
6		22.73	22.75	22.71	4	0.5
6	HSUPA	23.30	23.29	23.22	1	0
6		21.36	21.39	21.42	2	2
6		22.41	22.46	22.49	3	1
6		21.38	21.42	21.40	4	2
6		23.28	23.25	23.22	5	0

3GPP Release Version	Mode	PCS Band [dBm]			Sub-Test (See Table Below)	MPR
		9262	9400	9538		
99	WCDMA	23.78	23.71	23.78	-	-
6	HSDPA	23.68	23.64	23.74	1	0
6		23.62	23.62	23.72	2	0
6		23.25	23.22	23.31	3	0.5
6		23.29	23.29	23.21	4	0.5
6	HSUPA	23.64	23.60	23.69	1	0
6		21.81	21.89	21.74	2	2
6		22.85	22.86	22.86	3	1
6		21.93	21.96	21.92	4	2
6		23.66	23.63	23.76	5	0

Sub-Test Setup for Release 6 HSDPA

Sub-Test	β_c	β_d	B_c/β_d	β_{hs}
1	2/15	15/15	2/15	4/15
2	12/15	15/15	15/15	24/15
3	15/15	8/15	15/8	30/15
4	15/15	4/15	15/4	30/15
Δ_{ack}, Δ_{nack} and Δ_{cqi} = 8				

Sub-Test Setup for Release 6 HSUPA

Sub-Test	β_c	β_d	B_c/β_d	β_{hs}	B_{ec}	B_{ed}	MPR	AG Index	E-TFCI
1	11/15	15/15	11/15	22/15	209/225	1039/225	0.0	20	75
2	6/15	15/15	6/15	12/15	12/15	94/75	2.0	12	67
3	15/15	9/15	15/9	30/15	30/15	47/15	1.0	15	92
4	2/15	15/15	2/15	4/15	2/15	56/15	2.0	17	71
5	15/15	15/15	15/15	30/15	24/15	134/15	0.0	21	81
Δ_{ack}, Δ_{nack} and Δ_{cqi} = 8									

		RF Conducted Power Table							
		GPRS Data							
Band	Channel	GPRS [dBm] 1 TX Slot(Peak)	GPRS [dBm] 1 TX Slot(Avg.)	GPRS [dBm] 2 TX Slot(Peak)	GPRS [dBm] 2 TX Slot(Avg.)	GPRS [dBm] 3 TX Slot(Peak)	GPRS [dBm] 3 TX Slot(Avg.)	GPRS [dBm] 4 TX Slot(Peak)	GPRS [dBm] 4 TX Slot(Avg.)
Cellular	128	31.1	22.1	29.4	23.4	27.4	23.1	26.0	23.0
	190	31.4	22.4	29.3	23.3	27.4	23.1	26.0	23.0
	251	31.2	22.2	29.4	23.4	27.3	23.0	25.8	22.8
PCS	512	28.7	19.7	26.5	20.5	24.5	20.2	23.1	20.1
	661	29.1	20.1	26.6	20.6	24.0	19.7	22.9	19.9
	810	29.2	20.2	26.8	20.8	24.1	19.8	22.9	19.9

		RF Conducted Power Table							
		EDGE Data							
Band	Channel	EDGE [dBm] 1 TX Slot(Peak)	EDGE [dBm] 1 TX Slot(Avg)	EDGE [dBm] 2 TX Slot(Peak)	EDGE [dBm] 2 TX Slot(Avg)	EDGE [dBm] 3 TX Slot(Peak)	EDGE [dBm] 3 TX Slot(Avg)	EDGE [dBm] 4 TX Slot(Peak)	EDGE [dBm] 4 TX Slot(Avg)
Cellular	128	26.3	17.3	24.7	18.7	22.6	18.3	21.3	18.3
	190	26.3	17.3	24.7	18.7	22.4	18.1	21.1	18.1
	251	26.2	17.2	24.7	18.7	22.4	18.1	21.1	18.1
PCS	512	25.5	16.5	23.5	17.5	21.6	17.3	20.4	17.4
	661	25.6	16.6	23.7	17.7	21.8	17.5	20.4	17.4
	810	25.7	16.7	23.6	17.6	21.8	17.5	20.4	17.4

802.11b						2450 GHz n HT20				
Freq	Channel	Data Rate	Antenna	Power		Freq	Channel	Data Rate	Antenna	Power
2412	1	1	Chain A	19.75		2412	1	6	Chain A	15.07
2437	6	1	Chain A	19.92		2437	6	6	Chain A	15.53
2462	11	1	Chain A	19.83		2462	11	6	Chain A	14.66
2412	1	1	Chain B	19.71		2412	1	6	Chain B	15.04
2437	6	1	Chain B	19.94		2437	6	6	Chain B	15.49
2462	11	1	Chain B	19.80		2462	11	6	Chain B	14.63
2412	1	1	Chain C	19.62		2412	1	6	Chain C	15.48
2437	6	1	Chain C	19.71		2437	6	6	Chain C	15.79
2462	11	1	Chain C	19.67		2462	11	6	Chain C	14.98
802.11g						2450 GHz n HT40				
Freq	Channel	Data Rate	Antenna	Power		Freq	Channel	Data Rate	Antenna	Power
2412	1	6	Chain A	18.96		2422	3	6	Chain A	12.32
2437	6	6	Chain A	18.88		2437	6	6	Chain A	12.36
2462	11	6	Chain A	18.84		2452	9	6	Chain A	12.79
2412	1	6	Chain B	18.91		2422	3	6	Chain B	12.27
2437	6	6	Chain B	18.84		2437	6	6	Chain B	12.38
2462	11	6	Chain B	18.81		2452	9	6	Chain B	12.75
2412	1	6	Chain C	18.99		2422	3	6	Chain C	12.67
2437	6	6	Chain C	18.95		2437	6	6	Chain C	12.56
2462	11	6	Chain C	18.87		2452	9	6	Chain C	12.32

802.11a 5.18-5.24 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.18	36	6	Chain A	16.29
5.20	40	6	Chain A	16.21
5.22	44	6	Chain A	16.17
5.24	48	6	Chain A	15.99
5.18	36	6	Chain B	16.27
5.20	40	6	Chain B	16.19
5.22	44	6	Chain B	16.13
5.24	48	6	Chain B	16.01
5.18	36	6	Chain C	16.21
5.20	40	6	Chain C	16.35
5.22	44	6	Chain C	16.46
5.24	48	6	Chain C	16.37

802.11 n20 5.18-5.24 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.18	36	6	Chain A	15.98
5.20	40	6	Chain A	16.42
5.22	44	6	Chain A	16.31
5.24	48	6	Chain A	16.25
5.18	36	6	Chain B	15.97
5.20	40	6	Chain B	16.42
5.22	44	6	Chain B	16.33
5.24	48	6	Chain B	16.02
5.18	36	6	Chain C	15.80
5.20	40	6	Chain C	15.76
5.22	44	6	Chain C	15.72
5.24	48	6	Chain C	15.83

802.11 n40 5.18-5.24 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.19	38	6	Chain A	15.83
5.21	42	6	Chain A	16.20
5.23	46	6	Chain A	16.32
5.19	38	6	Chain B	15.91
5.21	42	6	Chain B	16.25
5.23	46	6	Chain B	16.30
5.19	38	6	Chain C	16.24
5.21	42	6	Chain C	16.37
5.23	46	6	Chain C	16.32

802.11a 5.24-5.32 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.26	52	6	Chain A	16.45
5.28	56	6	Chain A	16.36
5.30	60	6	Chain A	16.27
5.32	64	6	Chain A	16.31
5.26	52	6	Chain B	16.40
5.28	56	6	Chain B	16.37
5.30	60	6	Chain B	16.22
5.32	64	6	Chain B	16.35
5.26	52	6	Chain C	16.24
5.28	56	6	Chain C	16.29
5.30	60	6	Chain C	16.31
5.32	64	6	Chain C	16.45

802.11 n20 5.24-5.32 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.26	52	6	Chain A	16.41
5.28	56	6	Chain A	16.46
5.30	60	6	Chain A	16.52
5.32	64	6	Chain A	16.49
5.26	52	6	Chain B	16.37
5.28	56	6	Chain B	16.42
5.30	60	6	Chain B	16.48
5.32	64	6	Chain B	16.43
5.26	52	6	Chain C	16.21
5.28	56	6	Chain C	16.37
5.30	60	6	Chain C	16.33
5.32	64	6	Chain C	16.46

802.11 n40 5.24-5.32 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.27	54	6	Chain A	16.01
5.29	58	6	Chain A	15.67
5.31	62	6	Chain A	13.57
5.27	54	6	Chain B	16.00
5.29	58	6	Chain B	15.72
5.31	62	6	Chain B	13.77
5.27	54	6	Chain C	16.02
5.29	58	6	Chain C	15.89
5.31	62	6	Chain C	13.72

802.11a 5.6 GHz						802.11 n20 5.6 GHz				
Freq	Channel	Data Rate	Antenna	Power		Freq	Channel	Data Rate	Antenna	Power
5.50	100	6	Chain A	16.45		5.50	100	6	Chain A	16.41
5.52	104	6	Chain A	16.42		5.52	104	6	Chain A	16.37
5.54	108	6	Chain A	16.39		5.54	108	6	Chain A	16.39
5.56	112	6	Chain A	16.42		5.56	112	6	Chain A	16.40
5.58	116	6	Chain A	16.47		5.58	116	6	Chain A	16.43
5.60	120	6	Chain A	16.45		5.60	120	6	Chain A	16.41
5.62	124	6	Chain A	16.43		5.62	124	6	Chain A	16.38
5.64	128	6	Chain A	16.37		5.64	128	6	Chain A	16.34
5.66	132	6	Chain A	16.35		5.66	132	6	Chain A	16.36
5.68	136	6	Chain A	16.31		5.68	136	6	Chain A	16.31
5.70	140	6	Chain A	16.33		5.70	140	6	Chain A	16.29
5.50	100	6	Chain B	16.40		5.50	100	6	Chain B	16.37
5.52	104	6	Chain B	16.44		5.52	104	6	Chain B	16.39
5.54	108	6	Chain B	16.36		5.54	108	6	Chain B	16.34
5.56	112	6	Chain B	16.41		5.56	112	6	Chain B	16.41
5.58	116	6	Chain B	16.45		5.58	116	6	Chain B	16.42
5.60	120	6	Chain B	16.40		5.60	120	6	Chain B	16.40
5.62	124	6	Chain B	16.44		5.62	124	6	Chain B	16.36
5.64	128	6	Chain B	16.39		5.64	128	6	Chain B	16.35
5.66	132	6	Chain B	16.36		5.66	132	6	Chain B	16.39
5.68	136	6	Chain B	16.30		5.68	136	6	Chain B	16.32
5.70	140	6	Chain B	16.23		5.70	140	6	Chain B	16.30
5.50	100	6	Chain C	16.18		5.50	100	6	Chain C	16.61
5.52	104	6	Chain C	16.35		5.52	104	6	Chain C	16.55
5.54	108	6	Chain C	16.46		5.54	108	6	Chain C	16.59
5.56	112	6	Chain C	16.49		5.56	112	6	Chain C	16.42
5.58	116	6	Chain C	16.67		5.58	116	6	Chain C	16.47
5.60	120	6	Chain C	16.61		5.60	120	6	Chain C	16.60
5.62	124	6	Chain C	16.65		5.62	124	6	Chain C	16.67
5.64	128	6	Chain C	16.54		5.64	128	6	Chain C	16.43
5.66	132	6	Chain C	16.46		5.66	132	6	Chain C	16.48
5.68	136	6	Chain C	16.30		5.68	136	6	Chain C	16.52
5.70	140	6	Chain C	16.22		5.70	140	6	Chain C	16.44

802.11 n40 5.6 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.51	102	6	Chain A	15.53
5.53	106	6	Chain A	15.93
5.55	110	6	Chain A	16.51
5.57	114	6	Chain A	16.45
5.59	122	6	Chain A	16.39
5.61	126	6	Chain A	16.41
5.63	130	6	Chain A	16.48
5.67	134	6	Chain A	16.46
5.69	138	6	Chain A	16.43
5.51	102	6	Chain B	15.50
5.53	106	6	Chain B	15.95
5.55	110	6	Chain B	16.51
5.57	114	6	Chain B	16.42
5.59	122	6	Chain B	16.41
5.61	126	6	Chain B	16.45
5.63	130	6	Chain B	16.47
5.67	134	6	Chain B	16.41
5.69	138	6	Chain B	16.46
5.51	102	6	Chain C	16.01
5.53	106	6	Chain C	16.04
5.55	110	6	Chain C	16.34
5.57	114	6	Chain C	16.47
5.59	122	6	Chain C	16.53
5.61	126	6	Chain C	16.41
5.63	130	6	Chain C	16.46
5.67	134	6	Chain C	16.39
5.69	138	6	Chain C	16.48

802.11a 5.8 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.745	149	6	Chain A	16.43
5.765	153	6	Chain A	16.39
5.785	157	6	Chain A	16.49
5.805	161	6	Chain A	16.35
5.825	165	6	Chain A	16.27
5.745	149	6	Chain B	16.41
5.765	153	6	Chain B	16.37
5.785	157	6	Chain B	16.48
5.805	161	6	Chain B	16.36
5.825	165	6	Chain B	16.29
5.745	149	6	Chain C	16.36
5.765	153	6	Chain C	16.47
5.785	157	6	Chain C	16.52
5.805	161	6	Chain C	16.43
5.825	165	6	Chain C	16.39

802.11 n20 5.8 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.745	149	6	Chain A	16.48
5.765	153	6	Chain A	16.49
5.785	157	6	Chain A	16.61
5.805	161	6	Chain A	16.52
5.825	165	6	Chain A	16.49
5.745	149	6	Chain B	16.42
5.765	153	6	Chain B	16.46
5.785	157	6	Chain B	16.60
5.805	161	6	Chain B	16.55
5.825	165	6	Chain B	16.51
5.745	149	6	Chain C	16.28
5.765	153	6	Chain C	16.34
5.785	157	6	Chain C	16.37
5.805	161	6	Chain C	16.45
5.825	165	6	Chain C	16.26

802.11 n40 5.8 GHz				
Freq	Channel	Data Rate	Antenna	Power
5.755	151	6	Chain A	16.42
5.775	155	6	Chain A	16.45
5.795	159	6	Chain A	16.49
5.815	163	6	Chain A	16.42
5.755	151	6	Chain B	16.40
5.775	155	6	Chain B	16.41
5.795	159	6	Chain B	16.47
5.815	163	6	Chain B	16.43
5.755	151	6	Chain C	16.36
5.775	155	6	Chain C	16.39
5.795	159	6	Chain C	16.42
5.815	163	6	Chain C	16.48

SAR Data Summary – 850 MHz Body

MEASUREMENT RESULTS								
Position	**Gap**	**Frequency**		**Technology**	**Modulation**	**End Power**		**SAR (W/kg)**
		MHz	**Ch.**			**(dBm)**	**Battery**	
Bottom	0 mm	824.7	1013	EvDo Rev.0	CDMA	24.49	Standard	1.054
		836.6	384	EvDo Rev.0	CDMA	24.55	Standard	1.023
		848.3	777	EvDo Rev.0	CDMA	24.46	Standard	0.952
		836.6	190	GPRS 2 slot	GMSK	29.30	Standard	0.722
		826.4	4132	WCDMA	WCDMA	23.32	Standard	0.955
		836.6	4183	WCDMA	WCDMA	23.31	Standard	0.959
		846.6	4233	WCDMA	WCDMA	23.78	Standard	0.960

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

SAR Data Summary – 1900 MHz Body

MEASUREMENT RESULTS								
Position	Gap	Frequency		Technology	Modulation	End Power		SAR (W/kg)
		MHz	Ch.			(dBm)	Battery	
Bottom	0 mm	1851.25	25	EvDo Rev.0	CDMA	24.11	Standard	1.284
		1880.00	600	EvDo Rev.0	CDMA	23.93	Standard	1.200
		1908.75	1175	EvDo Rev.0	CDMA	24.07	Standard	1.243
		1880.00	661	GPRS 2 slot	GMSK	26.60	Standard	0.388
		1852.40	9262	WCDMA	WCDMA	23.78	Standard	1.231
		1880.00	9400	WCDMA	WCDMA	23.71	Standard	1.293
		1907.60	9538	WCDMA	WCDMA	23.78	Standard	1.152

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

SAR Data Summary – 2450 MHz Body

MEASUREMENT RESULTS									
Position	**Gap**	**Antenna**	**Frequency**		**Technology**	**Modulation**	**End Power**		**SAR (W/kg)**
			MHz	**Ch.**			**(dBm)**	**Battery**	
Bottom	0 mm	Chain A	2437	6	b	OFDM	19.92	Standard	0.256
		Chain B	2437	6	b	OFDM	19.94	Standard	0.336
		Chain C	2437	6	b	OFDM	19.71	Standard	0.299

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

SAR Data Summary – 5200 MHz Body

MEASUREMENT RESULTS									
Position	**Gap**	**Antenna**	**Frequency**		**Technology**	**Modulation**	**End Power**		**SAR (W/kg)**
			MHz	**Ch.**			**(dBm)**	**Battery**	
Bottom	0 mm	Chain A	5180	36	a	OFDM	16.29	Standard	0.210
		Chain B	5180	36	a	OFDM	16.27	Standard	0.335
		Chain C	5180	36	a	OFDM	16.21	Standard	0.307
		Chain A	5300	60	a	OFDM	16.27	Standard	0.200
		Chain B	5300	60	a	OFDM	16.22	Standard	0.305
		Chain C	5300	60	a	OFDM	16.31	Standard	0.315

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

SAR Data Summary – 5600 MHz Body

MEASUREMENT RESULTS									
Position	**Gap**	**Antenna**	**Frequency**		**Technology**	**Modulation**	**End Power**		**SAR (W/kg)**
			MHz	**Ch.**			**(dBm)**	**Battery**	
Bottom	0 mm	Chain A	5620	124	a	OFDM	16.43	Standard	0.202
		Chain B	5620	124	a	OFDM	16.44	Standard	0.323
		Chain C	5620	124	a	OFDM	16.65	Standard	0.349

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

SAR Data Summary – 5800 MHz Body

MEASUREMENT RESULTS									
Position	**Gap**	**Antenna**	**Frequency**		**Technology**	**Modulation**	**End Power**		**SAR (W/kg)**
			MHz	**Ch.**			**(dBm)**	**Battery**	
Bottom	0 mm	Chain A	5785	157	a	OFDM	16.49	Standard	0.241
		Chain B	5785	157	a	OFDM	16.48	Standard	0.334
		Chain C	5785	157	a	OFDM	16.52	Standard	0.364

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

SAR Data Summary – Simultaneous Transmission Evaluation

The following table shows all the possible transmissions.

Band	WWAN	WLAN1 – Chain A	WLAN2 – Chain B	WLAN3 – Chain C	Bluetooth
850 MHz	Yes	No	No	No	No
1900 MHz	Yes	No	No	No	No
2450 MHz	No	Yes	Yes	Yes	No
5200 MHz	No	Yes	Yes	Yes	No
5600 MHz	No	Yes	Yes	Yes	No
5800 MHz	No	Yes	Yes	Yes	No
Bluetooth	No	No	No	No	Yes

The WWAN, WLAN and Bluetooth can transmit simultaneously. The Bluetooth is exempt from SAR measurements as the total power is $<60/f_{(GHz)}$. The Bluetooth antenna is greater than 15 cm from any of the other transmitting antennas. Therefore, it was excluded from simultaneous transmission testing.

The following table gives the distances between the transmitting antennas.

WLAN – Antennas	WWAN Antenna
WLAN1 – Chain A	2.2 cm
WLAN2 – Chain B	22.0 cm
WLAN3 – Chain C	9.4 cm

For WLAN2-WWAN and WLAN3-WWAN, the evaluation to exclude simultaneous testing was determined by KDB 616217 D03 section 4b. When the distance between the transmitting antennas is greater than $[5*[(SAR_1 + SAR_2)/1.6]^{1.5}$ cm, the pair does not require simultaneous transmit testing. The SAR values used are the highest SAR for each antenna. For WLAN2-WWAN, the calculation is $[5*[(1.293+0.336)/1.6]^{1.5}$ cm which equals 5.1 cm. The distance between the WLAN2 antenna and WWAN antenna is 22.0 cm which is greater than 5.1 cm. For WLAN3-WWAN, the calculation is $[5*[(1.293+0.364)/1.6]^{1.5}$ cm which equals 5.3 cm. The distance between the WLAN3 antenna and WWAN antenna is 9.4 cm which is greater than 5.3 cm. Therefore, these two pairs are excluded from simultaneous transmission testing.

For WLAN1-WWAN, the evaluation to exclude simultaneous testing was determined by KDB 616217 D03 section 4a. When the sum of the highest SAR for the two transmitting pair divided by 1.6 is less than 1, the pair is excluded from simultaneous transmission testing. The highest SAR for the WLAN1 antenna is 0.256 W/kg. The highest SAR for the WWAN is 1.293 W/kg. The calculation is [(1.293+0.256)/1.6] which equals 0.968. The value is less than 1; therefore, this antenna pair is exempt from simultaneous transmission testing.

11. Test Equipment List

Table 11.1 Equipment Specifications

Type	Calibration Due Date	Calibration Done Date	Serial Number
ThermoCRS Robot	N/A	N/A	RAF0338198
ThermoCRS Controller	N/A	N/A	RCF0338224
ThermoCRS Teach Pendant (Joystick)	N/A	N/A	STP0334405
IBM Computer, 2.66 MHz P4	N/A	N/A	8189D8U KCPR08N
Aprel E-Field Probe ALS-E020	09/22/2011	09/22/2010	RFE-215
Aprel E-Field Probe ALS-E030	07/14/2011	07/14/2010	E030-001
Aprel Dummy Probe	N/A	N/A	023
Aprel Left Phantom	N/A	N/A	RFE-267
Aprel Right Phantom	N/A	N/A	RFE-268
Aprel UniPhantom	N/A	N/A	RFE-273
Aprel Validation Dipole ALS-D-450-S-2 Head	01/12/2012	01/12/2010	RFE-362
Aprel Validation Dipole ALS-D-450-S-2 Body	01/19/2012	01/19/2011	RFE-362
Aprel Validation Dipole ALS-D-750-S-2 Head	01/14/2012	01/14/2010	177-00501
Aprel Validation Dipole ALS-D-750-S-2 Body	11/15/2011	11/15/2010	177-00501
Aprel Validation Dipole ALS-D-835-S-2 Head	01/14/2012	01/14/2010	180-00561
Aprel Validation Dipole ALS-D-835-S-2 Body	11/16/2011	11/16/2010	180-00561
Aprel Validation Dipole ALS-D-900-S-2 Head	01/12/2012	01/12/2010	RFE-275
Aprel Validation Dipole ALS-D-900-S-2 Body	11/19/2011	11/19/2010	RFE-275
Aprel Validation Dipole ALS-D-1900-S-2 Head	01/15/2012	01/15/2010	210-00713
Aprel Validation Dipole ALS-D-1900-S-2 Body	11/16/2011	11/16/2010	210-00713
Aprel Validation Dipole ALS-D-2450-S-2 Head	01/12/2012	01/12/2010	RFE-278
Aprel Validation Dipole ALS-D-2450-S-2 Body	11/18/2011	11/18/2010	RFE-278
Aprel Validation Dipole RFE-D-2600-S-2 Body	01/18/2012	01/18/2010	RFE-121
Aprel Validation Dipole RFE-D-BB-S-2 Head	01/12/2012	01/12/2010	235-00801
Aprel Validation Dipole RFE-D-BB-S-2 Body	02/09/2012	02/09/2011	235-00801
Agilent (HP) 437B Power Meter	03/30/2012	03/30/2011	3125U08837
Agilent (HP) 8481B Power Sensor	03/30/2012	03/30/2011	3318A05384
Agilent N1911A Power Meter	03/30/2012	03/30/2011	GB45100254
Agilent N1922A Power Sensor	03/30/2012	03/30/2011	MY45240464
Advantest R3261A Spectrum Analyzer	03/30/2012	03/30/2011	31720068
Agilent (HP) 8350B Signal Generator	03/31/2012	03/31/2011	2749A10226
Agilent (HP) 83525A RF Plug-In	03/31/2012	03/31/2011	2647A01172
Agilent (HP) 8753C Vector Network Analyzer	03/30/2012	03/30/2011	3135A01724
Agilent (HP) 85047A S-Parameter Test Set	03/31/2012	03/31/2011	2904A00595
Agilent (HP) 8960 Base Station Sim.	03/25/2012	03/25/2011	MY48360364
R&S CMW500 Wideband Radio Comm. Box	08/14/2011	08/14/2010	101383
Aprel Dielectric Probe Assembly	N/A	N/A	0011
Head Equivalent Matter (450 MHz)	N/A	N/A	N/A
Head Equivalent Matter (835/900 MHz)	N/A	N/A	N/A
Head Equivalent Matter (1900 MHz)	N/A	N/A	N/A
Head Equivalent Matter (2450 MHz)	N/A	N/A	N/A
Body Equivalent Matter (450 MHz)	N/A	N/A	N/A
Body Equivalent Matter (750 MHz)	N/A	N/A	N/A
Body Equivalent Matter (835/900 MHz)	N/A	N/A	N/A
Body Equivalent Matter (1900 MHz)	N/A	N/A	N/A
Body Equivalent Matter (2450 MHz)	N/A	N/A	N/A
Body Equivalent Matter (2600 MHz)	N/A	N/A	N/A
Body Equivalent Matter (5200 MHz)	N/A	N/A	N/A
Body Equivalent Matter (5800 MHz)	N/A	N/A	N/A

12. 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. [3]

13. 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 – 1999, 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 – 2002, 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, July 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), November 2005.

[7] Industry Canada, Safety Code 6, Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3kHz to 300 GHz, 1999.

Appendix A – System Validation Plots and Data

```
**********************************************************
Test Result for UIM Dielectric Parameter
Tue 31/May/2011 07:17:43
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
0.8050	55.32	0.97	55.73	0.95
0.8150	55.28	0.97	55.68	0.97
0.8250	55.24	0.97	55.64	0.98
0.8350	55.20	0.97	55.59	0.99
0.8450	55.17	0.98	55.55	1.01
0.8550	55.14	0.99	55.52	1.03
0.8650	55.11	1.01	55.48	1.05

```
**********************************************************
Test Result for UIM Dielectric Parameter
Fri 27/May/2011 06:51:38
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
1.8700	53.30	1.52	52.61	1.49
1.8800	53.30	1.52	52.60	1.51
1.8900	53.30	1.52	52.58	1.53
1.9000	53.30	1.52	52.56	1.54
1.9100	53.30	1.52	52.55	1.55
1.9200	53.30	1.52	52.53	1.57
1.9300	53.30	1.52	52.50	1.60

```
**********************************************************
Test Result for UIM Dielectric Parameter
Wed 01/Jun/2011 06:53:25
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	52.23	1.94
2.4300	52.73	1.93	52.21	1.95
2.4400	52.71	1.94	52.19	1.97
2.4500	52.70	1.95	52.17	1.98
2.4600	52.69	1.96	52.15	1.99
2.4700	52.67	1.98	52.11	2.00
2.4800	52.66	1.99	52.09	2.02

```
**********************************************************
Test Result for UIM Dielectric Parameter
Thu 02/Jun/2011 06:01:41
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	47.71	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 03/Jun/2011 06:06:51
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
5.5700	48.51	5.73	48.42	5.85
5.5800	48.50	5.74	48.40	5.87
5.5900	48.48	5.75	48.37	5.89
5.6000	48.47	5.77	48.35	5.92
5.6100	48.46	5.78	48.33	5.93
5.6200	48.44	5.79	48.31	5.95
5.6300	48.43	5.80	48.29	5.97

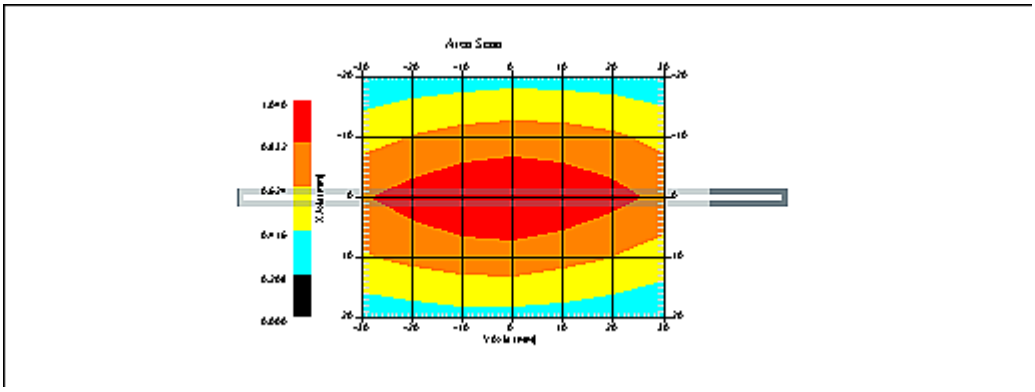
```
**********************************************************
Test Result for UIM Dielectric Parameter
Fri 03/Jun/2011 11:15:42
Freq  Frequency(GHz)
FCC_eH      FCC Bulletin 65 Supplement C ( June 2001) Limits for Head Epsilon
FCC_sH      FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
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

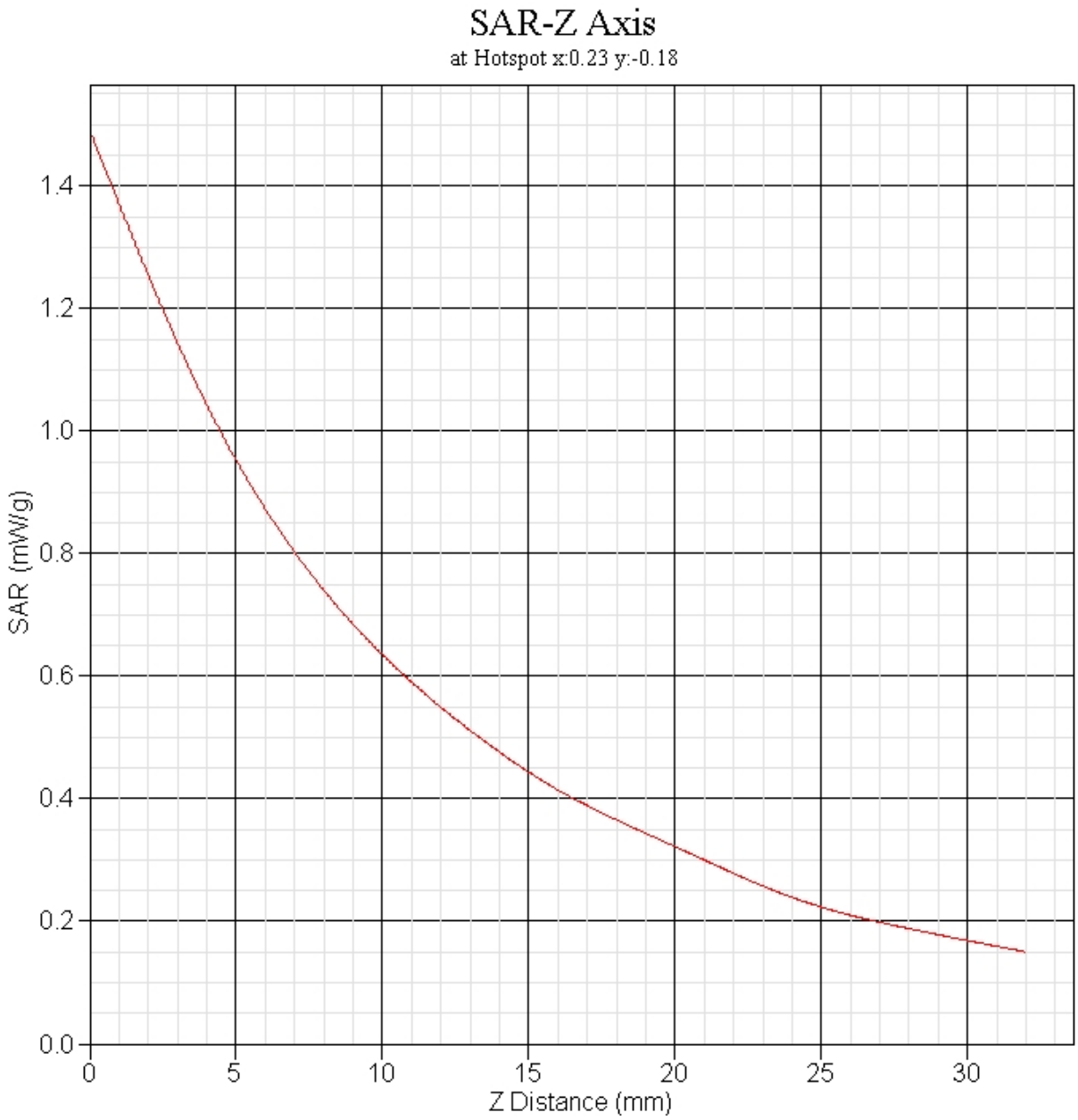
SAR Test Report

```
By Operator       : Jay
Measurement Date  : 31-May-2011
Starting Time     : 31-May-2011  07:27:43 AM
End Time          : 31-May-2011  07:42:55 AM
Scanning Time     : 912 secs

Product Data
Device Name       : Validation
Serial No.        : 835
Type              : Dipole
Model             : ALS-D-835-S-2
Frequency         : 835.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time        : 0 min(s)
Length            : 161 mm
Width             : 3.6 mm
Depth             : 89.8 mm
Antenna Type      : Internal
Orientation       : Touch
Power Drift-Start : 1.040 W/kg
Power Drift-Finish: 1.039 W/kg
Power Drift (%)   : -0.129

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.        : 835
Frequency         : 835.00 MHz
Last Calib. Date  : 31-May-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 49.00 RH%
Epsilon           : 55.59 F/m
Sigma             : 0.99 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         : 835.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 6.3
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)^2
Compression Point: 95.00 mV
Offset            : 1.56 mm
```

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 25.00 °C
Set-up Date       : 31-May-2011
Set-up Time       : 9:21:48 AM
Area Scan         : 5x7x1 : Measurement x=10mm, y=10mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Touch
Separation        : 15 mm
Channel           : Mid
```



```
1 gram SAR value    : 0.958 W/kg
10 gram SAR value   : 0.604 W/kg
Area Scan Peak SAR  : 1.038 W/kg
Zoom Scan Peak SAR  : 1.491 W/kg
```



SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 07:02:33 AM
End Time : 27-May-2011 07:15:43 AM
Scanning Time : 790 secs

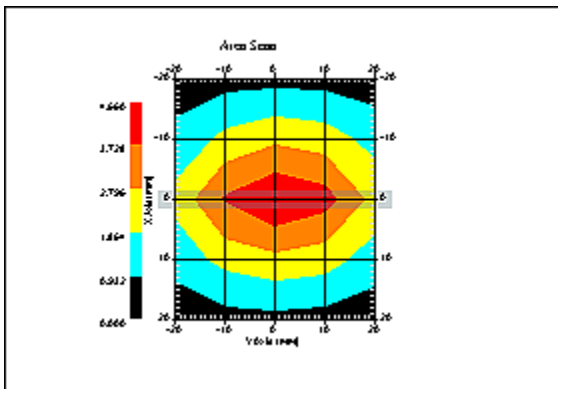
Product Data
Device Name : Validation
Serial No. : 1900
Type : Dipole
Model : ALS-D-1900-S-2
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.1 W
Drift Time : 0 min(s)
Length : 68 mm
Width : 3.6 mm
Depth : 39.5 mm
Antenna Type : Internal
Orientation : Touch
Power Drift-Start : 4.597 W/kg
Power Drift-Finish: 4.622 W/kg
Power Drift (%) : 0.544

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

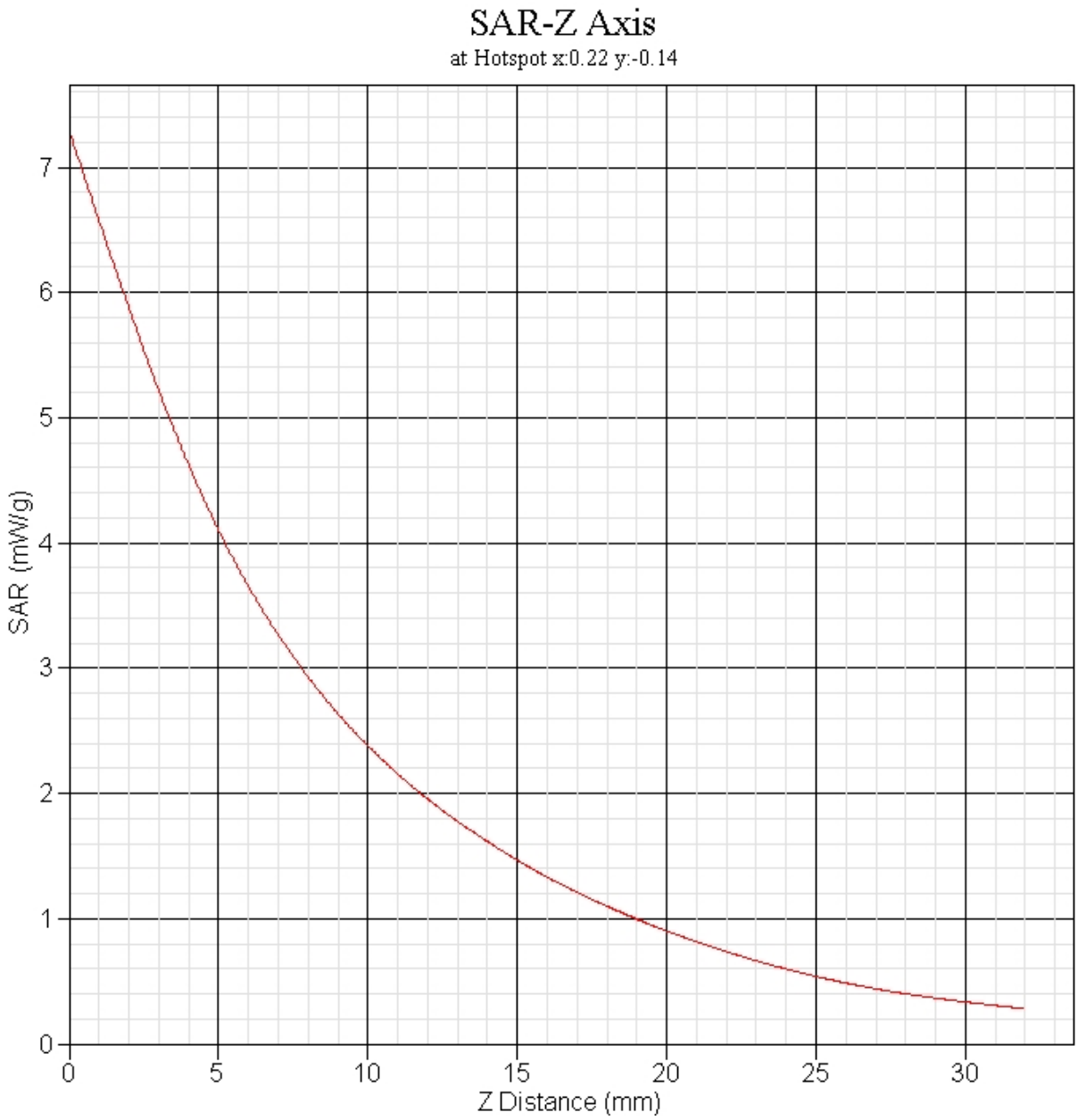
Tissue Data
Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 49.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 27-May-2011
Set-up Time       : 8:39:41 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
```



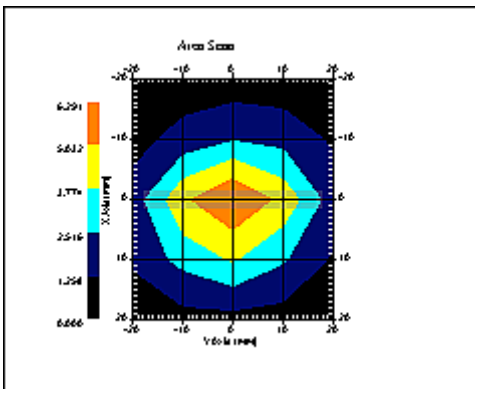
```
1 gram SAR value    : 4.001 W/kg
10 gram SAR value   : 2.082 W/kg
Area Scan Peak SAR  : 4.660 W/kg
Zoom Scan Peak SAR  : 7.296 W/kg
```



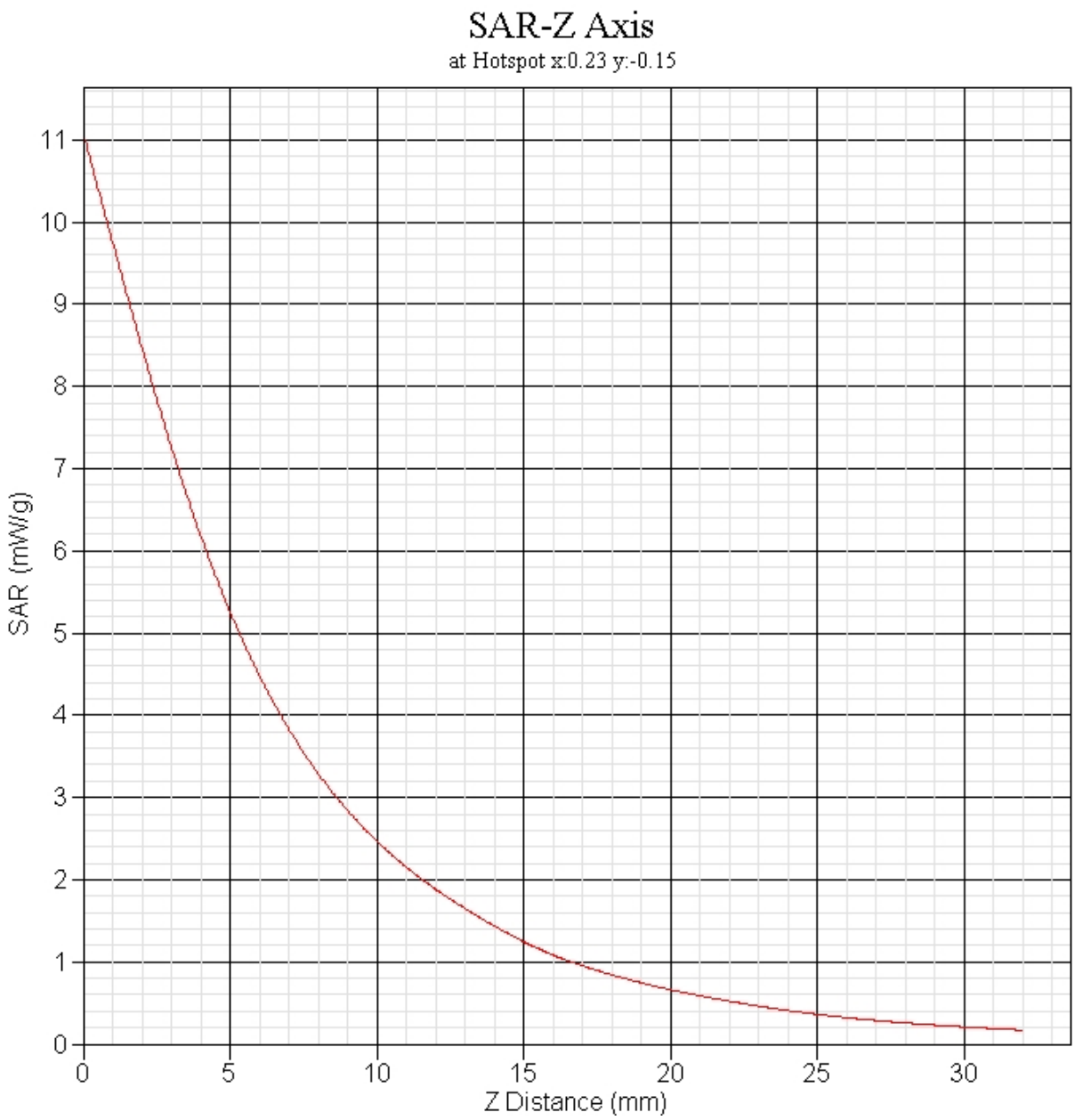
SAR Test Report

```
By Operator       : Jay
Measurement Date  : 01-Jun-2011
Starting Time     : 01-Jun-2011  06:59:21 AM
End Time          : 01-Jun-2011  07:12:20 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  : 01-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 45.00 RH%
Epsilon           : 52.17 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   µV/(V/m)^2
Compression Point: 95.00 mV
Offset            : 1.56 mm
```

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 01-Jun-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
```

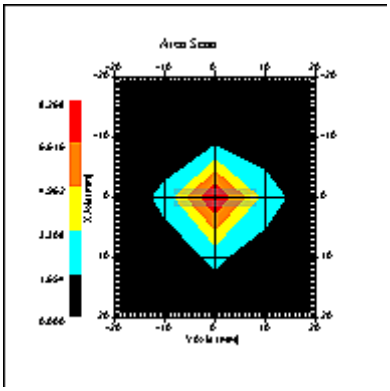


SAR Test Report

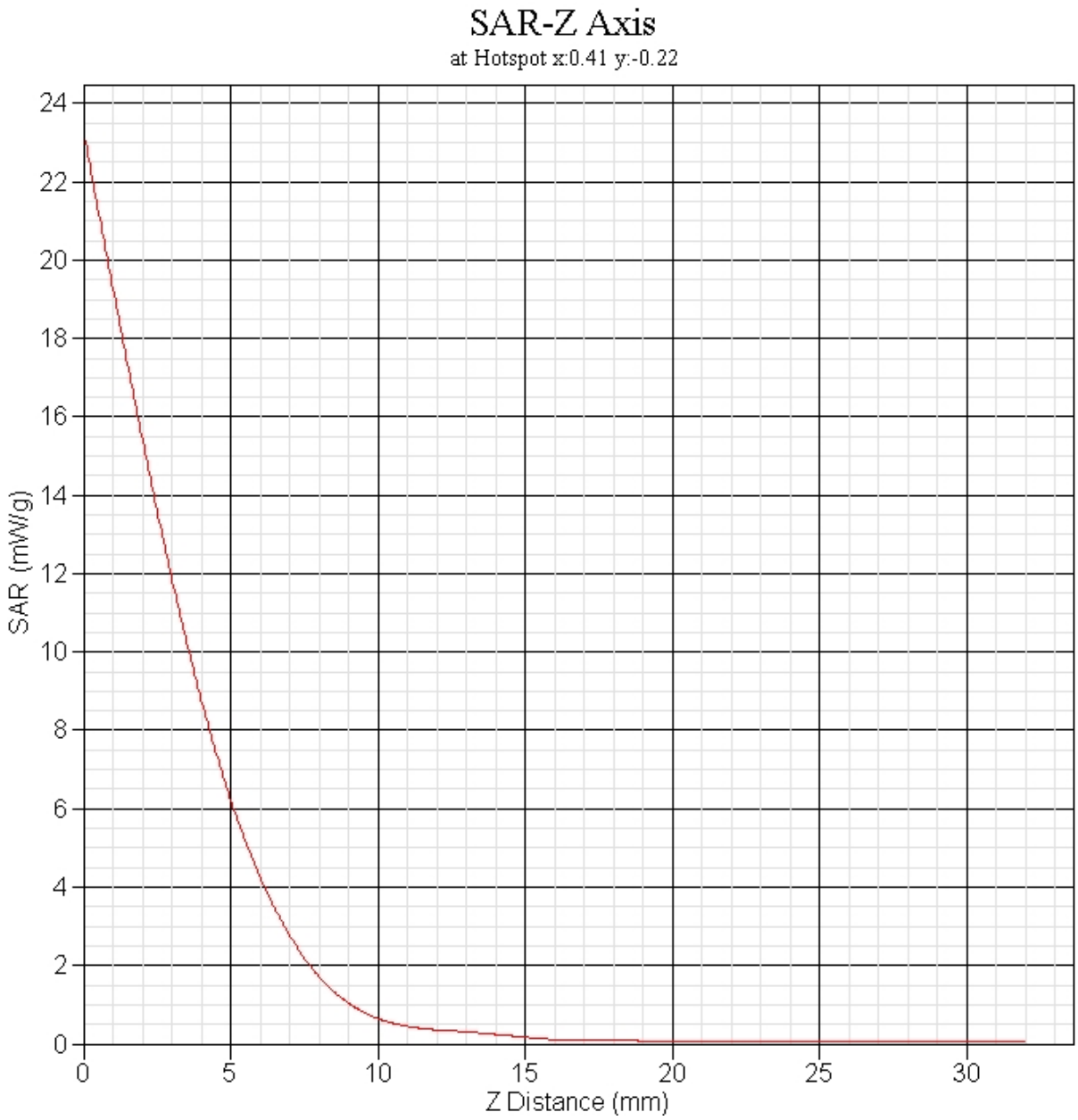
```
By Operator       : Jay
Measurement Date  : 02-Jun-2011
Starting Time     : 02-Jun-2011  06:09:43 AM
End Time          : 02-Jun-2011  06:32:59 AM
Scanning Time     : 1396 secs

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.        : 5250
Frequency         : 5250.00 MHz
Last Calib. Date  : 02-Jun-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         : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/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 : 02-Jun-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

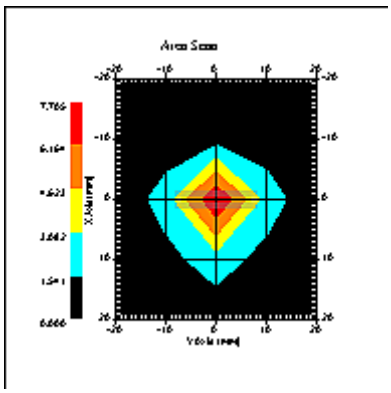


SAR Test Report

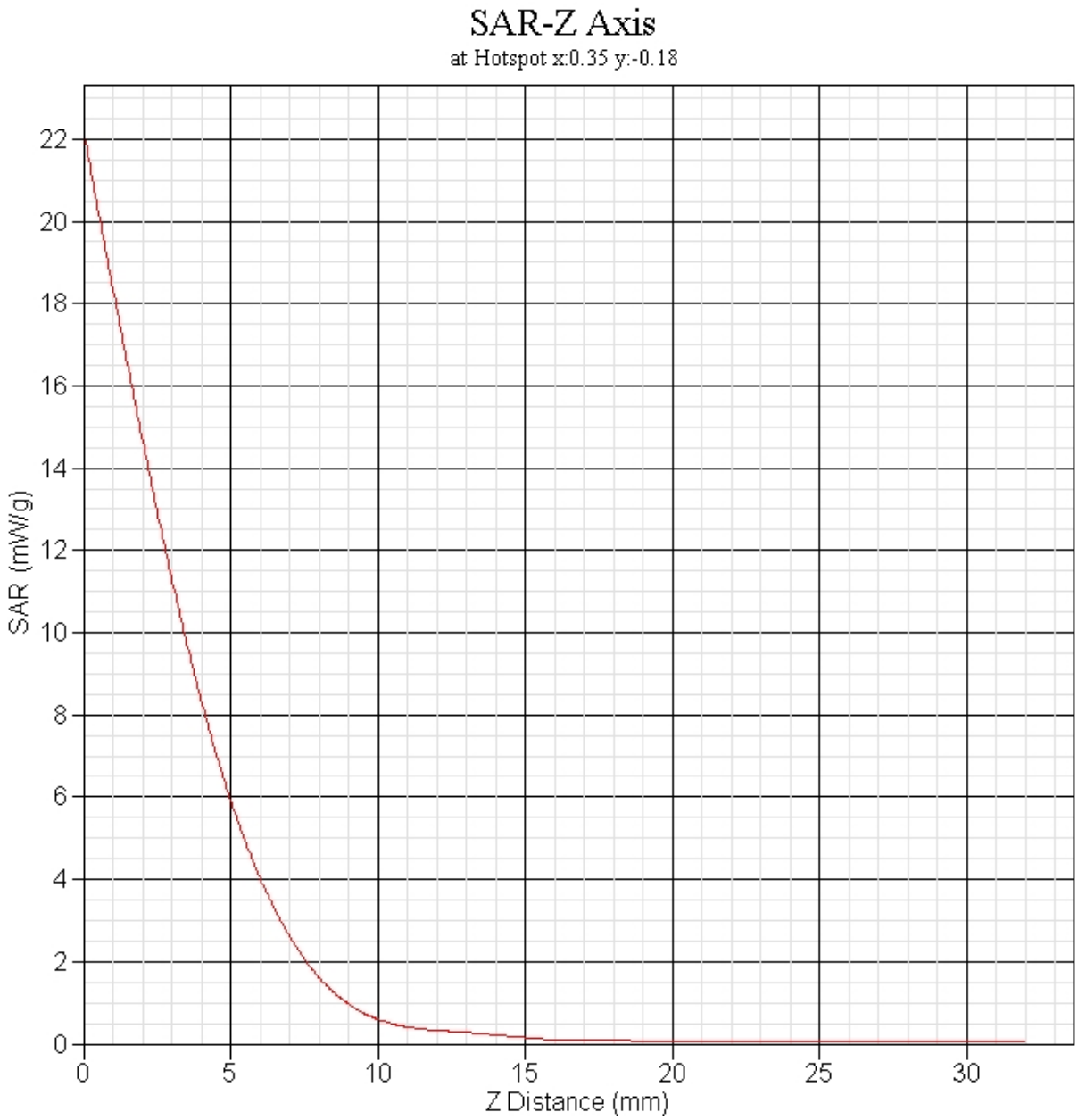
```
By Operator       : Jay
Measurement Date  : 03-Jun-2011
Starting Time     : 03-Jun-2011  06:11:39 AM
End Time          : 03-Jun-2011  06:34:27 AM
Scanning Time     : 1368 secs

Product Data
Device Name       : Validation
Serial No.        : 5600
Type              : Dipole
Model             : ALS-D-BB-S-2
Frequency         : 5600.00 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 : 8.011 W/kg
Power Drift-Finish: 8.090 W/kg
Power Drift (%)   : 0.984

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.        : 5600
Frequency         : 5600.00 MHz
Last Calib. Date  : 03-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 50.00 RH%
Epsilon           : 48.35 F/m
Sigma             : 5.92 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         : 5600.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/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-Jun-2011
Set-up Time : 8:54:57 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



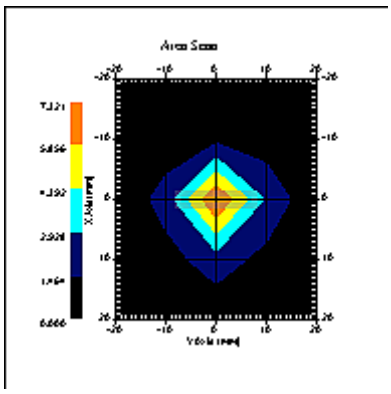
1 gram SAR value : 6.228 W/kg
10 gram SAR value : 2.156 W/kg
Area Scan Peak SAR : 7.705 W/kg
Zoom Scan Peak SAR : 22.217 W/kg



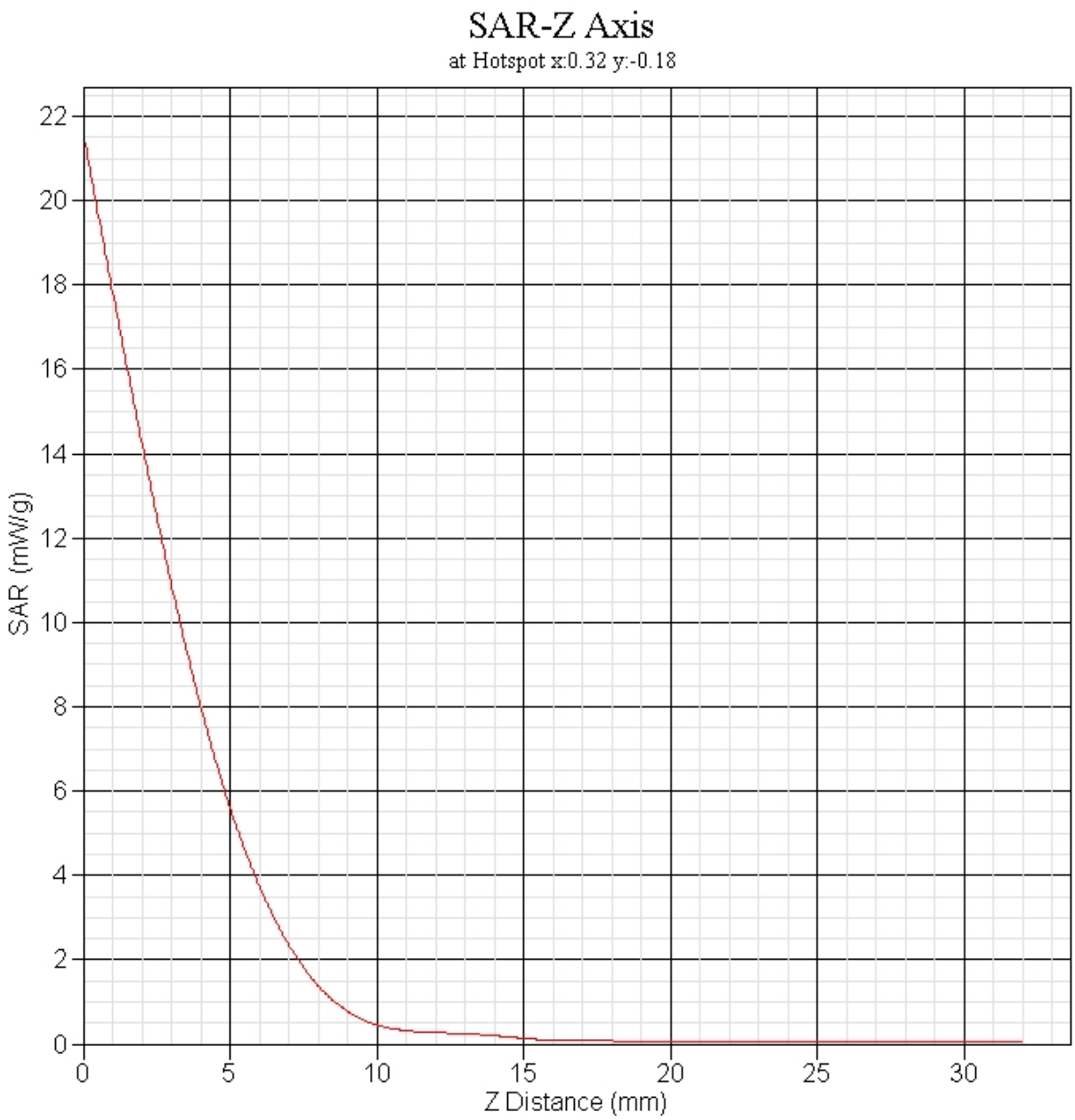
SAR Test Report

```
By Operator       : Jay
Measurement Date  : 03-Jun-2011
Starting Time     : 03-Jun-2011  12:13:39 PM
End Time          : 03-Jun-2011  12:36:30 PM
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  : 03-Jun-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   µV/(V/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-Jun-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
```



Appendix B – SAR Test Data Plots

SAR Test Report

By Operator : Jay
Measurement Date : 31-May-2011
Starting Time : 31-May-2011 08:20:28 AM
End Time : 31-May-2011 08:36:40 AM
Scanning Time : 972 secs

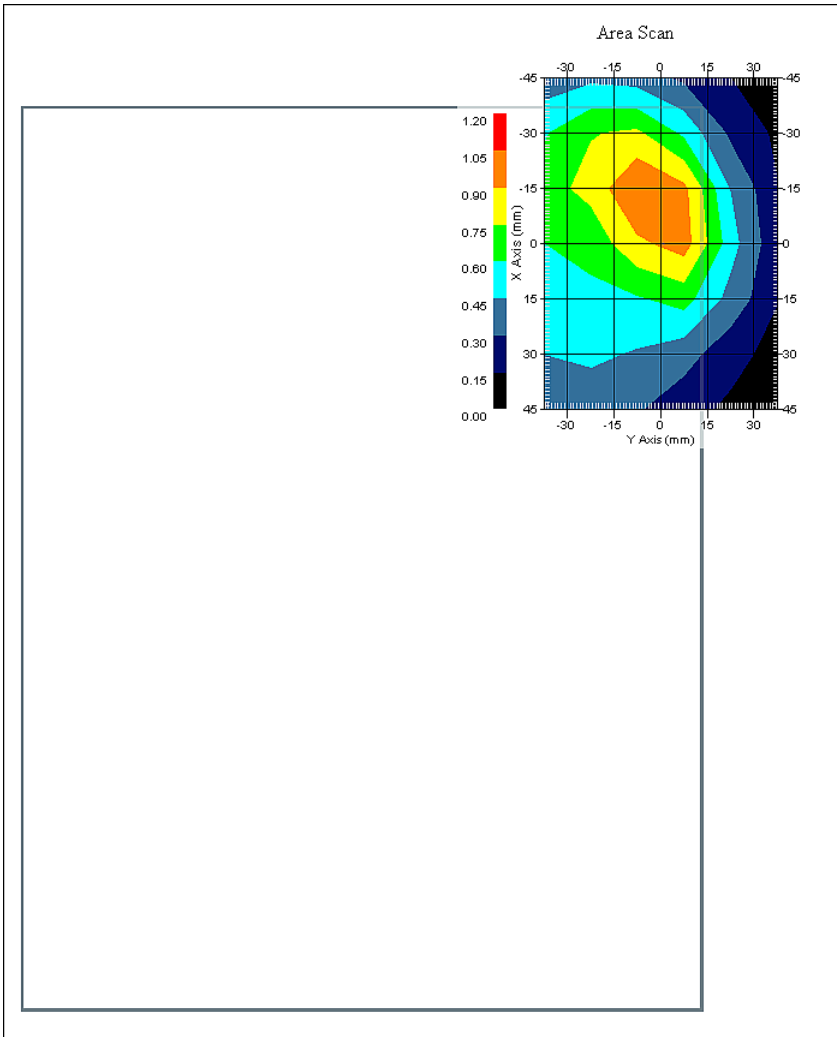
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : CDMA
Model : X10gx
Frequency : 850.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.098 W/kg
Power Drift-Finish: 1.079 W/kg
Power Drift (%) : -1.749

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

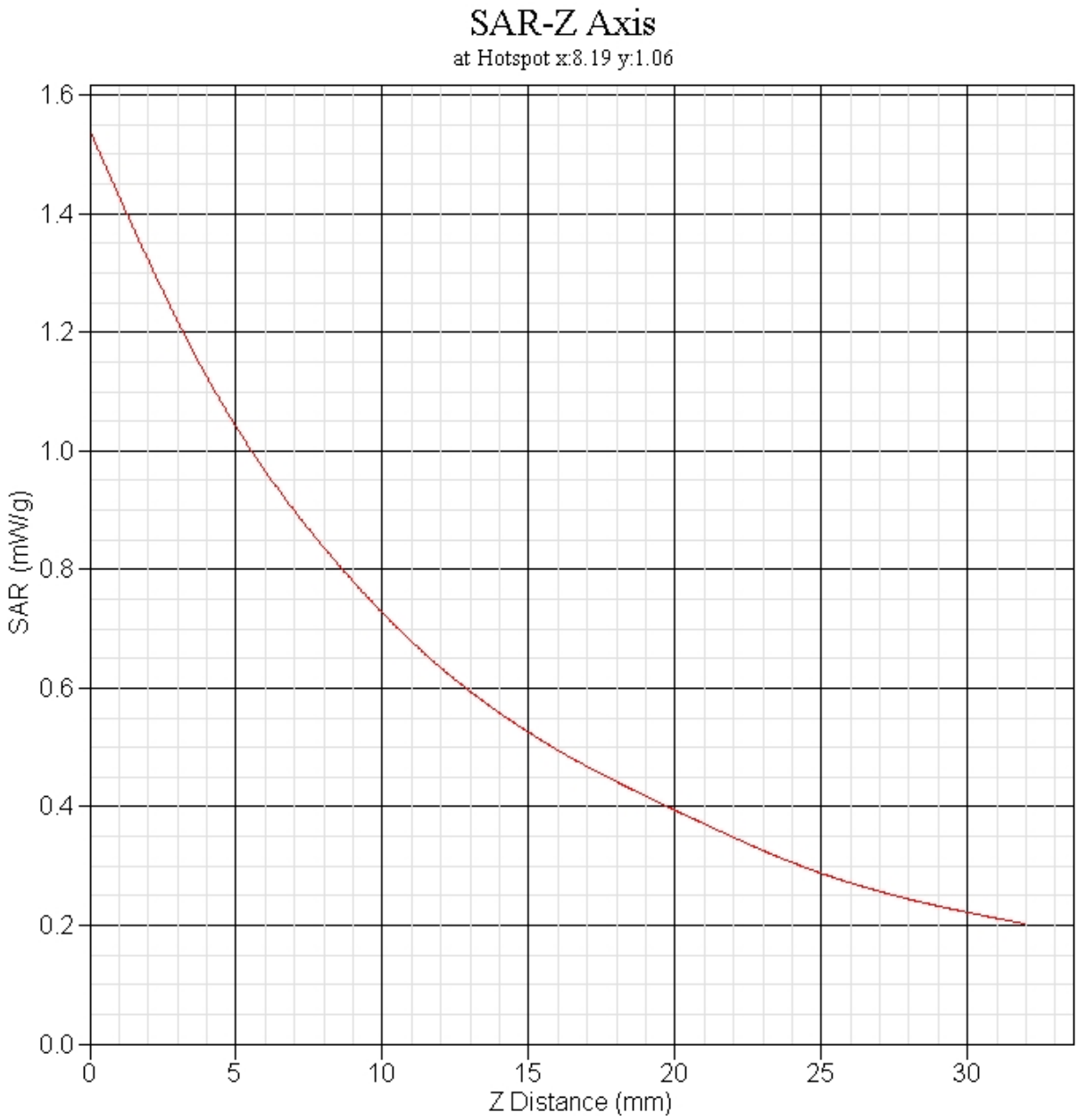
Tissue Data
Type : BODY
Serial No. : 835
Frequency : 835.00 MHz
Last Calib. Date : 31-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.59 F/m
Sigma : 0.99 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 835.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 6.3
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 31-May-2011
Set-up Time       : 2:36:28 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Low
```




```
1 gram SAR value    : 1.054 W/kg
10 gram SAR value   : 0.675 W/kg
Area Scan Peak SAR : 1.051 W/kg
Zoom Scan Peak SAR : 1.541 W/kg
```



SAR Test Report

By Operator : Jay
Measurement Date : 31-May-2011
Starting Time : 31-May-2011 08:02:41 AM
End Time : 31-May-2011 08:18:52 AM
Scanning Time : 971 secs

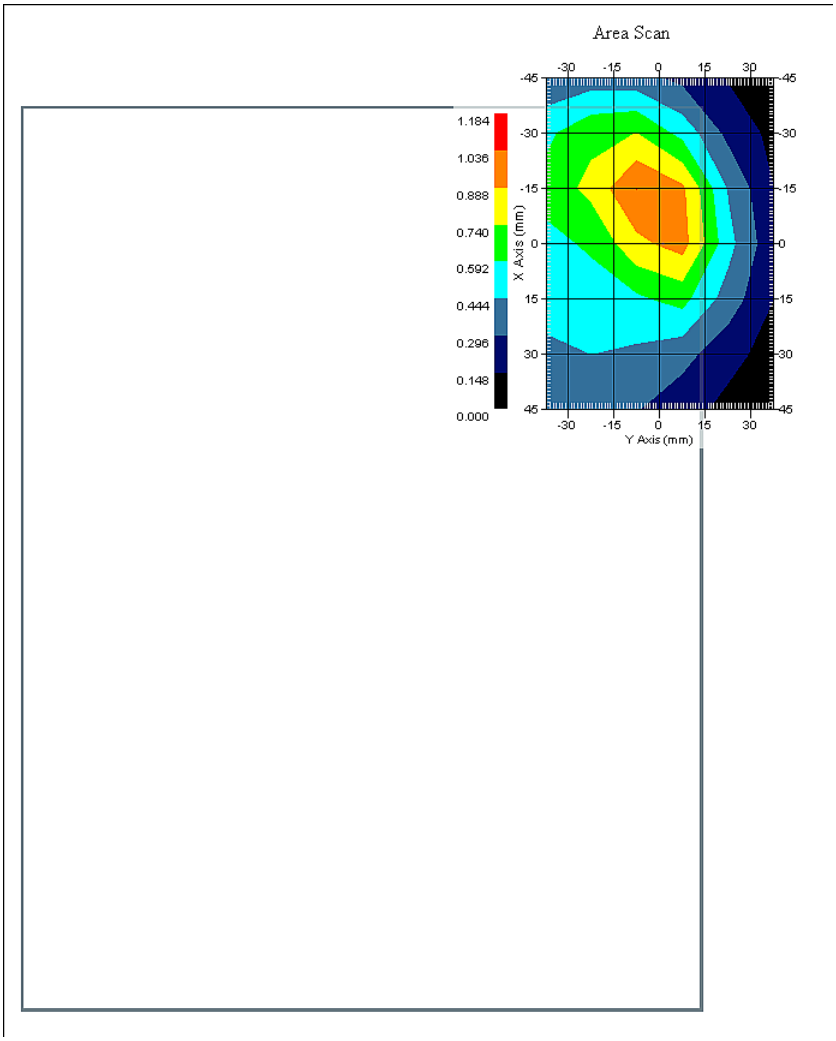
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : CDMA
Model : X10gx
Frequency : 850.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.058 W/kg
Power Drift-Finish: 1.047 W/kg
Power Drift (%) : -1.017

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. : 835
Frequency : 835.00 MHz
Last Calib. Date : 31-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.59 F/m
Sigma : 0.99 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 : 835.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 6.3
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 31-May-2011
Set-up Time       : 2:36:28 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 1.023 W/kg
10 gram SAR value   : 0.653 W/kg
Area Scan Peak SAR  : 1.039 W/kg
Zoom Scan Peak SAR  : 1.501 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 31-May-2011
Starting Time : 31-May-2011 08:38:46 AM
End Time : 31-May-2011 08:55:07 AM
Scanning Time : 981 secs

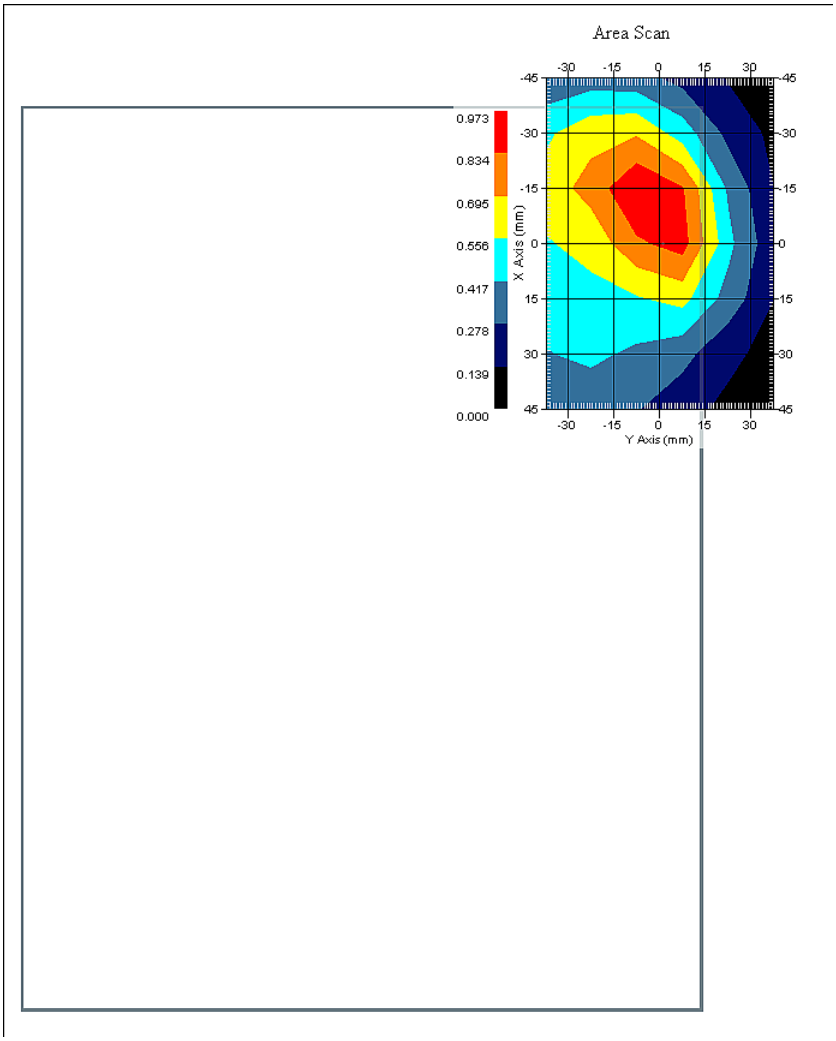
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : CDMA
Model : X10gx
Frequency : 850.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 0.979 W/kg
Power Drift-Finish: 0.979 W/kg
Power Drift (%) : -0.005

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. : 835
Frequency : 835.00 MHz
Last Calib. Date : 31-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.59 F/m
Sigma : 0.99 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 : 835.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 6.3
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 31-May-2011
Set-up Time       : 2:36:28 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : High
```



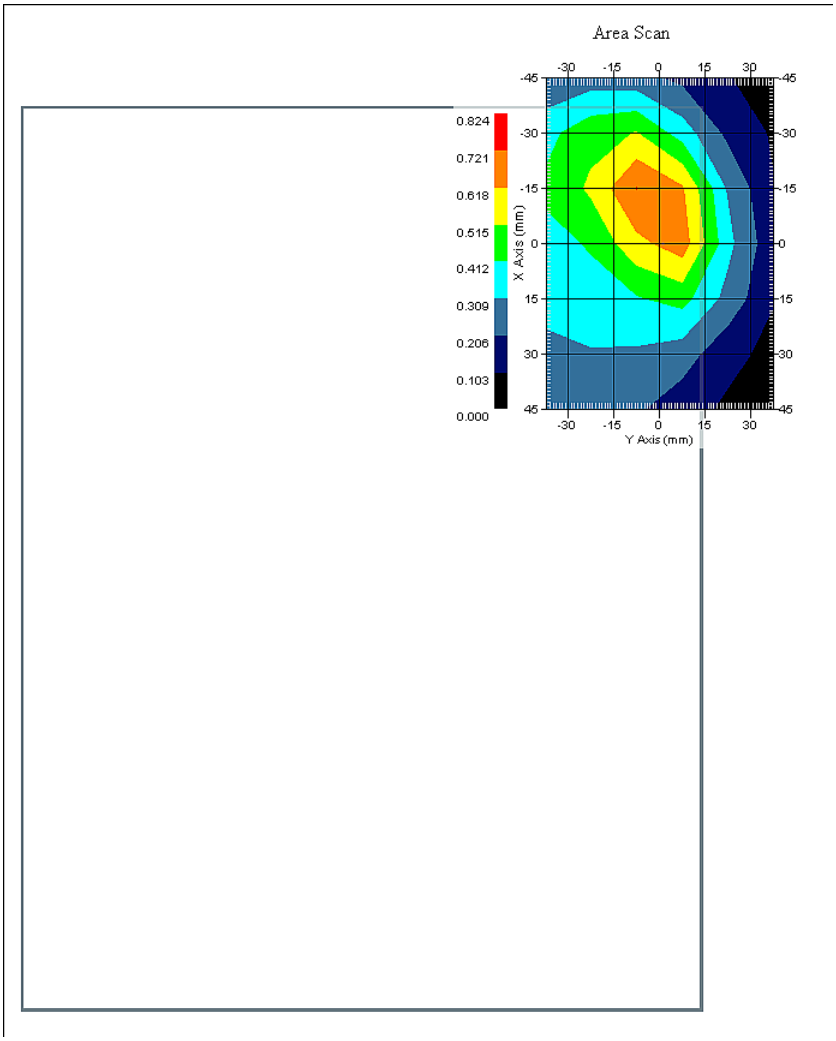

```
1 gram SAR value    : 0.952 W/kg
10 gram SAR value   : 0.608 W/kg
Area Scan Peak SAR : 0.971 W/kg
Zoom Scan Peak SAR : 1.401 W/kg
```

SAR Test Report

```
By Operator       : Jay
Measurement Date  : 31-May-2011
Starting Time     : 31-May-2011  10:00:54 AM
End Time          : 31-May-2011  10:23:45 AM
Scanning Time     : 1371 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : GSM
Model             : X10gx
Frequency         : 850.00 MHz
Max. Transmit Pwr : 2 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Main
Orientation       : Bottom
Power Drift-Start : 0.723 W/kg
Power Drift-Finish: 0.724 W/kg
Power Drift (%)   : 0.107

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.        : 835
Frequency         : 835.00 MHz
Last Calib. Date  : 31-May-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 40.00 RH%
Epsilon           : 55.59 F/m
Sigma             : 0.99 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         : 835.00 MHz
Duty Cycle Factor: 8.3
Conversion Factor: 6.3
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)^2
Compression Point: 95.00 mV
Offset            : 1.56 mm
```

Measurement Data
Crest Factor : 8.3
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 31-May-2011
Set-up Time : 2:36:28 PM
Area Scan : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position : Bottom
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.722 W/kg
10 gram SAR value : 0.456 W/kg
Area Scan Peak SAR : 0.724 W/kg
Zoom Scan Peak SAR : 1.090 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 31-May-2011
Starting Time : 31-May-2011 09:19:48 AM
End Time : 31-May-2011 09:36:04 AM
Scanning Time : 976 secs

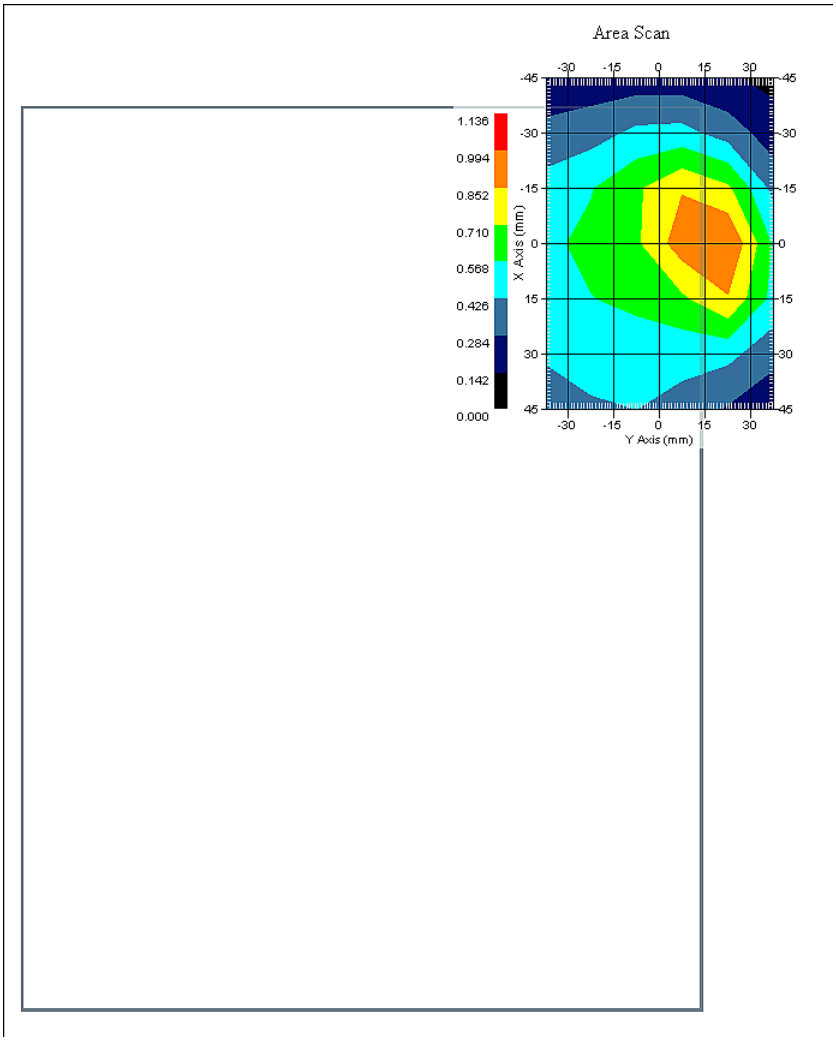
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : WCDMA
Model : X10gx
Frequency : 850.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 0.769 W/kg
Power Drift-Finish: 0.756 W/kg
Power Drift (%) : -1.765

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. : 835
Frequency : 835.00 MHz
Last Calib. Date : 31-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 40.00 RH%
Epsilon : 55.59 F/m
Sigma : 0.99 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 : 835.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 6.3
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 31-May-2011
Set-up Time       : 2:36:28 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Low
```

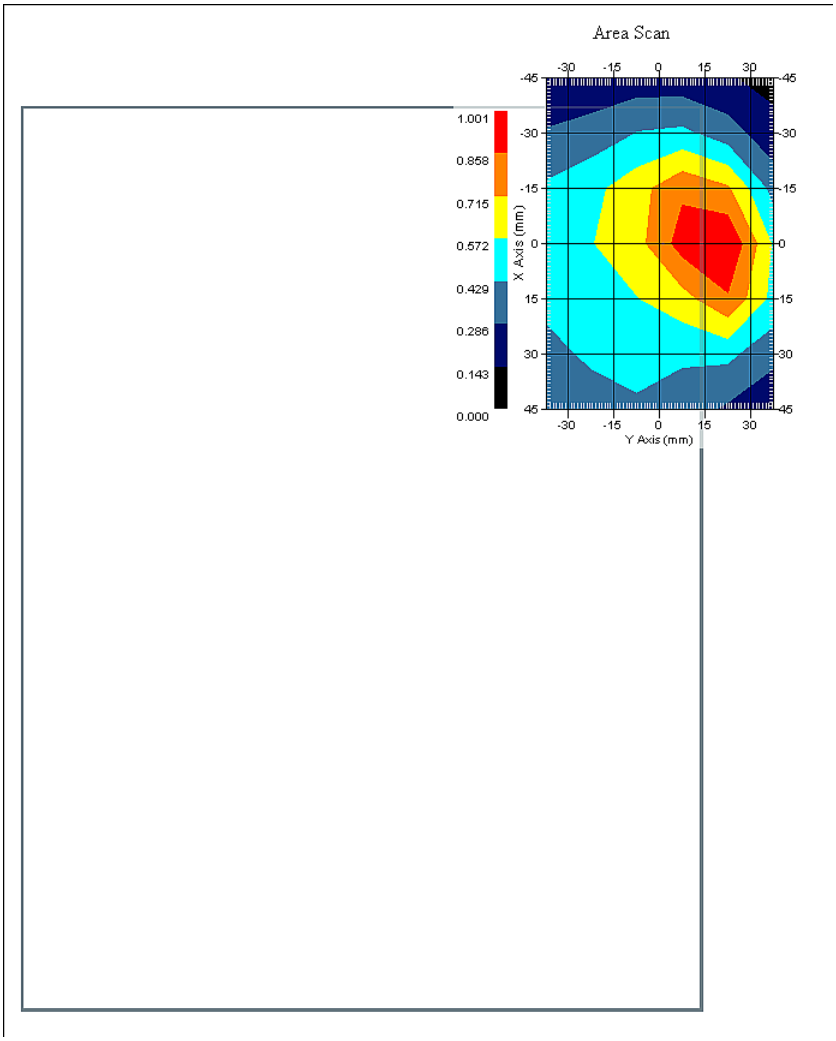



```
1 gram SAR value    : 0.955 W/kg
10 gram SAR value   : 0.647 W/kg
Area Scan Peak SAR  : 0.995 W/kg
Zoom Scan Peak SAR  : 1.351 W/kg
```

SAR Test Report

```
By Operator       : Jay
Measurement Date  : 31-May-2011
Starting Time     : 31-May-2011  09:00:53 AM
End Time          : 31-May-2011  09:17:15 AM
Scanning Time     : 982 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Type              : Other
Mode              : WCDMA
Frequency         : 850.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Main
Orientation       : Bottom
Power Drift-Start : 0.774 W/kg
Power Drift-Finish: 0.744 W/kg
Power Drift (%)   : -3.829

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.       : 835
Frequency        : 835.00 MHz
Last Calib. Date : 31-May-2011
Temperature      : 20.00 °C
Ambient Temp.    : 23.00 °C
Humidity         : 40.00 RH%
Epsilon          : 55.59 F/m
Sigma            : 0.99 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        : 835.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 6.3
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)^2
Compression Point: 95.00 mV
Offset           : 1.56 mm
```

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 31-May-2011
Set-up Time       : 2:36:28 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```

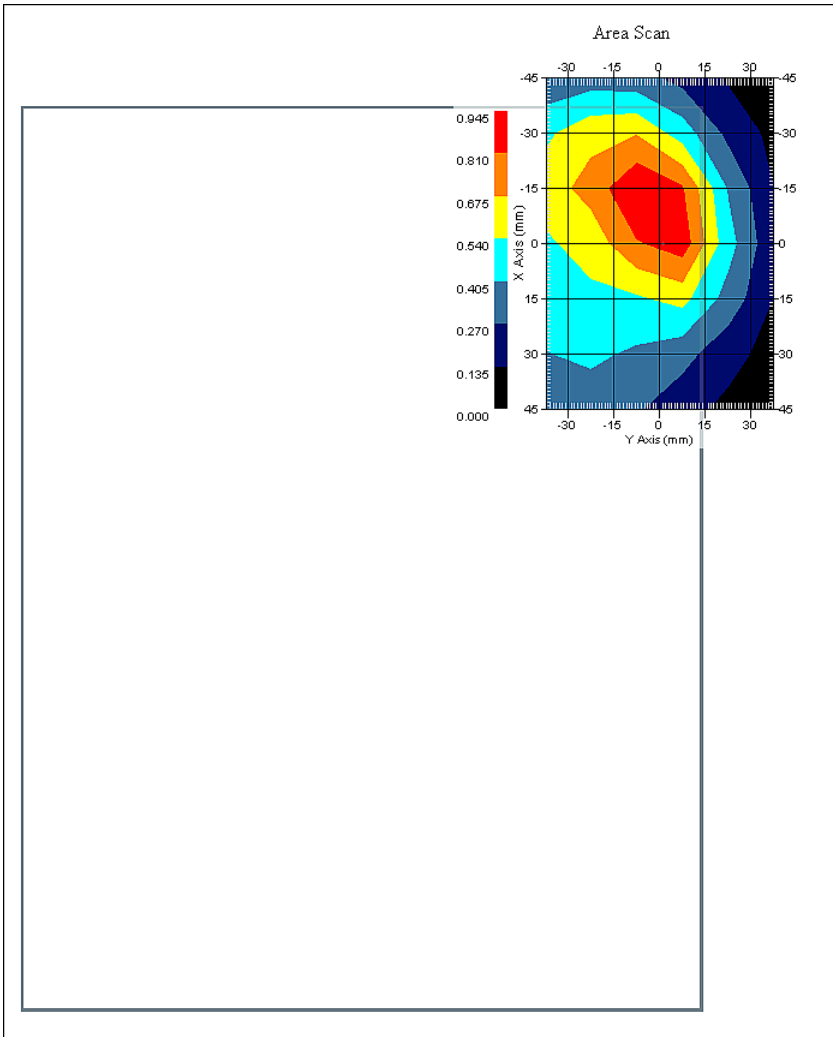



```
1 gram SAR value    : 0.959 W/kg
10 gram SAR value   : 0.644 W/kg
Area Scan Peak SAR  : 0.999 W/kg
Zoom Scan Peak SAR  : 1.361 W/kg
```

SAR Test Report

```
By Operator       : Jay
Measurement Date  : 31-May-2011
Starting Time     : 31-May-2011  09:38:09 AM
End Time          : 31-May-2011  09:55:23 AM
Scanning Time     : 1034 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : WCDMA
Model             : X10gx
Frequency         : 850.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Main
Orientation       : Bottom
Power Drift-Start : 0.941 W/kg
Power Drift-Finish: 0.978 W/kg
Power Drift (%)   : 3.893

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.        : 835
Frequency         : 835.00 MHz
Last Calib. Date  : 31-May-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 40.00 RH%
Epsilon           : 55.59 F/m
Sigma             : 0.99 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         : 835.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 6.3
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/m)^2
Compression Point: 95.00 mV
Offset            : 1.56 mm
```

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 31-May-2011
Set-up Time       : 2:36:28 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : High
```




```
1 gram SAR value    : 0.960 W/kg
10 gram SAR value   : 0.615 W/kg
Area Scan Peak SAR : 0.945 W/kg
Zoom Scan Peak SAR : 1.401 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 07:45:36 AM
End Time : 27-May-2011 08:01:57 AM
Scanning Time : 981 secs

Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : CDMA
Model : X10gx
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.060 W/kg
Power Drift-Finish: 1.077 W/kg
Power Drift (%) : 1.597

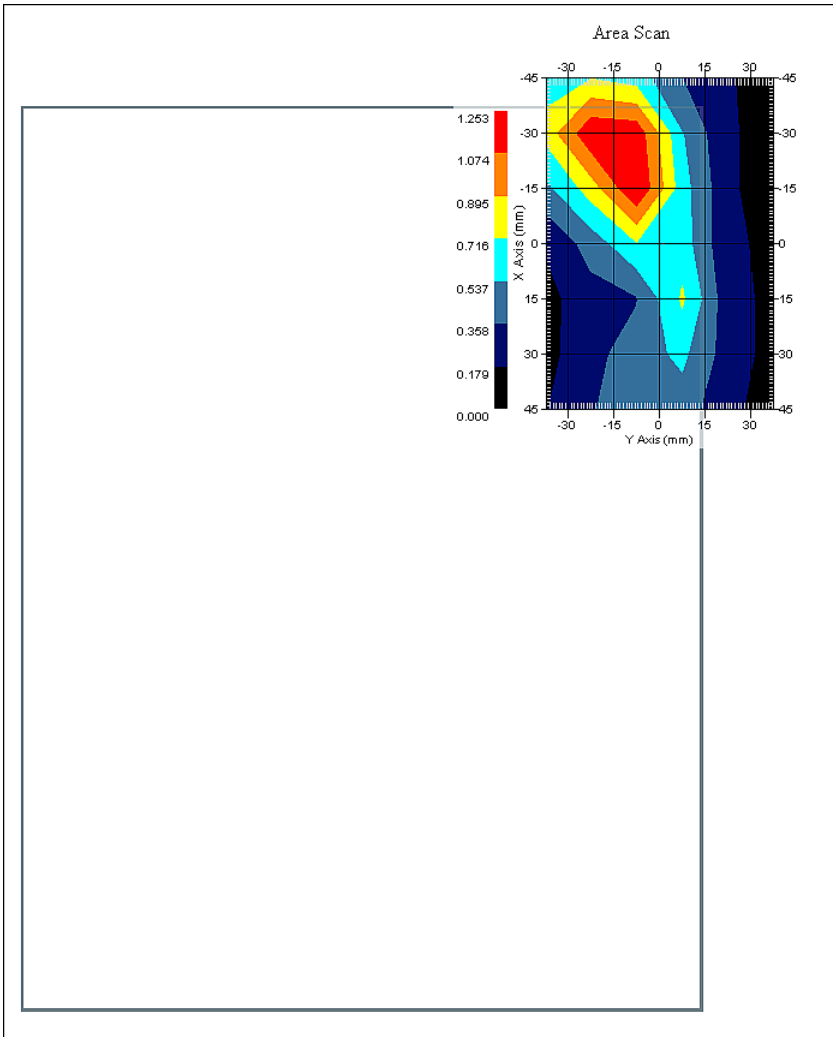
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data
Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 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 : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-May-2011
Set-up Time : 11:07:20 AM
Area Scan : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position : Bottom
Separation : 0 mm
Channel : Low



1 gram SAR value : 1.284 W/kg
10 gram SAR value : 0.793 W/kg
Area Scan Peak SAR : 1.250 W/kg
Zoom Scan Peak SAR : 2.041 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 07:27:30 AM
End Time : 27-May-2011 07:43:56 AM
Scanning Time : 986 secs

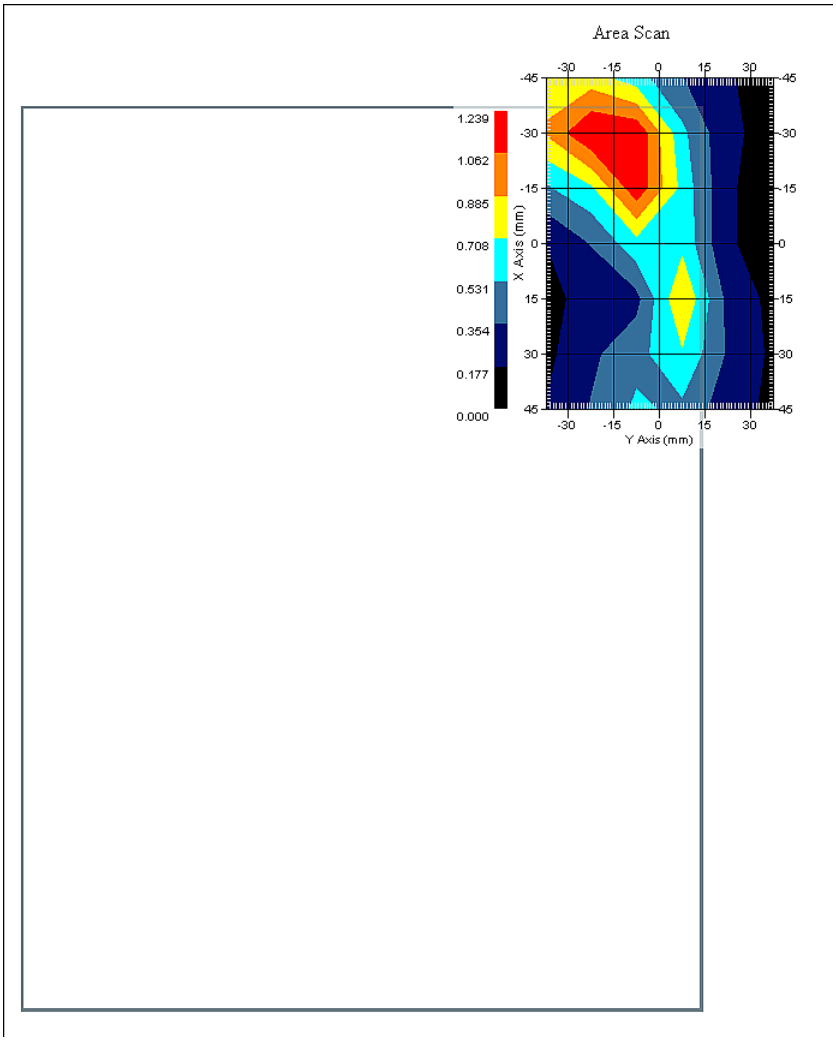
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : CDMA
Model : X10gx
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.059 W/kg
Power Drift-Finish: 1.045 W/kg
Power Drift (%) : -1.276

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. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 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 : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 27-May-2011
Set-up Time       : 11:07:20 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 1.200 W/kg
10 gram SAR value   : 0.694 W/kg
Area Scan Peak SAR : 1.238 W/kg
Zoom Scan Peak SAR : 2.041 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 08:03:20 AM
End Time : 27-May-2011 08:19:34 AM
Scanning Time : 974 secs

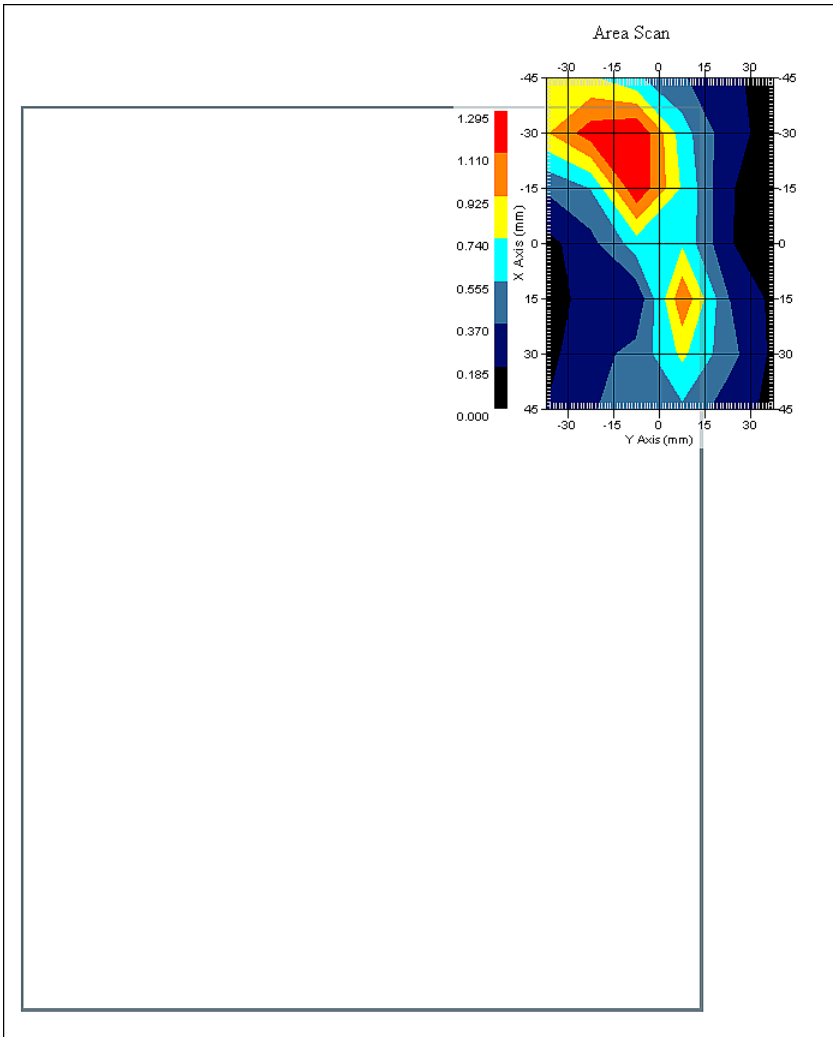
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : CDMA
Model : X10gx
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.152 W/kg
Power Drift-Finish: 1.166 W/kg
Power Drift (%) : 1.212

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. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 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 : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 27-May-2011
Set-up Time       : 11:07:20 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : High
```




```
1 gram SAR value    : 1.243 W/kg
10 gram SAR value   : 0.713 W/kg
Area Scan Peak SAR : 1.293 W/kg
Zoom Scan Peak SAR : 2.151 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 09:20:18 AM
End Time : 27-May-2011 09:43:46 AM
Scanning Time : 1408 secs

Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : GSM
Model : X10gx
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 0.360 W/kg
Power Drift-Finish: 0.349 W/kg
Power Drift (%) : -2.997

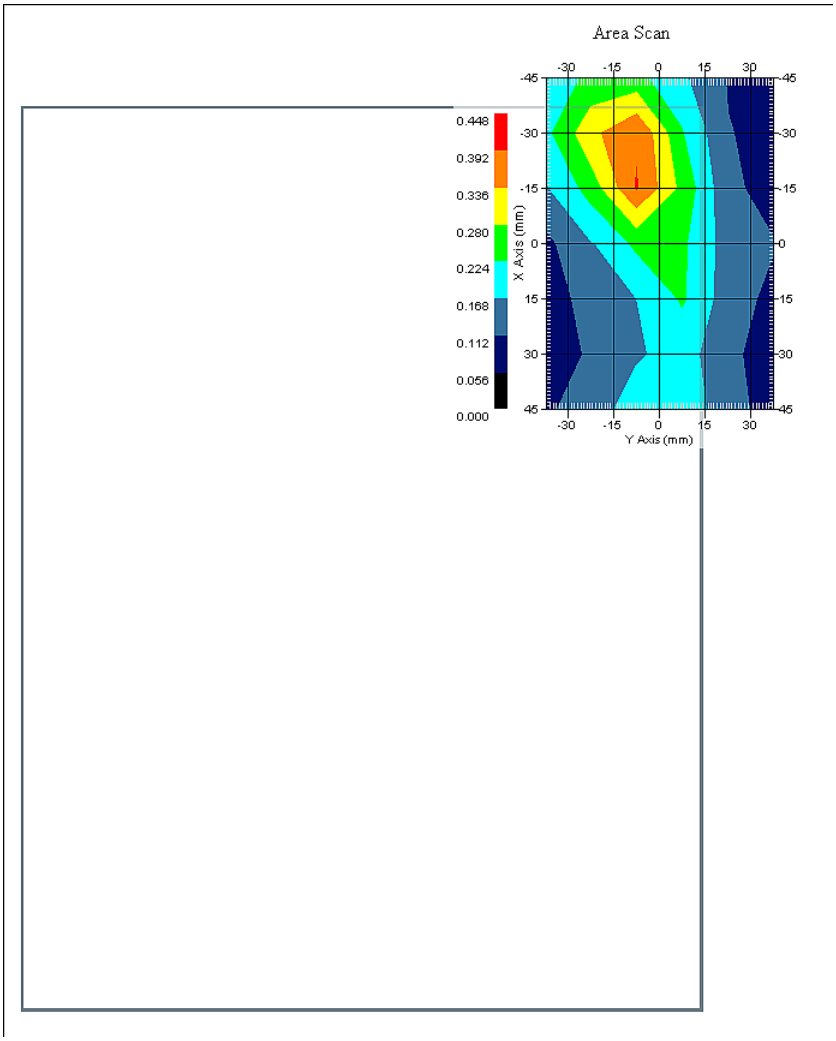
Phantom Data
Name : APREL-Uni
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Serial No. : System Default
Location : Center
Description : Uni-Phantom

Tissue Data
Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 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 : 1900.00 MHz
Duty Cycle Factor: 8.3
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data
Crest Factor : 8.3
Scan Type : Complete
Tissue Temp. : 20.00 °C
Ambient Temp. : 23.00 °C
Set-up Date : 27-May-2011
Set-up Time : 7:34:16 AM
Area Scan : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position : Bottom
Separation : 0 mm
Channel : Mid



1 gram SAR value : 0.388 W/kg
10 gram SAR value : 0.250 W/kg
Area Scan Peak SAR : 0.394 W/kg
Zoom Scan Peak SAR : 0.620 W/kg

SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 08:42:31 AM
End Time : 27-May-2011 08:58:51 AM
Scanning Time : 980 secs

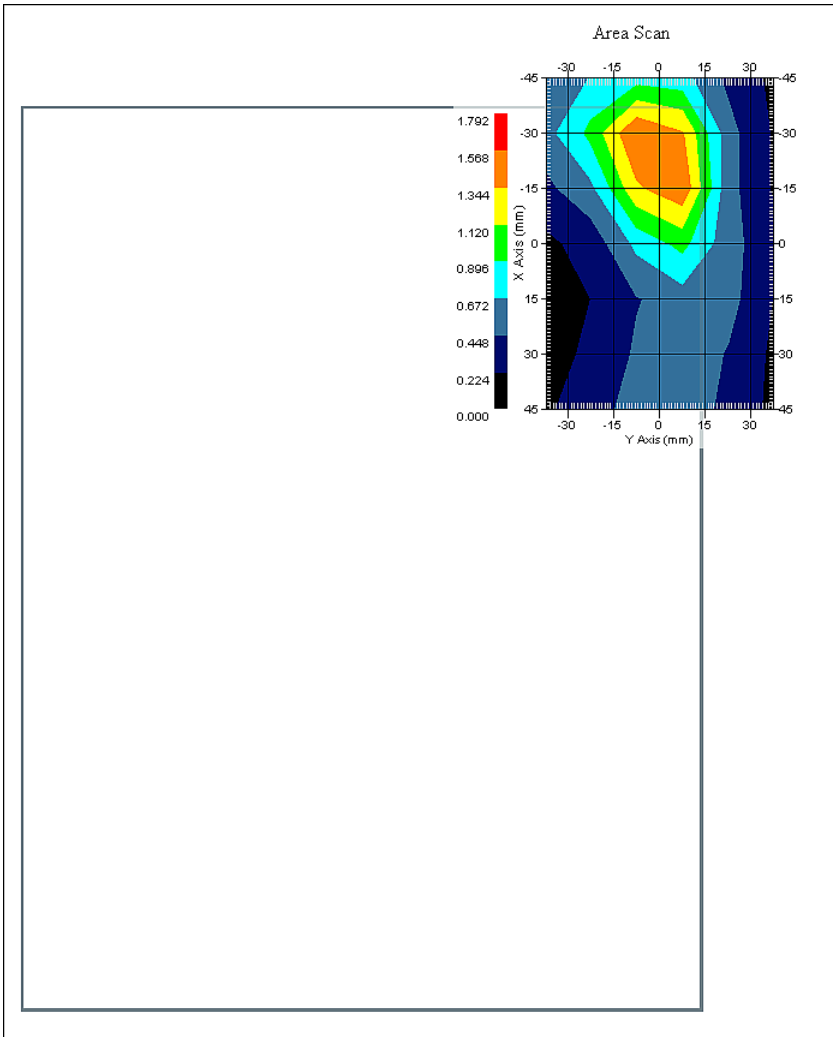
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : WCDMA
Model : X10gx
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.627 W/kg
Power Drift-Finish: 1.600 W/kg
Power Drift (%) : -1.709

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. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 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 : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 27-May-2011
Set-up Time       : 7:34:16 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Low
```




```
1 gram SAR value    : 1.231 W/kg
10 gram SAR value   : 0.725 W/kg
Area Scan Peak SAR  : 1.371 W/kg
Zoom Scan Peak SAR  : 2.102 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 08:23:38 AM
End Time : 27-May-2011 08:40:04 AM
Scanning Time : 986 secs

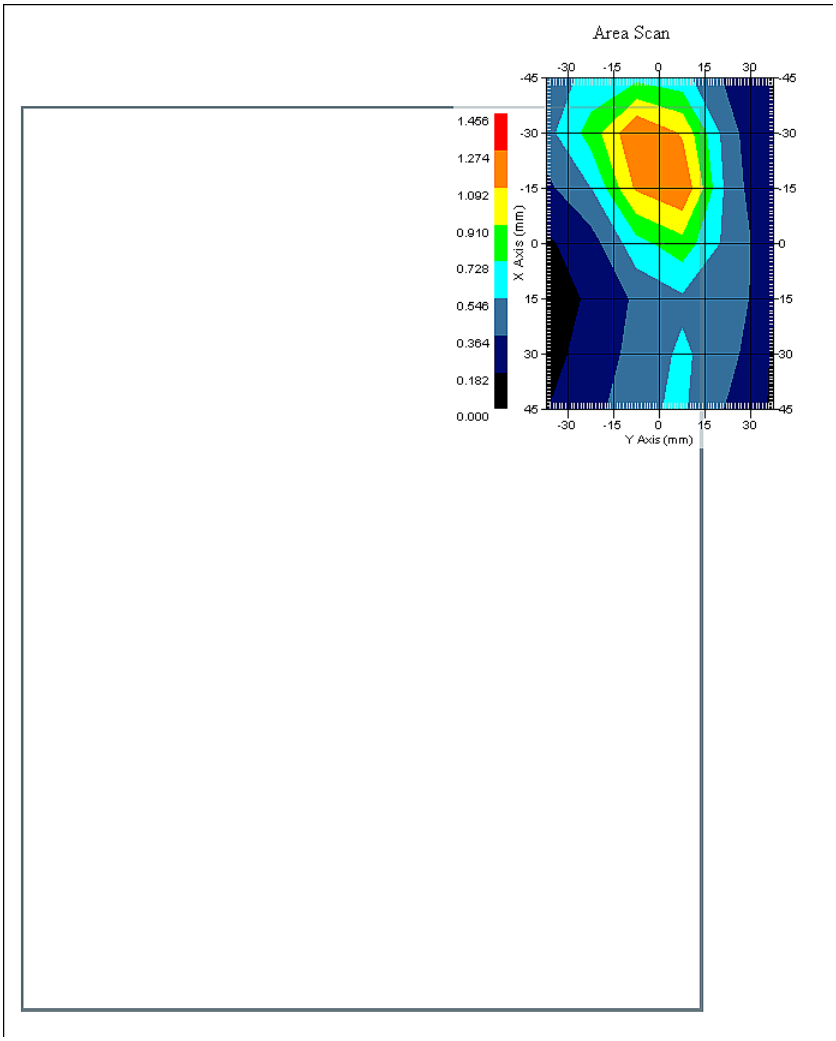
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : WCDMA
Model : X10gx
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.677 W/kg
Power Drift-Finish: 1.635 W/kg
Power Drift (%) : -2.507

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

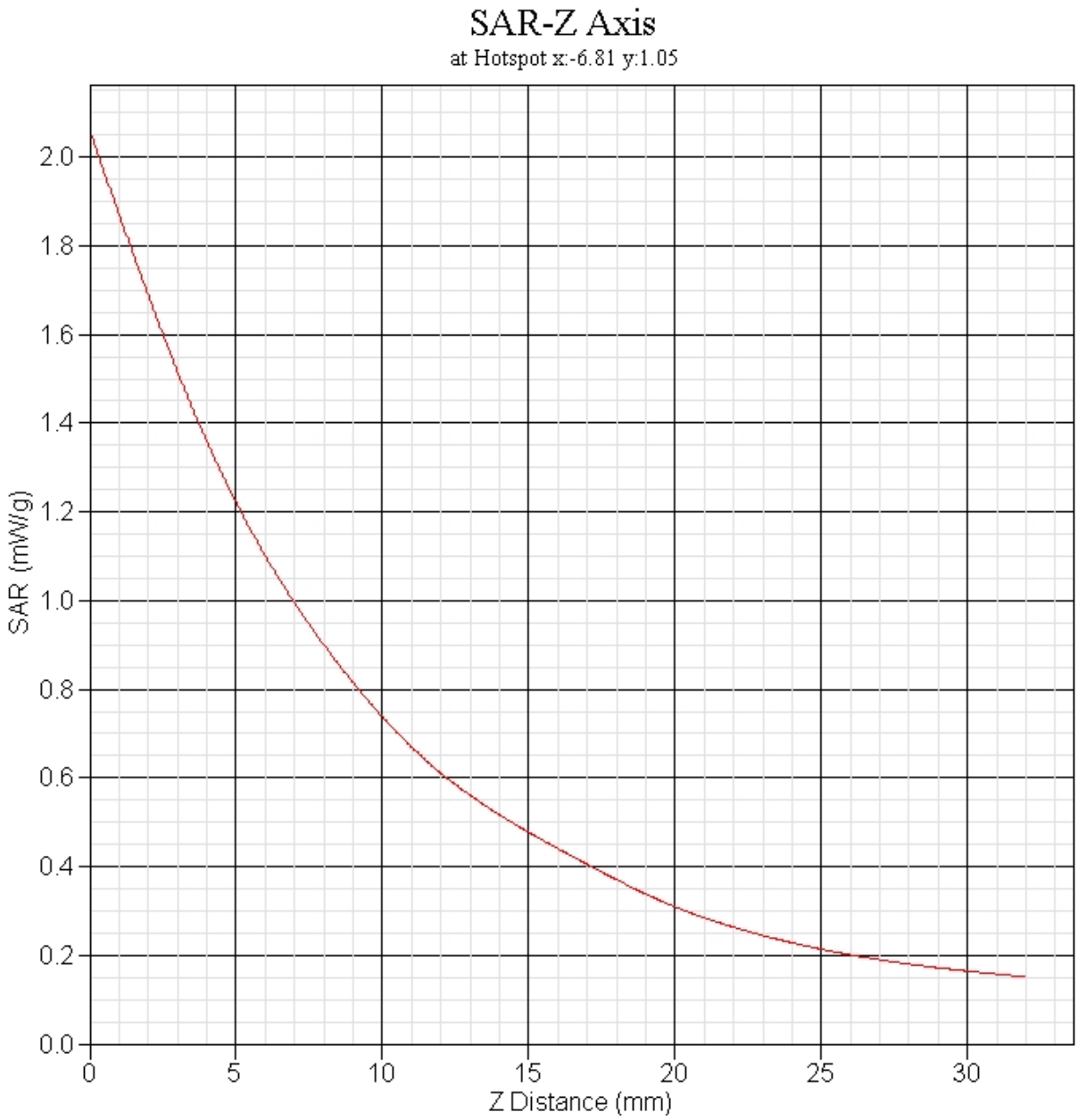
Tissue Data
Type : BODY
Serial No. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe 215 - RFEL
Model : E020
Type : E-Field Triangle
Serial No. : 215
Last Calib. Date : 22-Sep-2010
Frequency : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 27-May-2011
Set-up Time       : 7:34:16 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 1.293 W/kg
10 gram SAR value   : 0.740 W/kg
Area Scan Peak SAR : 1.275 W/kg
Zoom Scan Peak SAR : 2.061 W/kg
```



SAR Test Report

By Operator : Jay
Measurement Date : 27-May-2011
Starting Time : 27-May-2011 09:00:36 AM
End Time : 27-May-2011 09:16:57 AM
Scanning Time : 981 secs

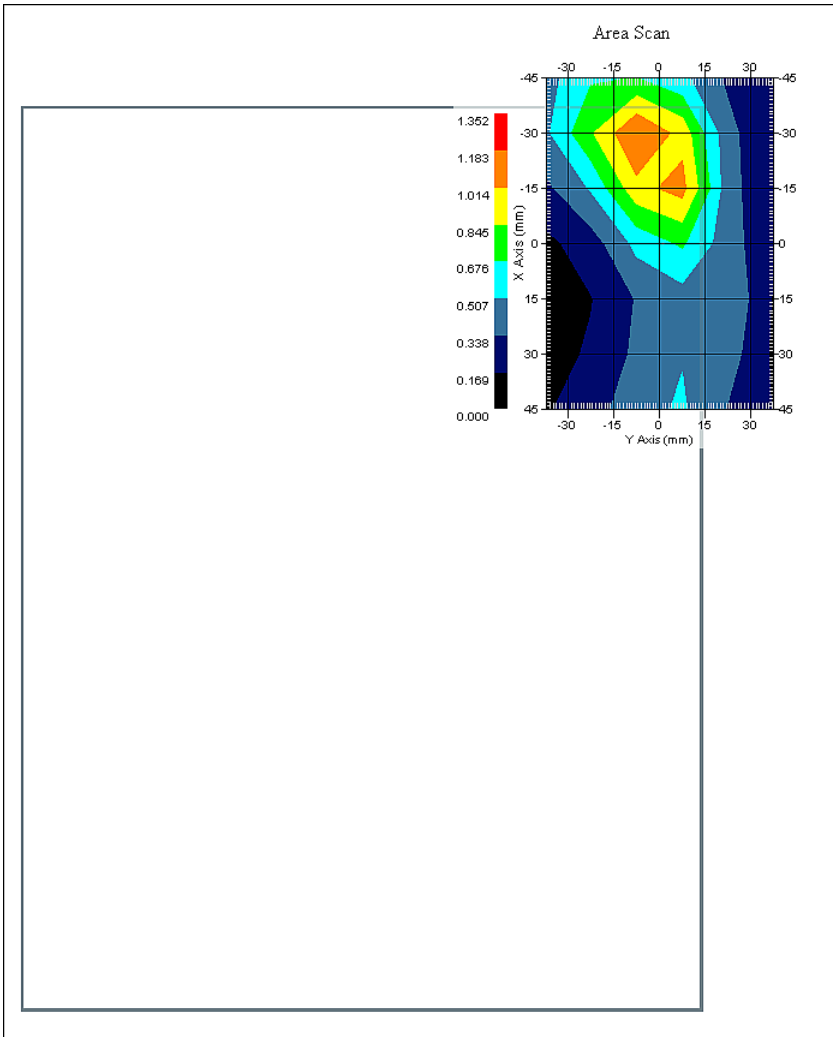
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : WCDMA
Model : X10gx
Frequency : 1900.00 MHz
Max. Transmit Pwr : 0.25 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Main
Orientation : Bottom
Power Drift-Start : 1.151 W/kg
Power Drift-Finish: 1.158 W/kg
Power Drift (%) : 0.624

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. : 1900
Frequency : 1900.00 MHz
Last Calib. Date : 27-May-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 36.00 RH%
Epsilon : 52.56 F/m
Sigma : 1.54 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 : 1900.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 5
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 27-May-2011
Set-up Time       : 7:34:16 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : High
```

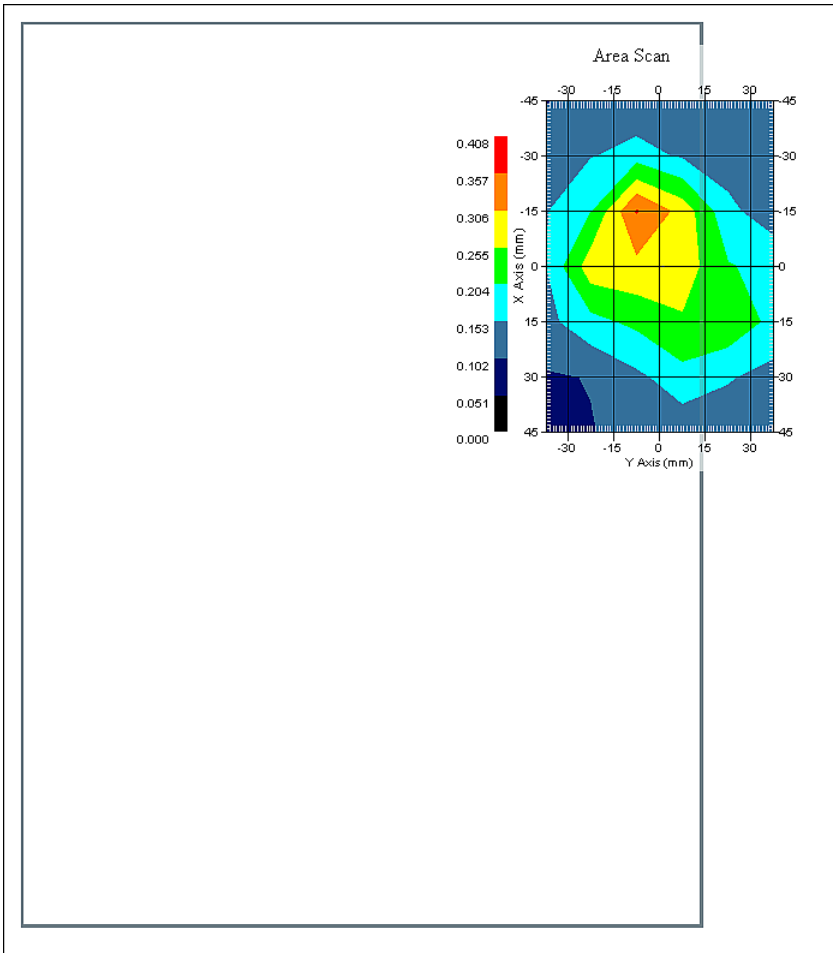



```
1 gram SAR value    : 1.152 W/kg
10 gram SAR value   : 0.669 W/kg
Area Scan Peak SAR  : 1.184 W/kg
Zoom Scan Peak SAR  : 1.841 W/kg
```

SAR Test Report

```
By Operator       : Jay
Measurement Date  : 01-Jun-2011
Starting Time     : 01-Jun-2011  07:27:08 AM
End Time          : 01-Jun-2011  07:43:13 AM
Scanning Time     : 965 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : 802.11b
Model             : X10gx
Frequency         : 2450.00 MHz
Max. Transmit Pwr : 0.09 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Chain A
Orientation       : Bottom
Power Drift-Start : 0.349 W/kg
Power Drift-Finish: 0.334 W/kg
Power Drift (%)   : -4.296

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  : 01-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 46.00 RH%
Epsilon           : 52.17 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   µV/(V/m)^2
Compression Point: 95.00 mV
Offset            : 1.56 mm
```

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 01-Jun-2011
Set-up Time       : 12:05:26 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```

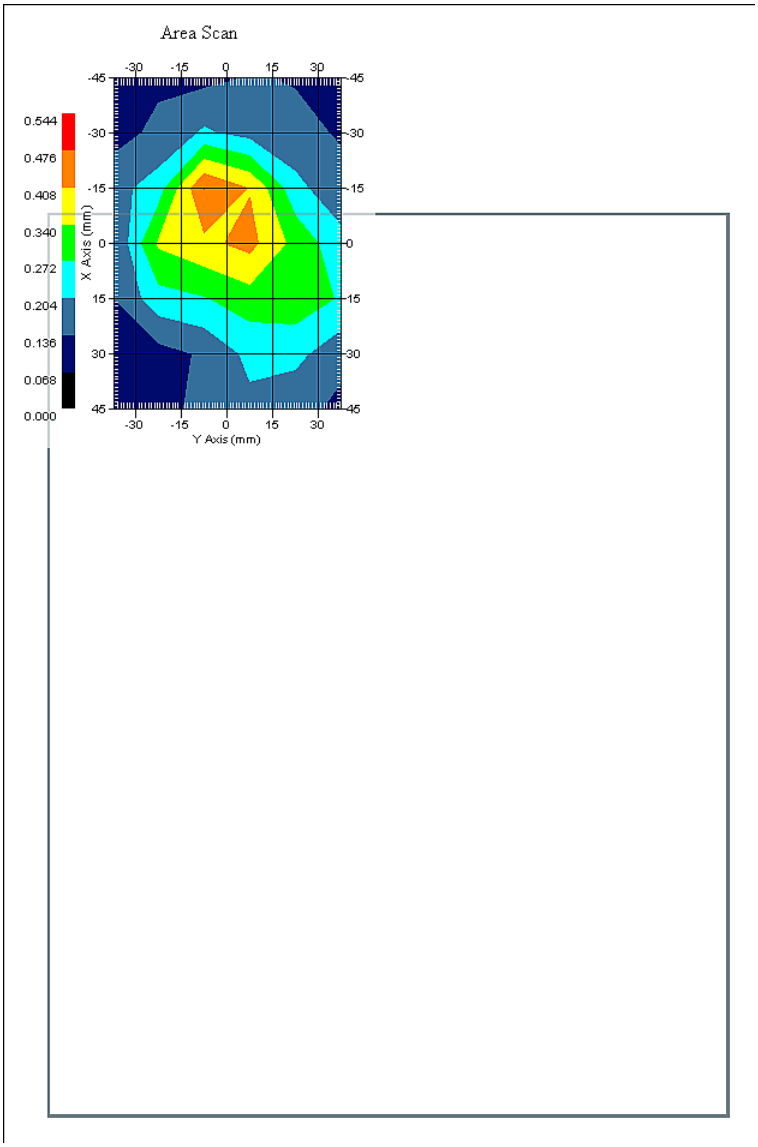



```
1 gram SAR value    : 0.256 W/kg
10 gram SAR value   : 0.178 W/kg
Area Scan Peak SAR  : 0.360 W/kg
Zoom Scan Peak SAR  : 0.560 W/kg
```

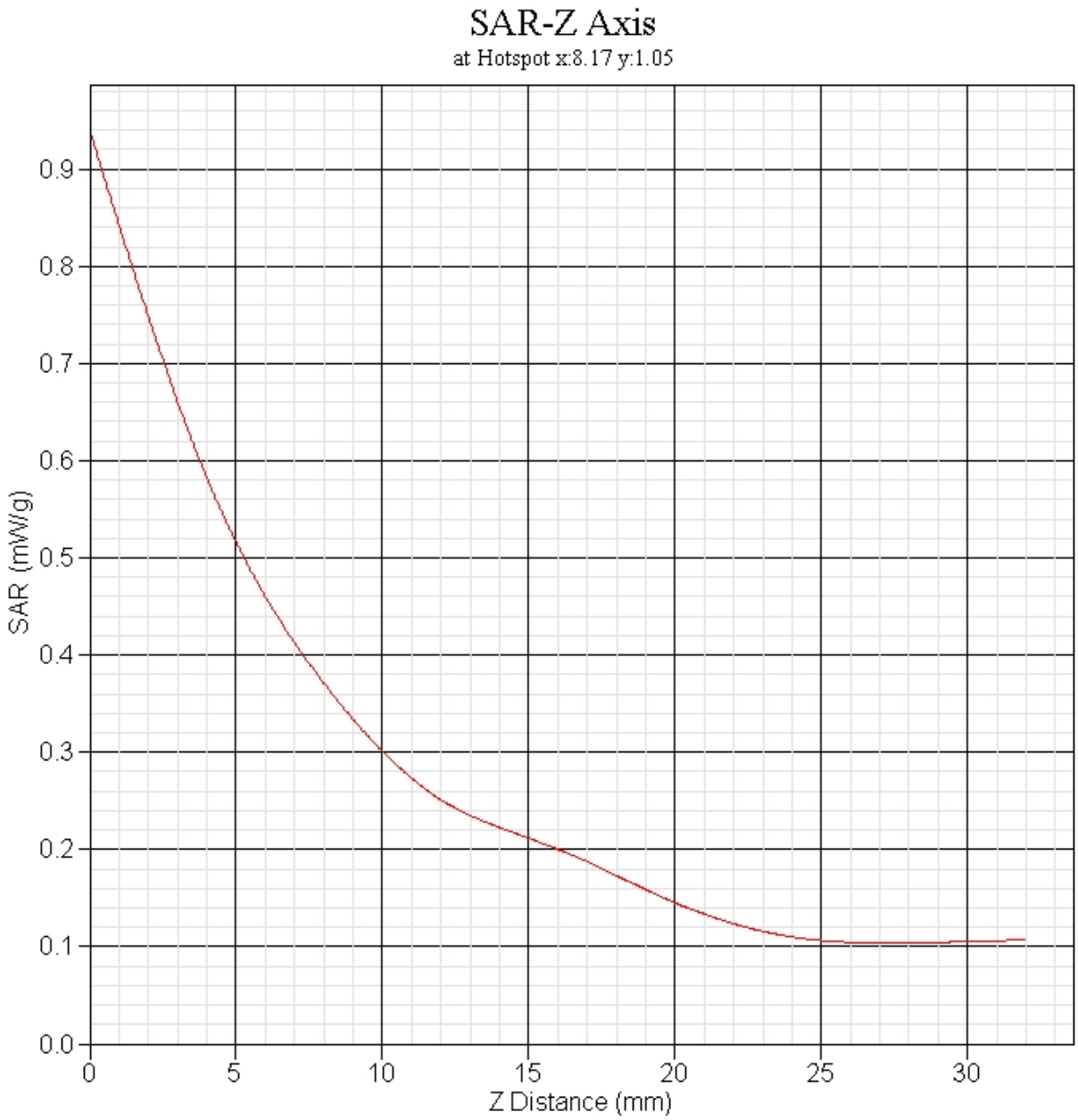
SAR Test Report

```
By Operator       : Jay
Measurement Date  : 01-Jun-2011
Starting Time     : 01-Jun-2011  07:56:03 AM
End Time          : 01-Jun-2011  08:12:14 AM
Scanning Time     : 971 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : 802.11b
Model             : X10gx
Frequency         : 2450.00 MHz
Max. Transmit Pwr : 0.09 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Chain B
Orientation       : Bottom
Power Drift-Start : 0.522 W/kg
Power Drift-Finish: 0.515 W/kg
Power Drift (%)   : -1.348

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  : 01-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 46.00 RH%
Epsilon           : 52.17 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   µV/(V/m)^2
Compression Point: 95.00 mV
Offset            : 1.56 mm
```

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 01-Jun-2011
Set-up Time       : 12:05:26 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```



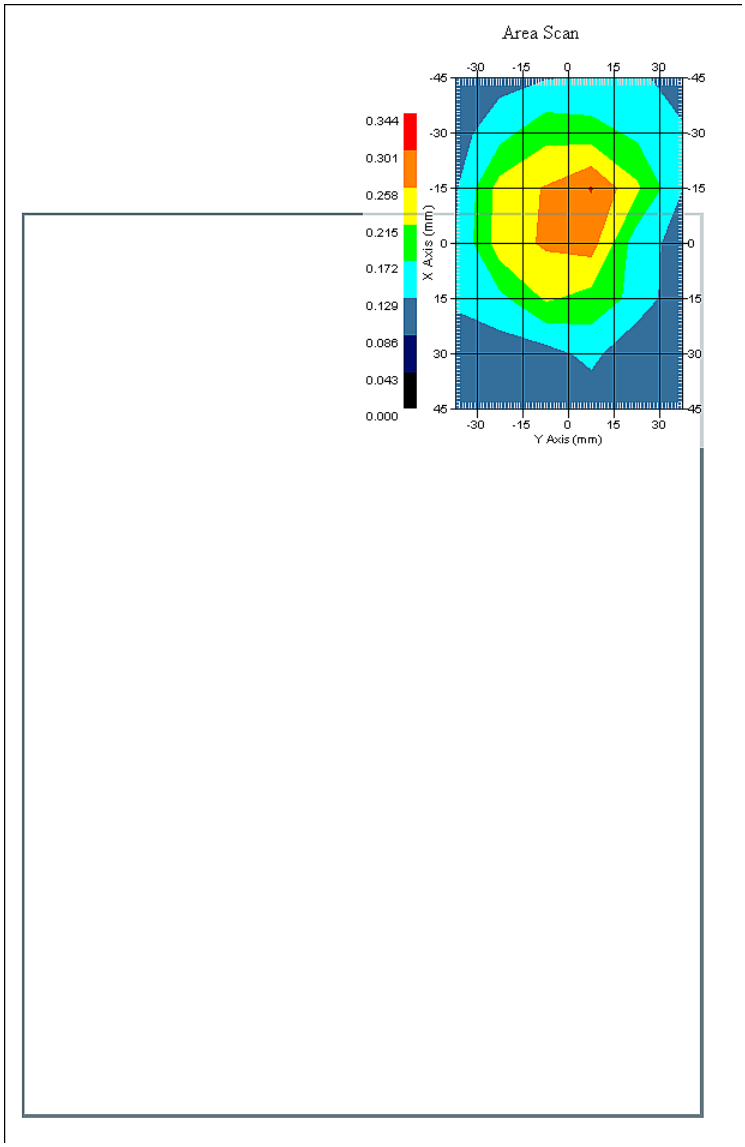

```
1 gram SAR value    : 0.336 W/kg
10 gram SAR value   : 0.207 W/kg
Area Scan Peak SAR  : 0.479 W/kg
Zoom Scan Peak SAR  : 0.940 W/kg
```



SAR Test Report

```
By Operator       : Jay
Measurement Date  : 01-Jun-2011
Starting Time     : 01-Jun-2011  08:23:15 AM
End Time          : 01-Jun-2011  08:39:27 AM
Scanning Time     : 972 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : 802.11b
Model             : X10gx
Frequency         : 2450.00 MHz
Max. Transmit Pwr : 0.09 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Chain C
Orientation       : Bottom
Power Drift-Start : 0.242 W/kg
Power Drift-Finish: 0.250 W/kg
Power Drift (%)   : 3.307

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  : 01-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 46.00 RH%
Epsilon           : 52.17 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   µV/(V/m)^2
Compression Point: 95.00 mV
Offset            : 1.56 mm
```

```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 01-Jun-2011
Set-up Time       : 12:05:26 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```

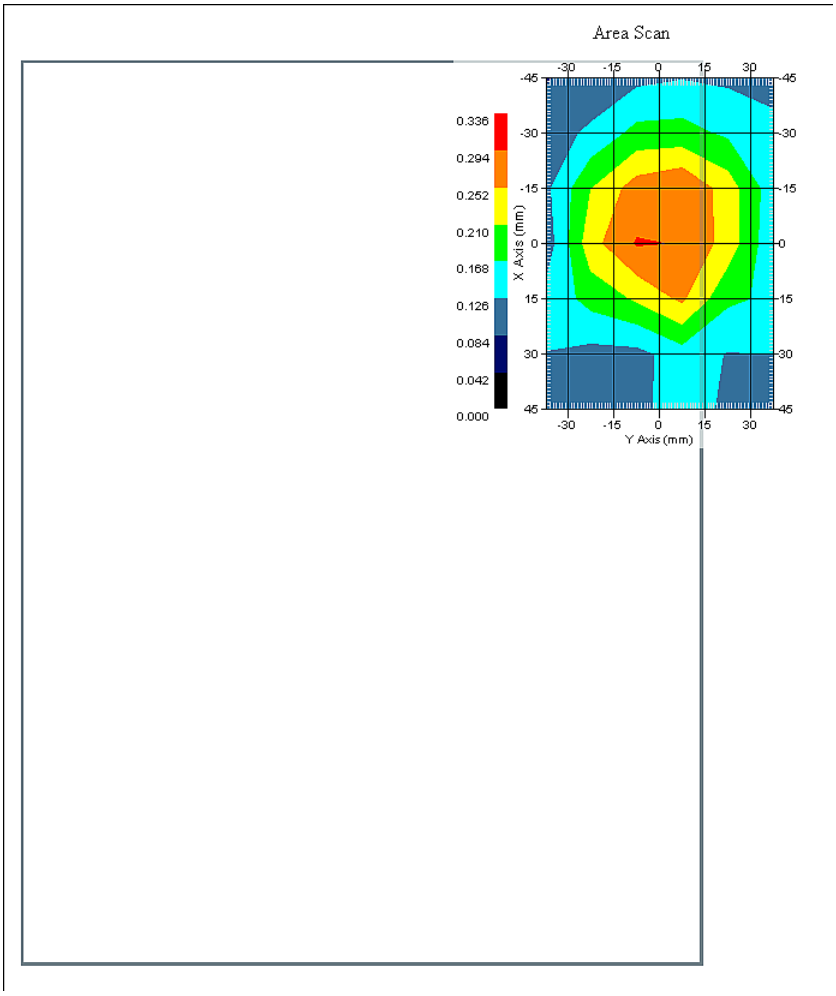



```
1 gram SAR value    : 0.299 W/kg
10 gram SAR value   : 0.201 W/kg
Area Scan Peak SAR : 0.303 W/kg
Zoom Scan Peak SAR : 0.440 W/kg
```

SAR Test Report

```
By Operator       : Jay
Measurement Date  : 02-Jun-2011
Starting Time     : 02-Jun-2011  06:45:19 AM
End Time          : 02-Jun-2011  07:10:48 AM
Scanning Time     : 1529 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : 802.11a
Model             : X10gx
Frequency         : 5150.00 MHz
Max. Transmit Pwr : 0.045 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Chain A
Orientation       : Bottom
Power Drift-Start : 0.263 W/kg
Power Drift-Finish: 0.258 W/kg
Power Drift (%)   : -2.049

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.        : 5250
Frequency         : 5250.00 MHz
Last Calib. Date  : 02-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 46.00 RH%
Epsilon           : 47.41 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         : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/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       : 02-Jun-2011
Set-up Time       : 7:24:35 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Low
```




```
1 gram SAR value    : 0.210 W/kg
10 gram SAR value   : 0.141 W/kg
Area Scan Peak SAR  : 0.297 W/kg
Zoom Scan Peak SAR  : 0.530 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 02-Jun-2011
Starting Time : 02-Jun-2011 08:18:55 AM
End Time : 02-Jun-2011 08:44:31 AM
Scanning Time : 1536 secs

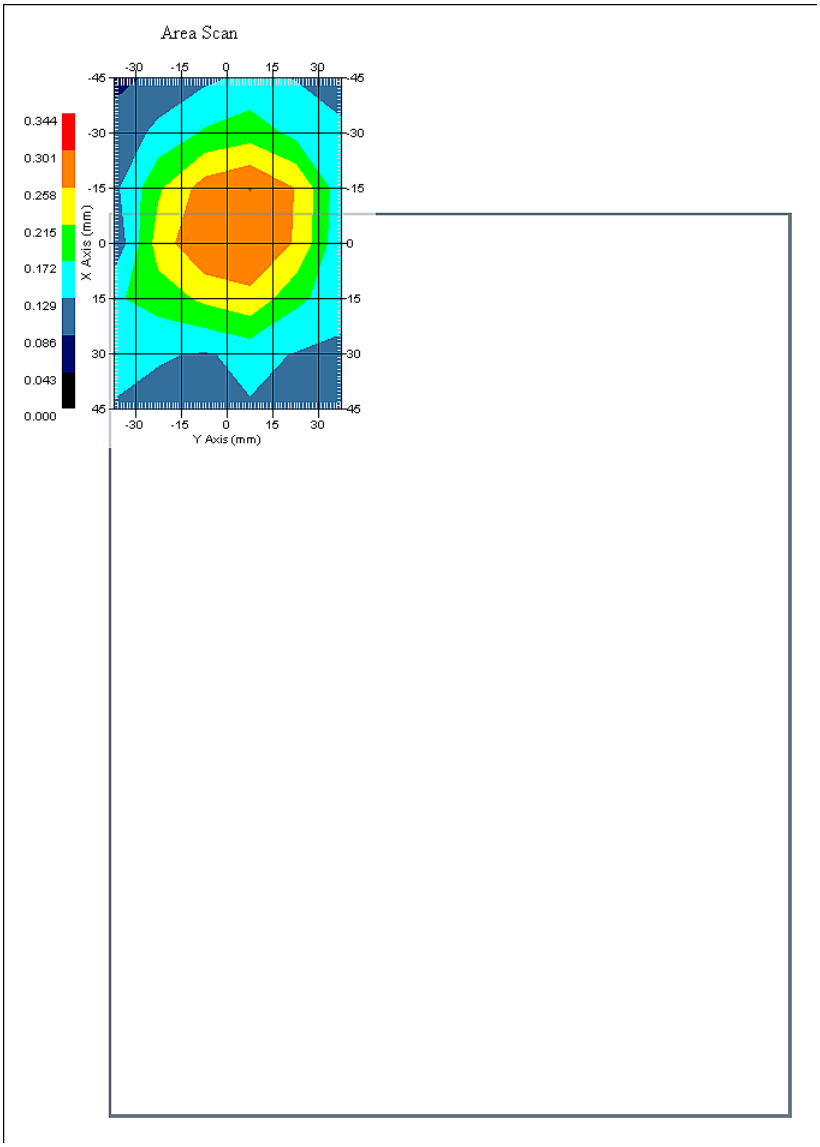
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5150.00 MHz
Max. Transmit Pwr : 0.045 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal – Chain B
Orientation : Bottom
Power Drift-Start : 0.261 W/kg
Power Drift-Finish: 0.251 W/kg
Power Drift (%) : -3.948

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

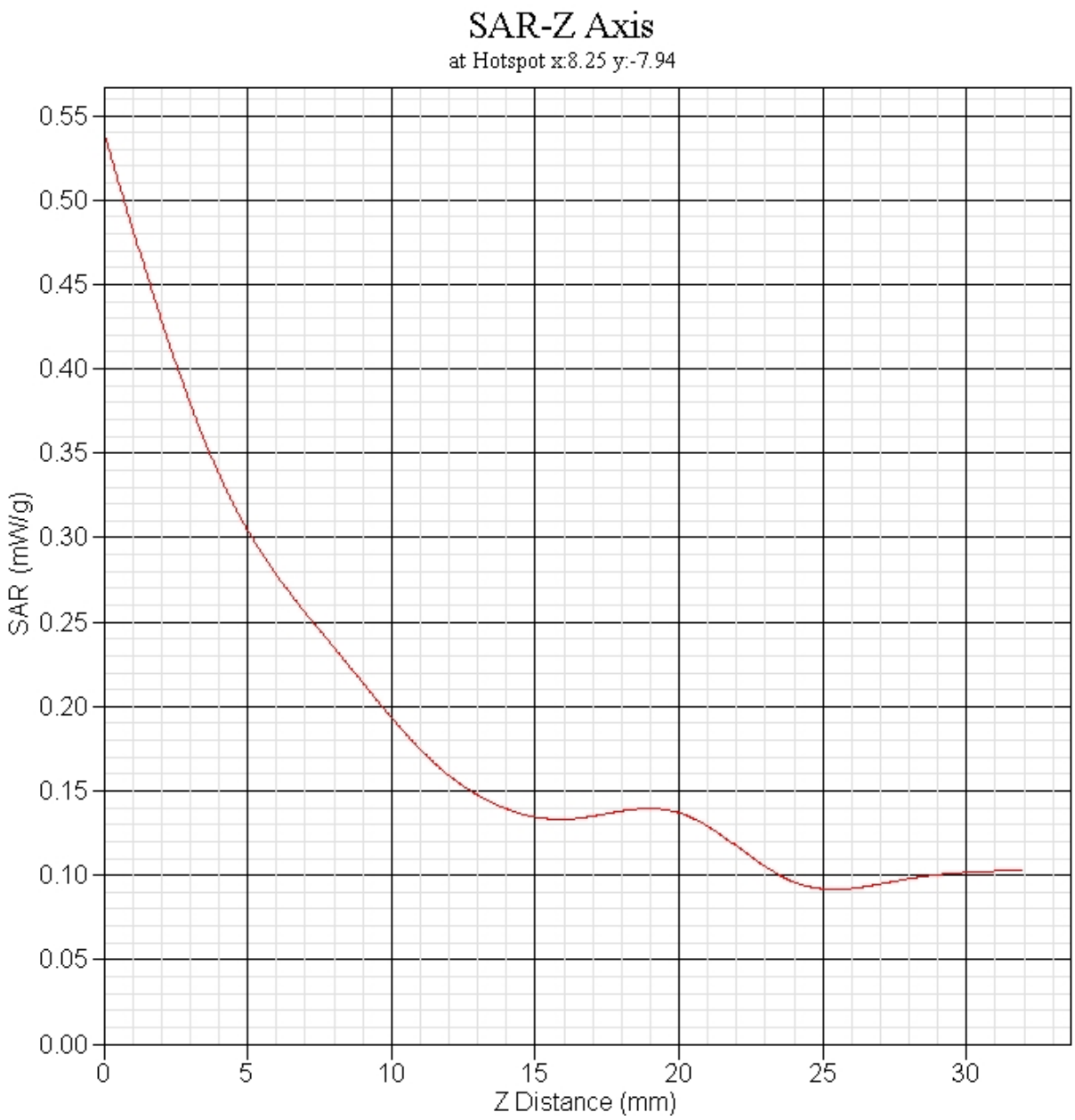
Tissue Data
Type : BODY
Serial No. : 5250
Frequency : 5250.00 MHz
Last Calib. Date : 02-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 47.41 F/m
Sigma : 5.42 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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       : 02-Jun-2011
Set-up Time       : 7:24:35 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.335 W/kg
10 gram SAR value   : 0.219 W/kg
Area Scan Peak SAR  : 0.302 W/kg
Zoom Scan Peak SAR  : 0.540 W/kg
```



SAR Test Report

By Operator : Jay
Measurement Date : 02-Jun-2011
Starting Time : 02-Jun-2011 08:50:16 AM
End Time : 02-Jun-2011 09:15:35 AM
Scanning Time : 1519 secs

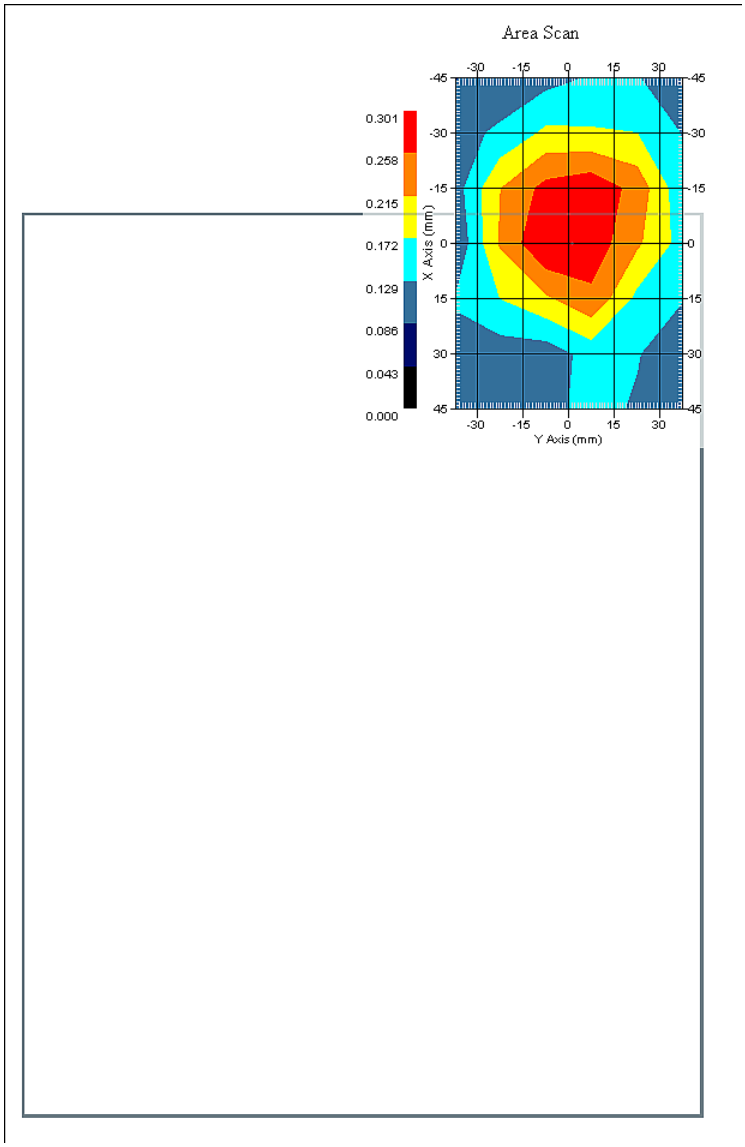
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5150.00 MHz
Max. Transmit Pwr : 0.045 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal – Chain C
Orientation : Bottom
Power Drift-Start : 0.253 W/kg
Power Drift-Finish: 0.249 W/kg
Power Drift (%) : -1.657

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. : 5250
Frequency : 5250.00 MHz
Last Calib. Date : 02-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 47.41 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 : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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       : 02-Jun-2011
Set-up Time       : 7:24:35 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Low
```

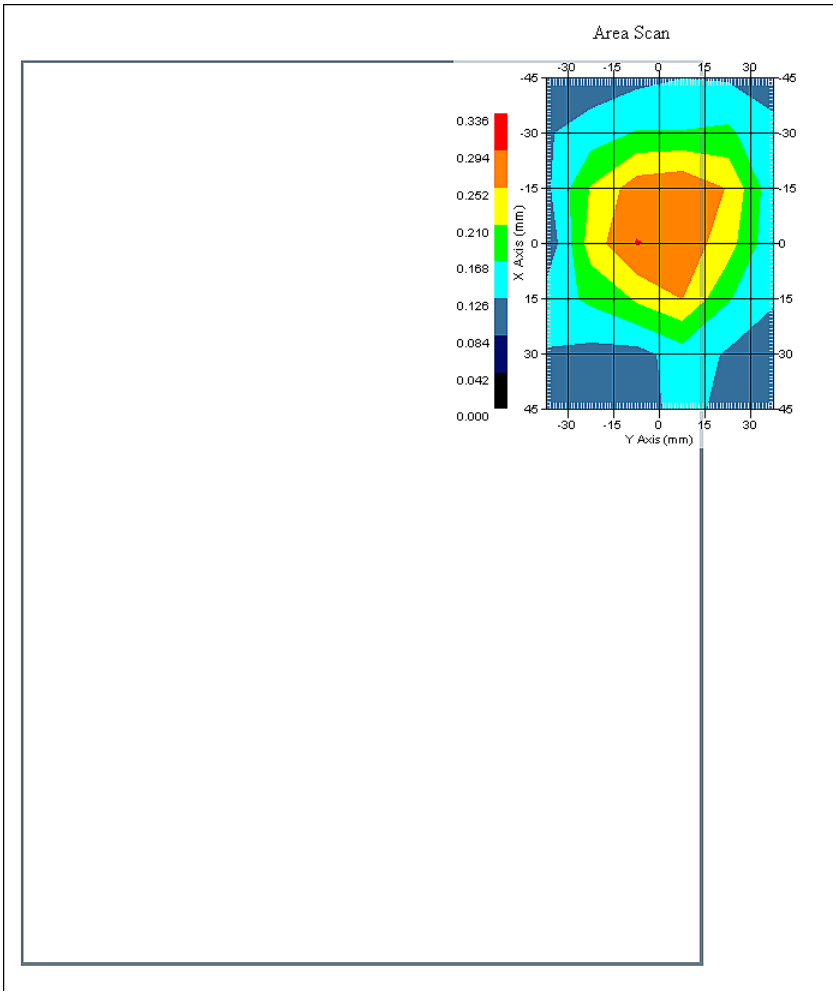



```
1 gram SAR value    : 0.307 W/kg
10 gram SAR value   : 0.189 W/kg
Area Scan Peak SAR  : 0.300 W/kg
Zoom Scan Peak SAR  : 0.520 W/kg
```

SAR Test Report

```
By Operator       : Jay
Measurement Date  : 02-Jun-2011
Starting Time     : 02-Jun-2011  07:16:30 AM
End Time          : 02-Jun-2011  07:41:48 AM
Scanning Time     : 1518 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : 802.11a
Model             : X10gx
Frequency         : 5250.00 MHz
Max. Transmit Pwr : 0.045 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Chain A
Orientation       : Bottom
Power Drift-Start : 0.262 W/kg
Power Drift-Finish: 0.261 W/kg
Power Drift (%)   : -0.332

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.        : 5250
Frequency         : 5250.00 MHz
Last Calib. Date  : 02-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 46.00 RH%
Epsilon           : 47.41 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         : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/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       : 02-Jun-2011
Set-up Time       : 7:24:35 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.200 W/kg
10 gram SAR value   : 0.136 W/kg
Area Scan Peak SAR  : 0.296 W/kg
Zoom Scan Peak SAR  : 0.530 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 02-Jun-2011
Starting Time : 02-Jun-2011 07:47:26 AM
End Time : 02-Jun-2011 08:12:51 AM
Scanning Time : 1525 secs

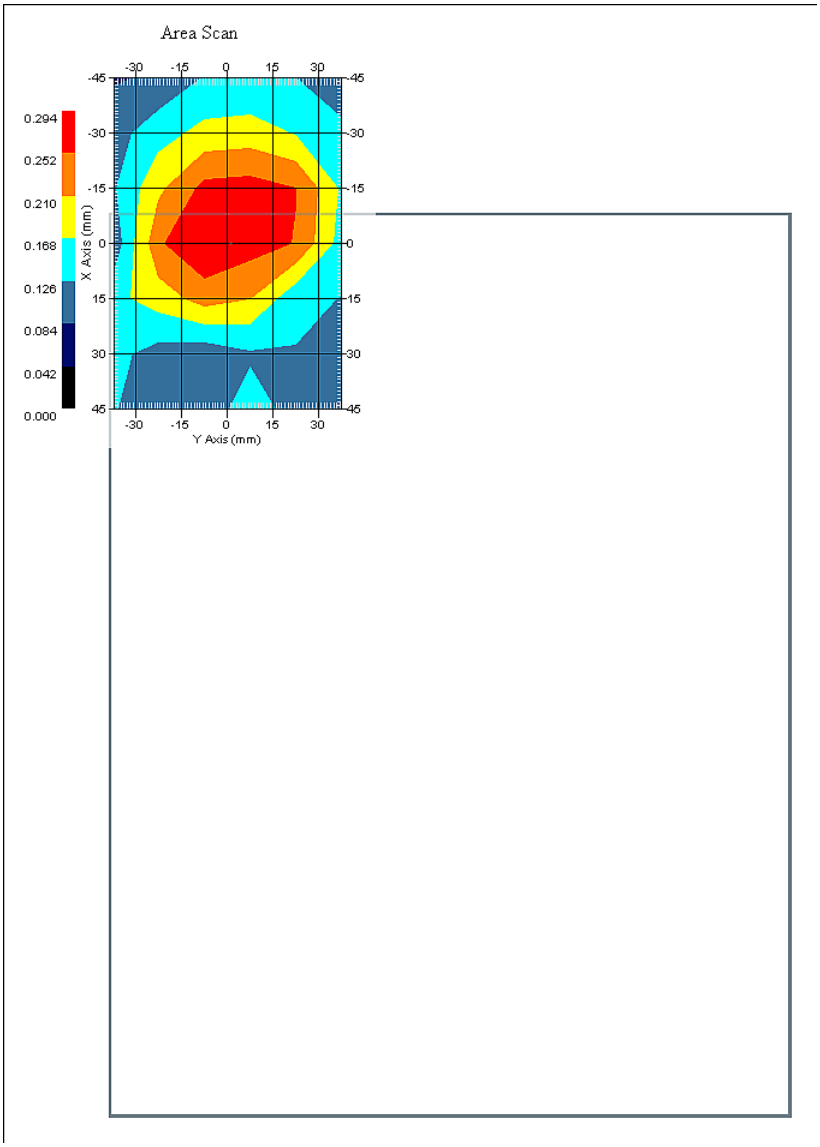
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5250.00 MHz
Max. Transmit Pwr : 0.045 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal – Chain B
Orientation : Bottom
Power Drift-Start : 0.245 W/kg
Power Drift-Finish: 0.248 W/kg
Power Drift (%) : 1.224

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. : 5250
Frequency : 5250.00 MHz
Last Calib. Date : 02-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 47.41 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 : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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       : 02-Jun-2011
Set-up Time       : 7:24:35 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.305 W/kg
10 gram SAR value   : 0.189 W/kg
Area Scan Peak SAR  : 0.292 W/kg
Zoom Scan Peak SAR  : 0.520 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 02-Jun-2011
Starting Time : 02-Jun-2011 07:47:26 AM
End Time : 02-Jun-2011 08:12:51 AM
Scanning Time : 1525 secs

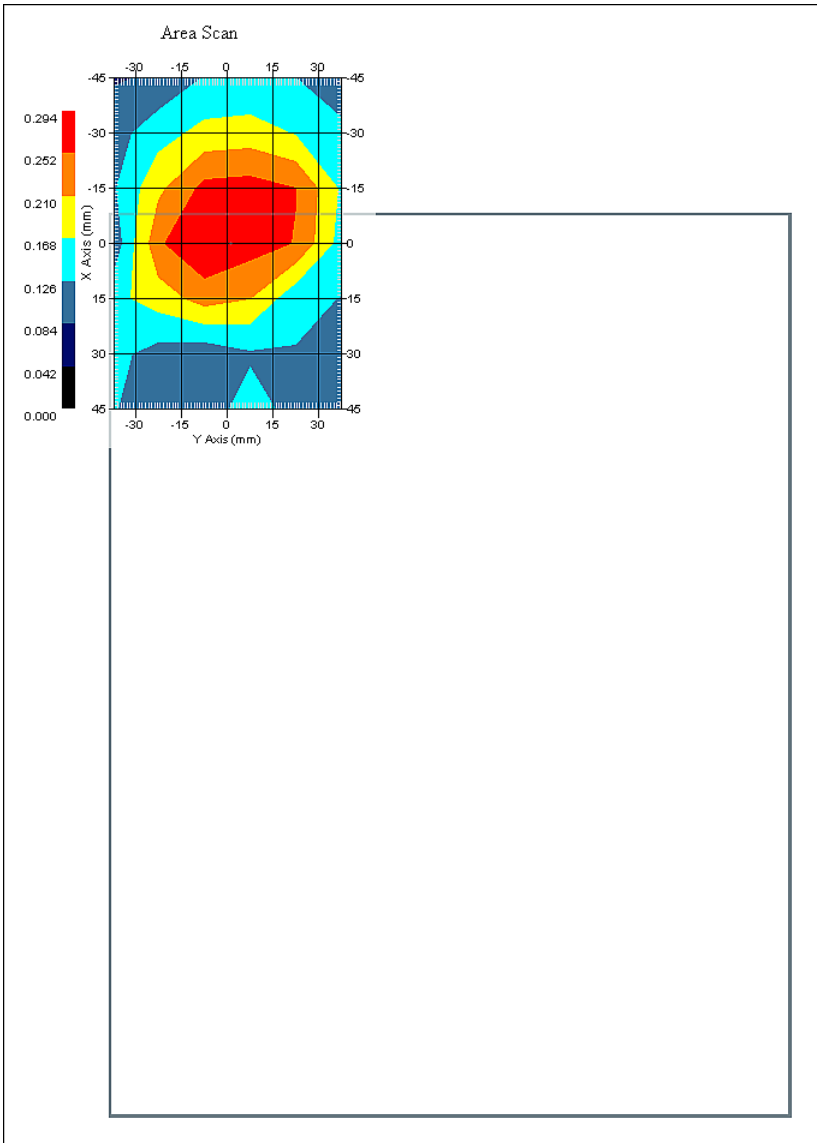
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5250.00 MHz
Max. Transmit Pwr : 0.045 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal – Chain B
Orientation : Bottom
Power Drift-Start : 0.245 W/kg
Power Drift-Finish: 0.248 W/kg
Power Drift (%) : 1.224

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. : 5250
Frequency : 5250.00 MHz
Last Calib. Date : 02-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 47.41 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 : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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       : 02-Jun-2011
Set-up Time       : 7:24:35 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```

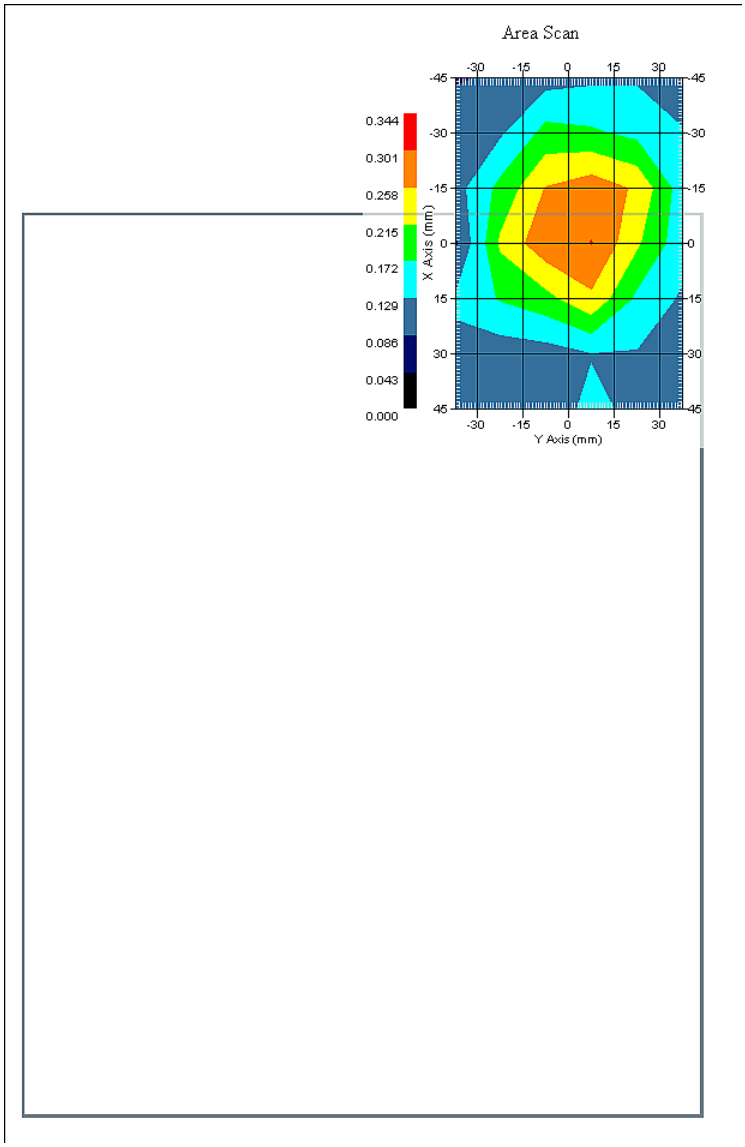



```
1 gram SAR value    : 0.305 W/kg
10 gram SAR value   : 0.189 W/kg
Area Scan Peak SAR  : 0.292 W/kg
Zoom Scan Peak SAR  : 0.520 W/kg
```

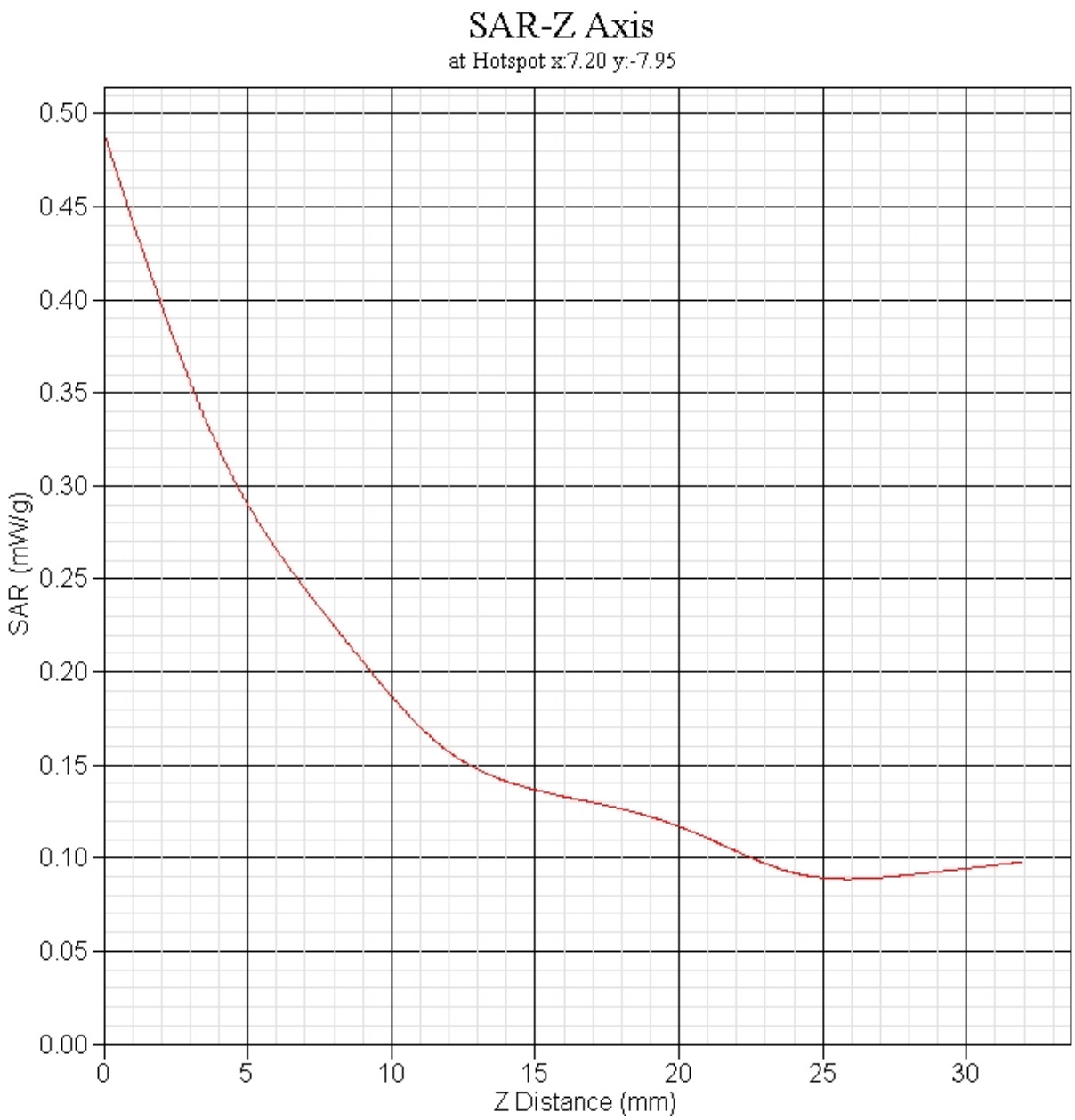
SAR Test Report

```
By Operator       : Jay
Measurement Date  : 02-Jun-2011
Starting Time     : 02-Jun-2011  09:21:59 AM
End Time          : 02-Jun-2011  09:47:34 AM
Scanning Time     : 1535 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : 802.11a
Model             : X10gx
Frequency         : 5250.00 MHz
Max. Transmit Pwr : 0.045 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Chain C
Orientation       : Bottom
Power Drift-Start : 0.253 W/kg
Power Drift-Finish: 0.257 W/kg
Power Drift (%)   : 1.489

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.        : 5250
Frequency         : 5250.00 MHz
Last Calib. Date  : 02-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 46.00 RH%
Epsilon           : 47.41 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         : 5250.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4.4
Probe Sensitivity: 1.20  1.20  1.20   µV/(V/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       : 02-Jun-2011
Set-up Time       : 7:24:35 AM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.315 W/kg
10 gram SAR value   : 0.210 W/kg
Area Scan Peak SAR  : 0.302 W/kg
Zoom Scan Peak SAR  : 0.490 W/kg
```



SAR Test Report

By Operator : Jay
Measurement Date : 03-Jun-2011
Starting Time : 03-Jun-2011 06:43:21 AM
End Time : 03-Jun-2011 07:08:28 AM
Scanning Time : 1507 secs

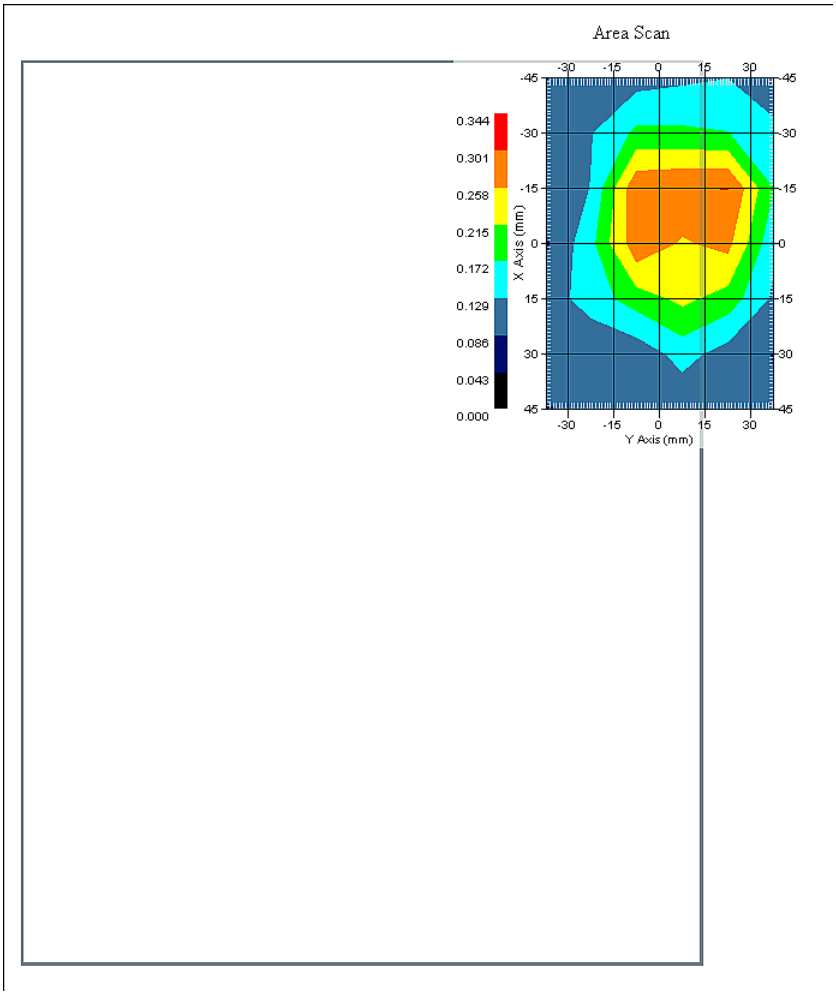
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5600.00 MHz
Max. Transmit Pwr : 0.046 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Chain A
Orientation : Bottom
Power Drift-Start : 0.257 W/kg
Power Drift-Finish: 0.258 W/kg
Power Drift (%) : 0.281

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. : 5600
Frequency : 5600.00 MHz
Last Calib. Date : 03-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 48.35 F/m
Sigma : 5.92 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 : 5600.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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-Jun-2011
Set-up Time       : 3:29:15 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.202 W/kg
10 gram SAR value   : 0.149 W/kg
Area Scan Peak SAR  : 0.302 W/kg
Zoom Scan Peak SAR  : 0.460 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 03-Jun-2011
Starting Time : 03-Jun-2011 07:14:18 AM
End Time : 03-Jun-2011 07:40:35 AM
Scanning Time : 1577 secs

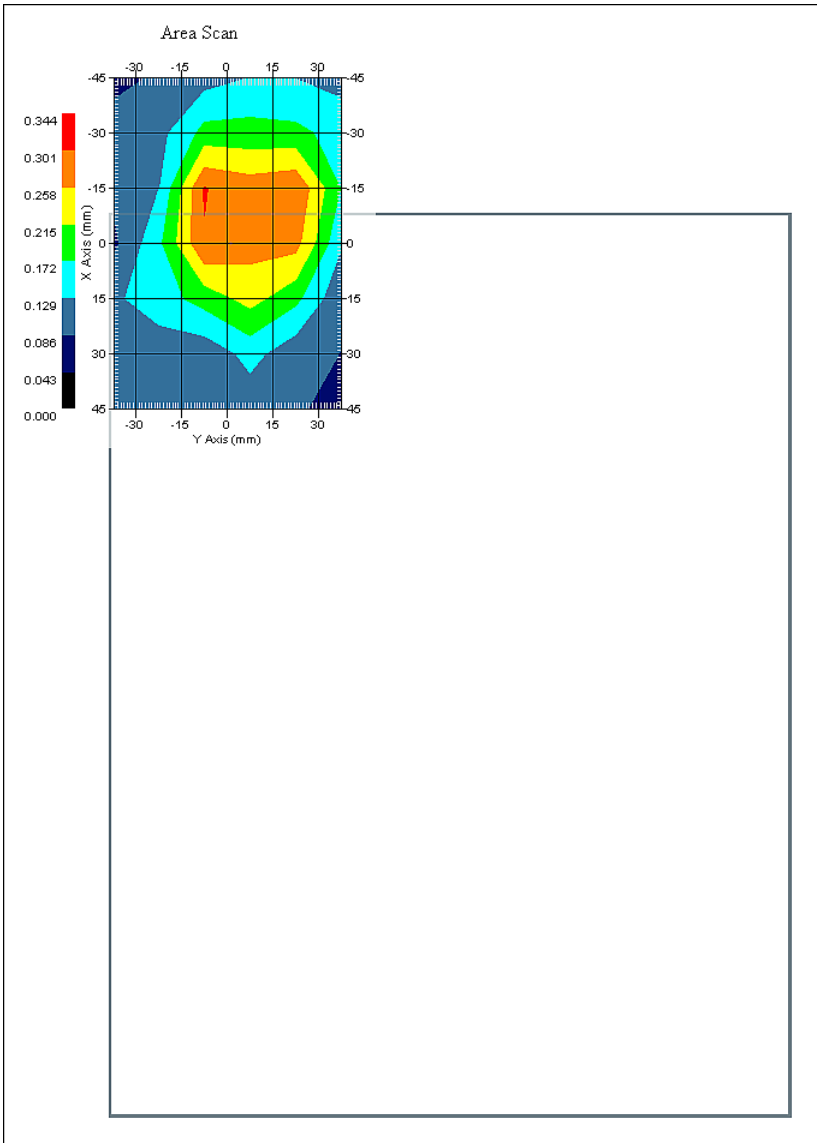
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5600.00 MHz
Max. Transmit Pwr : 0.046 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal – Chain B
Orientation : Bottom
Power Drift-Start : 0.261 W/kg
Power Drift-Finish: 0.266 W/kg
Power Drift (%) : 1.951

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. : 5600
Frequency : 5600.00 MHz
Last Calib. Date : 03-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 48.35 F/m
Sigma : 5.92 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 : 5600.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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-Jun-2011
Set-up Time       : 3:29:15 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.323 W/kg
10 gram SAR value   : 0.203 W/kg
Area Scan Peak SAR  : 0.303 W/kg
Zoom Scan Peak SAR  : 0.550 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 03-Jun-2011
Starting Time : 03-Jun-2011 07:48:44 AM
End Time : 03-Jun-2011 08:15:02 AM
Scanning Time : 1578 secs

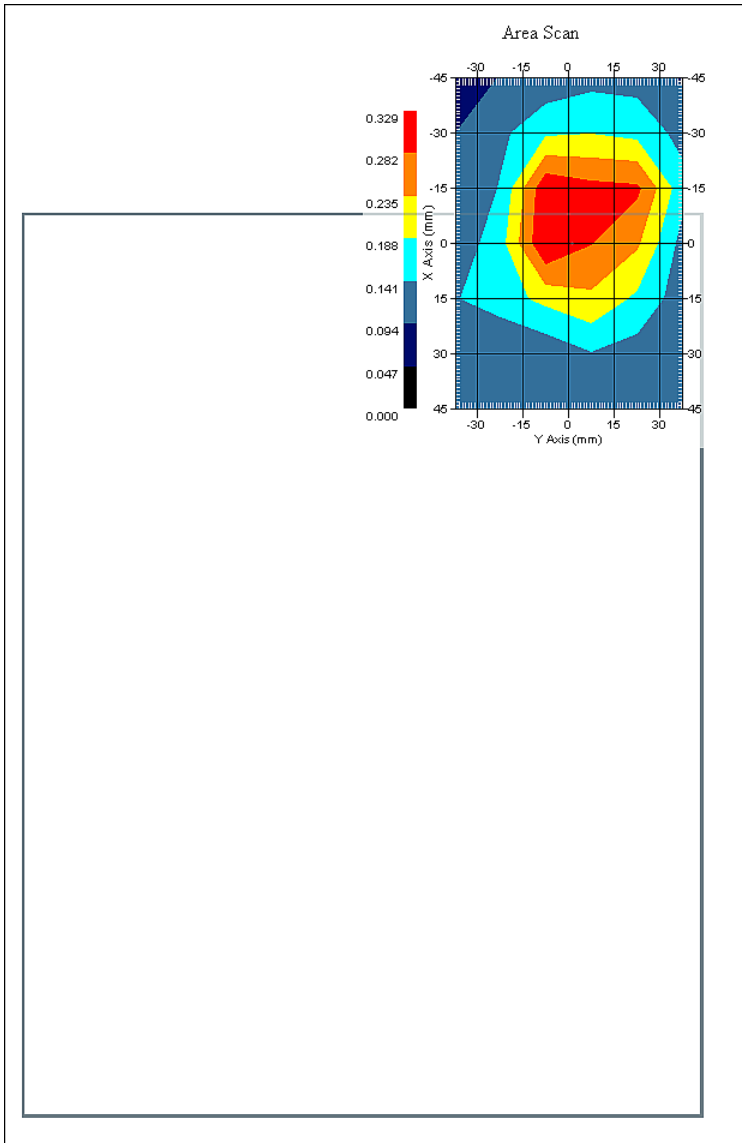
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5600.00 MHz
Max. Transmit Pwr : 0.046 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Chain C
Orientation : Bottom
Power Drift-Start : 0.247 W/kg
Power Drift-Finish: 0.256 W/kg
Power Drift (%) : 3.648

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

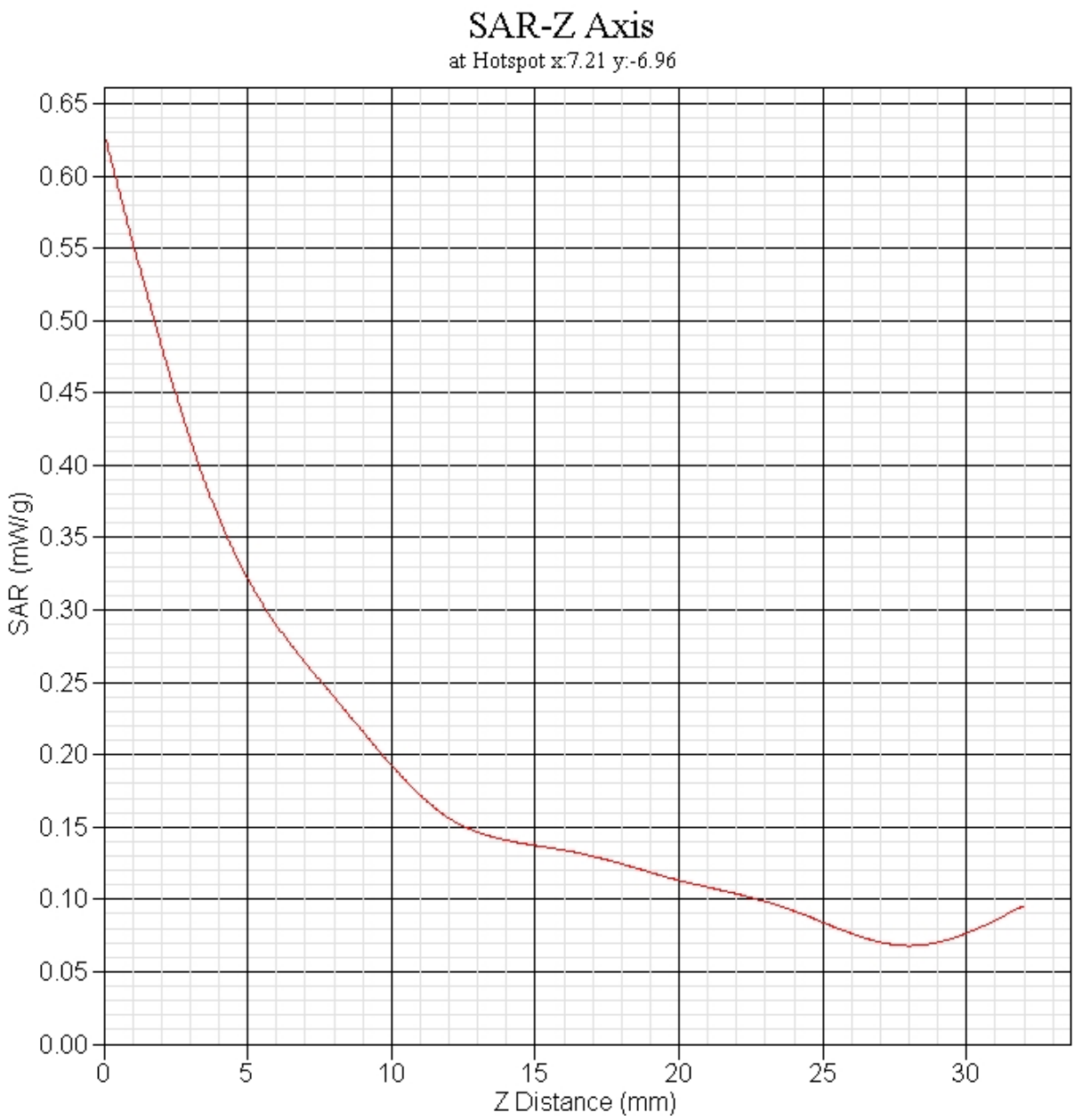
Tissue Data
Type : BODY
Serial No. : 5600
Frequency : 5600.00 MHz
Last Calib. Date : 03-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 48.35 F/m
Sigma : 5.92 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5600.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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-Jun-2011
Set-up Time       : 3:29:15 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```



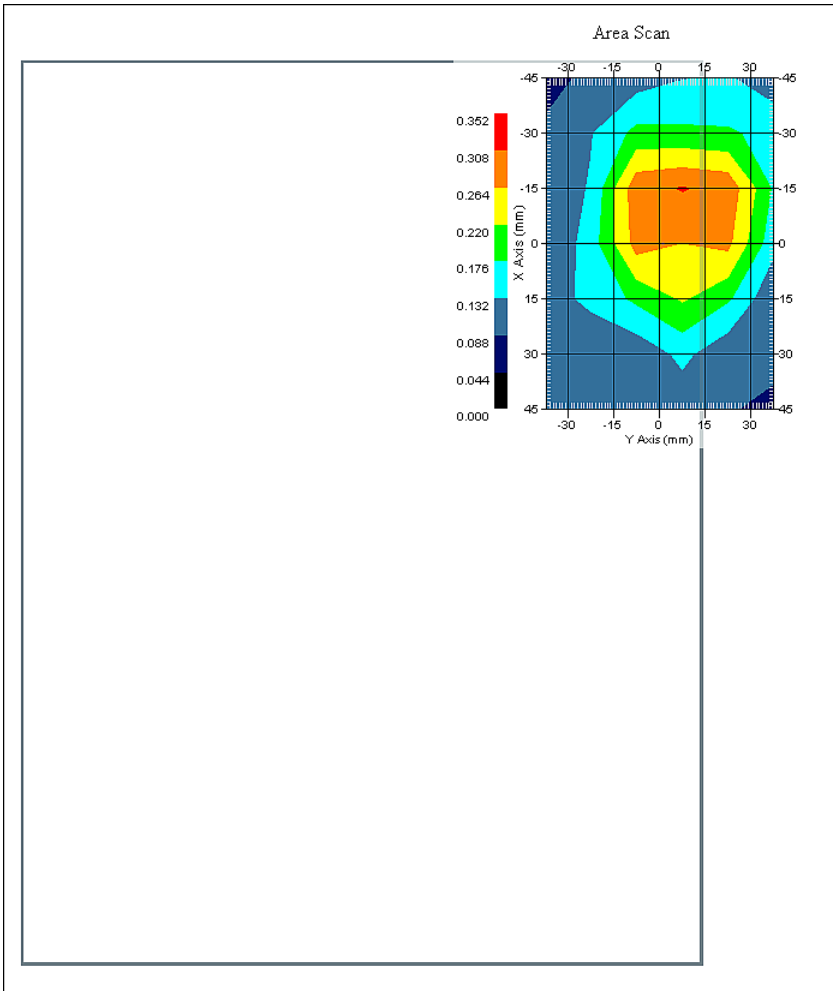

```
1 gram SAR value    : 0.349 W/kg
10 gram SAR value   : 0.216 W/kg
Area Scan Peak SAR  : 0.329 W/kg
Zoom Scan Peak SAR  : 0.630 W/kg
```



SAR Test Report

```
By Operator       : Jay
Measurement Date  : 03-Jun-2011
Starting Time     : 03-Jun-2011  12:45:23 PM
End Time          : 03-Jun-2011  01:10:34 PM
Scanning Time     : 1511 secs

Product Data
Device Name       : DRS
Serial No.        : 9146M01009G103000EFM000
Mode              : 802.11a
Model             : X10gx
Frequency         : 5800.00 MHz
Max. Transmit Pwr : 0.07 W
Drift Time        : 0 min(s)
Length            : 290 mm
Width             : 220 mm
Depth             : 40 mm
Antenna Type      : Internal - Chain A
Orientation       : Bottom
Power Drift-Start : 0.262 W/kg
Power Drift-Finish: 0.271 W/kg
Power Drift (%)   : 3.548

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.        : 5785
Frequency         : 5785.00 MHz
Last Calib. Date  : 03-Jun-2011
Temperature       : 20.00 °C
Ambient Temp.     : 23.00 °C
Humidity          : 46.00 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   µV/(V/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-Jun-2011
Set-up Time       : 3:29:15 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.241 W/kg
10 gram SAR value   : 0.156 W/kg
Area Scan Peak SAR  : 0.311 W/kg
Zoom Scan Peak SAR  : 0.550 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 03-Jun-2011
Starting Time : 03-Jun-2011 07:14:18 AM
End Time : 03-Jun-2011 07:40:35 AM
Scanning Time : 1577 secs

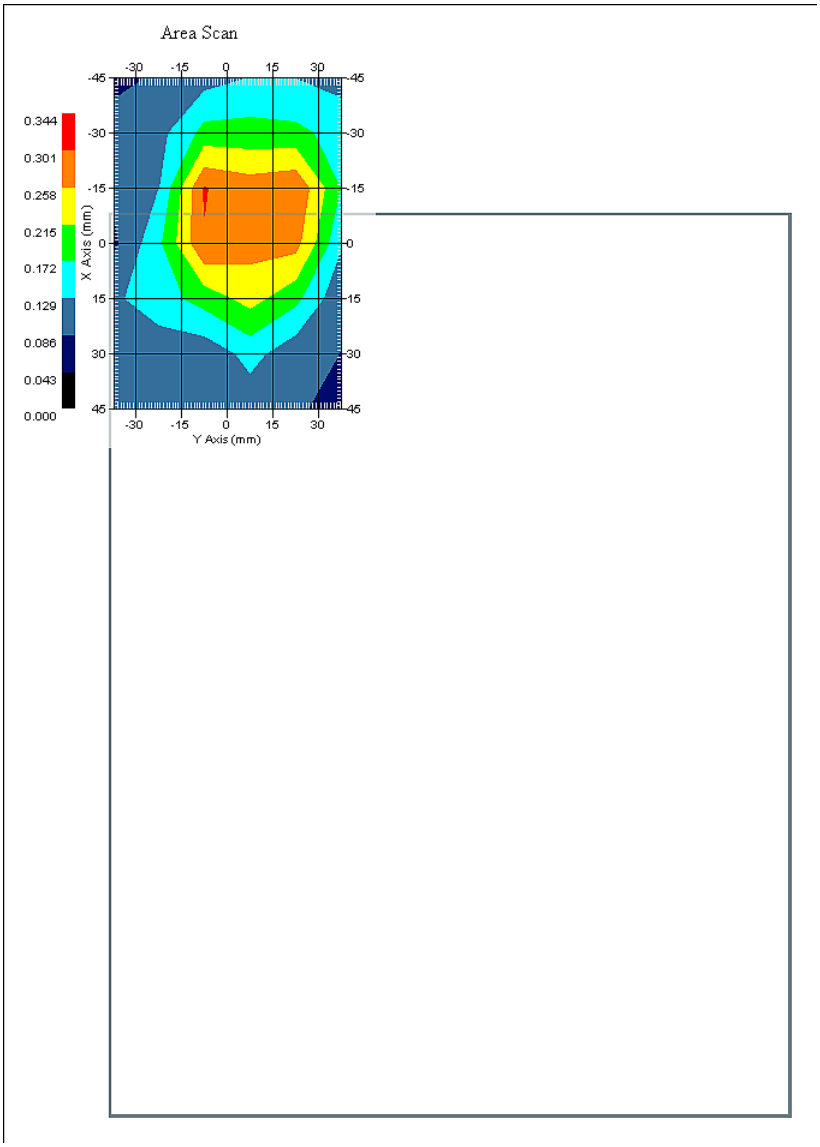
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5600.00 MHz
Max. Transmit Pwr : 0.046 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal – Chain B
Orientation : Bottom
Power Drift-Start : 0.261 W/kg
Power Drift-Finish: 0.266 W/kg
Power Drift (%) : 1.951

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. : 5600
Frequency : 5600.00 MHz
Last Calib. Date : 03-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 48.35 F/m
Sigma : 5.92 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 : 5600.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
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-Jun-2011
Set-up Time       : 3:29:15 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```




```
1 gram SAR value    : 0.323 W/kg
10 gram SAR value   : 0.203 W/kg
Area Scan Peak SAR  : 0.303 W/kg
Zoom Scan Peak SAR  : 0.550 W/kg
```

SAR Test Report

By Operator : Jay
Measurement Date : 03-Jun-2011
Starting Time : 03-Jun-2011 07:48:44 AM
End Time : 03-Jun-2011 08:15:02 AM
Scanning Time : 1578 secs

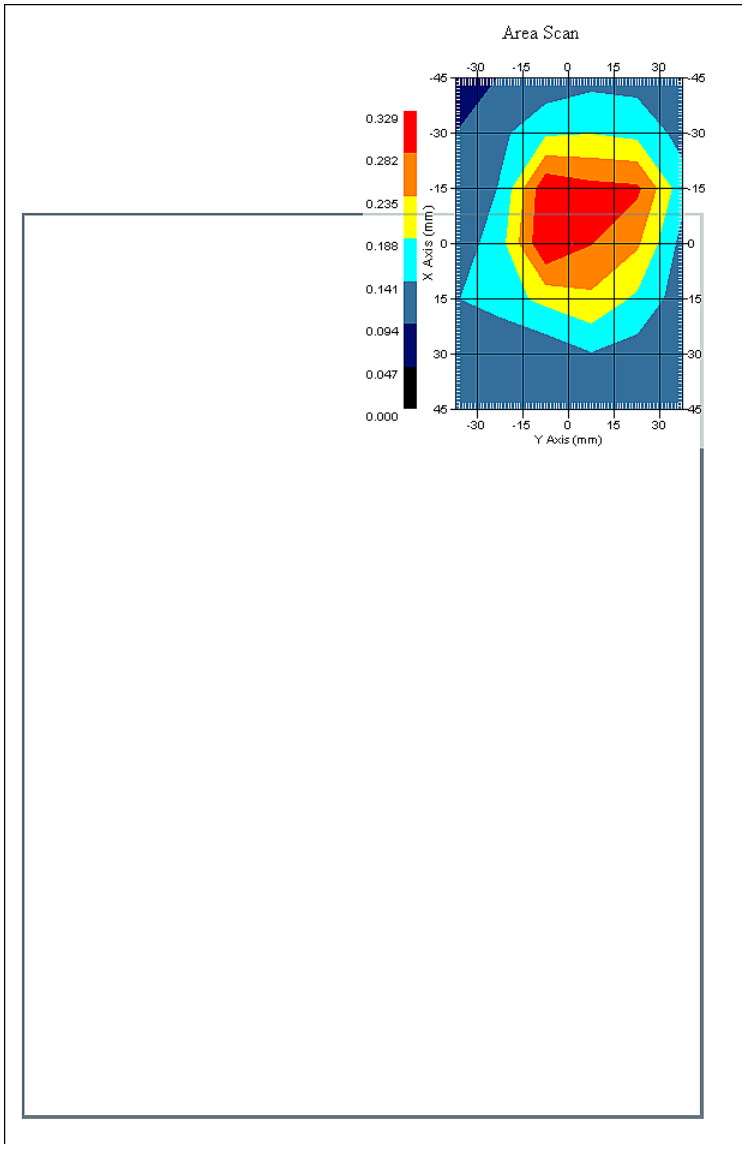
Product Data
Device Name : DRS
Serial No. : 9146M01009G103000EFM000
Mode : 802.11a
Model : X10gx
Frequency : 5600.00 MHz
Max. Transmit Pwr : 0.046 W
Drift Time : 0 min(s)
Length : 290 mm
Width : 220 mm
Depth : 40 mm
Antenna Type : Internal - Chain C
Orientation : Bottom
Power Drift-Start : 0.247 W/kg
Power Drift-Finish: 0.256 W/kg
Power Drift (%) : 3.648

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

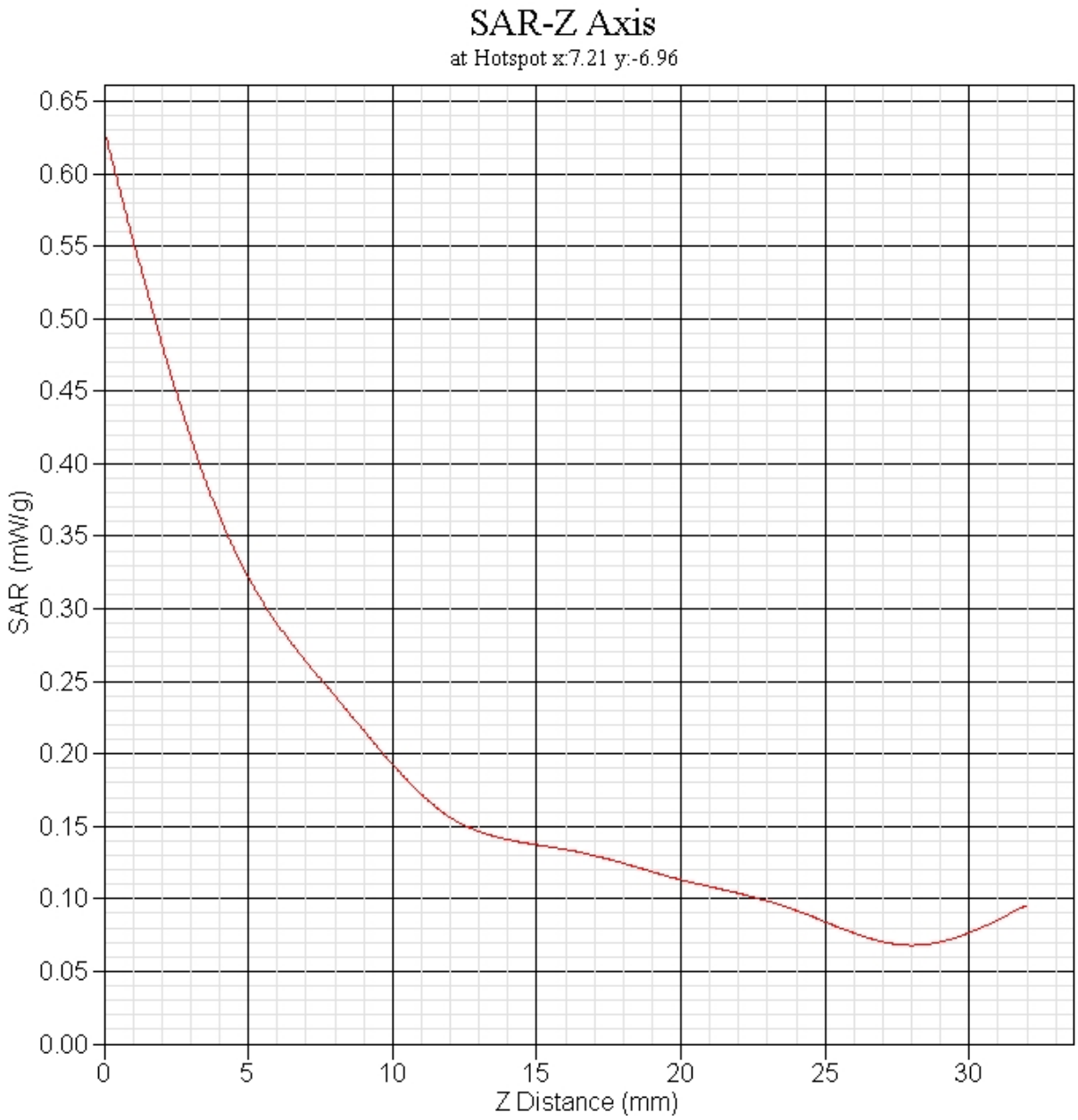
Tissue Data
Type : BODY
Serial No. : 5600
Frequency : 5600.00 MHz
Last Calib. Date : 03-Jun-2011
Temperature : 20.00 °C
Ambient Temp. : 23.00 °C
Humidity : 46.00 RH%
Epsilon : 48.35 F/m
Sigma : 5.92 S/m
Density : 1000.00 kg/cu. m

Probe Data
Name : Probe E030-001 - RFEL
Model : E030
Type : E-Field Triangle
Serial No. : E030-001
Last Calib. Date : 12-Jul-2010
Frequency : 5600.00 MHz
Duty Cycle Factor: 1
Conversion Factor: 4
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 0.56 mm

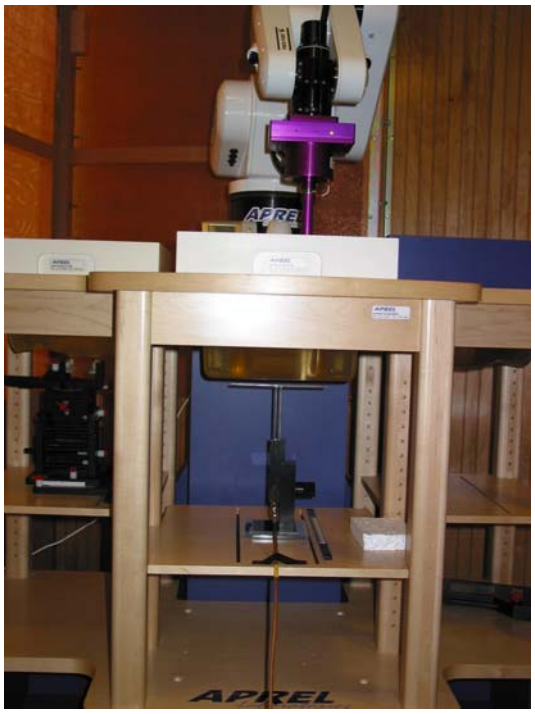
```
Measurement Data
Crest Factor      : 1
Scan Type         : Complete
Tissue Temp.      : 20.00 °C
Ambient Temp.     : 23.00 °C
Set-up Date       : 03-Jun-2011
Set-up Time       : 3:29:15 PM
Area Scan         : 7x6x1 : Measurement x=15mm, y=15mm, z=4mm
Zoom Scan         : 7x7x10 : Measurement x=4mm, y=4mm, z=2.5mm

Other Data
DUT Position      : Bottom
Separation        : 0 mm
Channel           : Mid
```



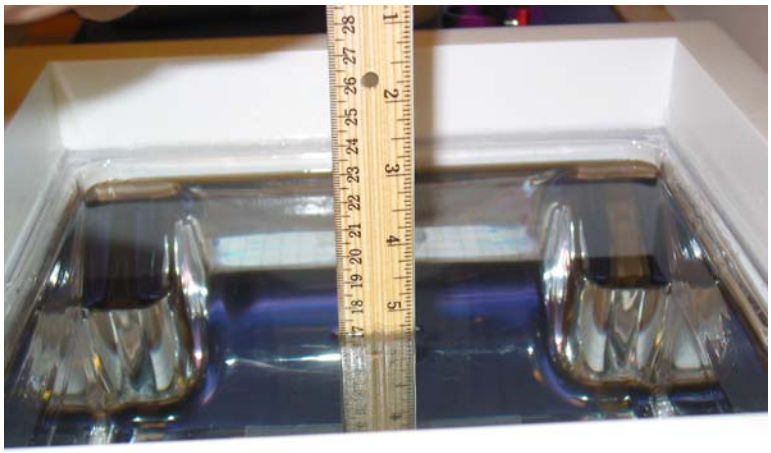

```
1 gram SAR value    : 0.349 W/kg
10 gram SAR value   : 0.216 W/kg
Area Scan Peak SAR  : 0.329 W/kg
Zoom Scan Peak SAR  : 0.630 W/kg
```



Appendix C – SAR Test Setup Photos



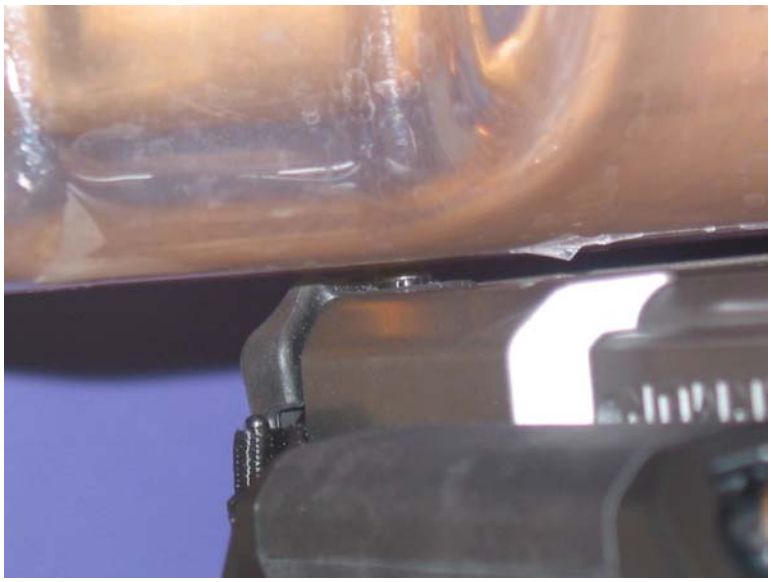
System Body Configuration



Body Tissue Depth

Bottom WWAN and Chain A WLAN Test Position

Bottom Chain C WLAN Test Position



Bottom Chain B WLAN Test Position

Front of Device

Back of Device

Battery

Antenna Locations
Antenna to User Distance 2 cm
Main WWAN to Chain A WLAN Distance 2.2 cm
Main WWAN to Chain C WLAN Distance 9.4 cm
Main WWAN to Chain B WLAN Distance 22.0 cm
BT to All Antennas >15 cm

Appendix D – Probe Calibration Data Sheets

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1156

Client.: RFEL

C E R T I F I C A T E OF C A L I B R A T I O N

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 835 MHz

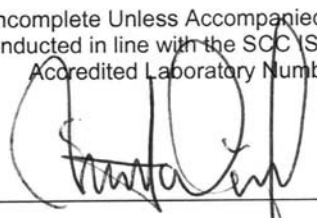
Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 215

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

!7 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)”

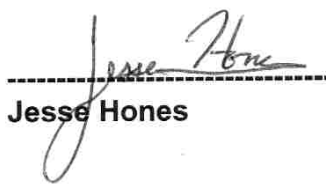
Conditions

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

Sensitivity in Body Tissue Measured

Frequency: 835 MHz

Epsilon: 53.7 (+/-5%) **Sigma:** 0.96 S/m (+/-5%)

ConvF

Channel X: 6.3

Channel Y: 6.3

Channel Z: 6.3

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

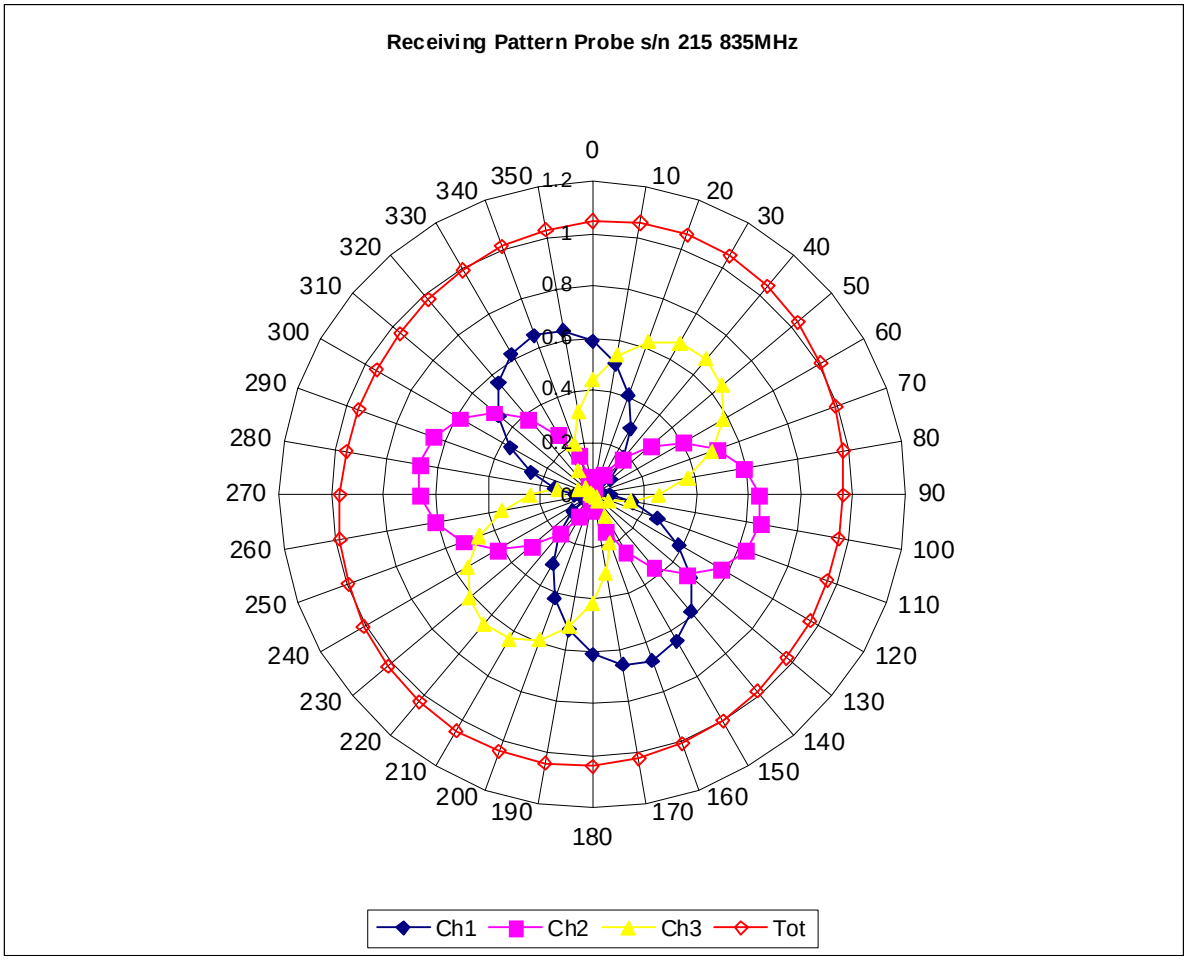
Boundary Effect:

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.

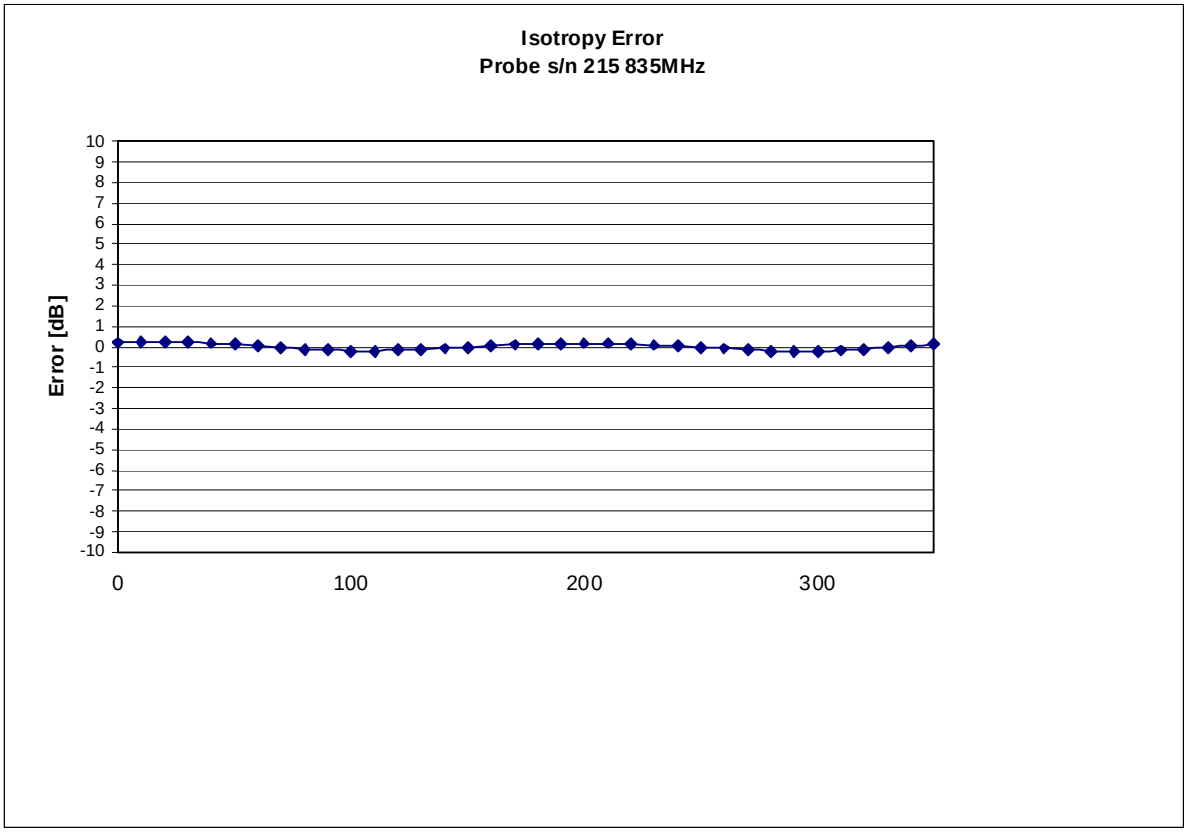
Spatial Resolution:

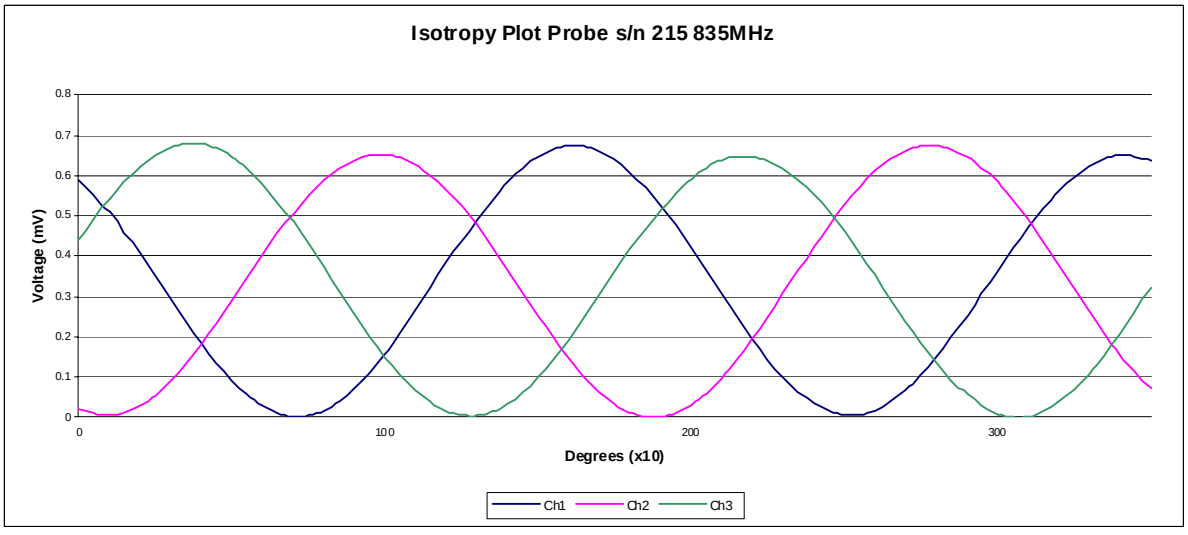
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 835 MHz (Air)



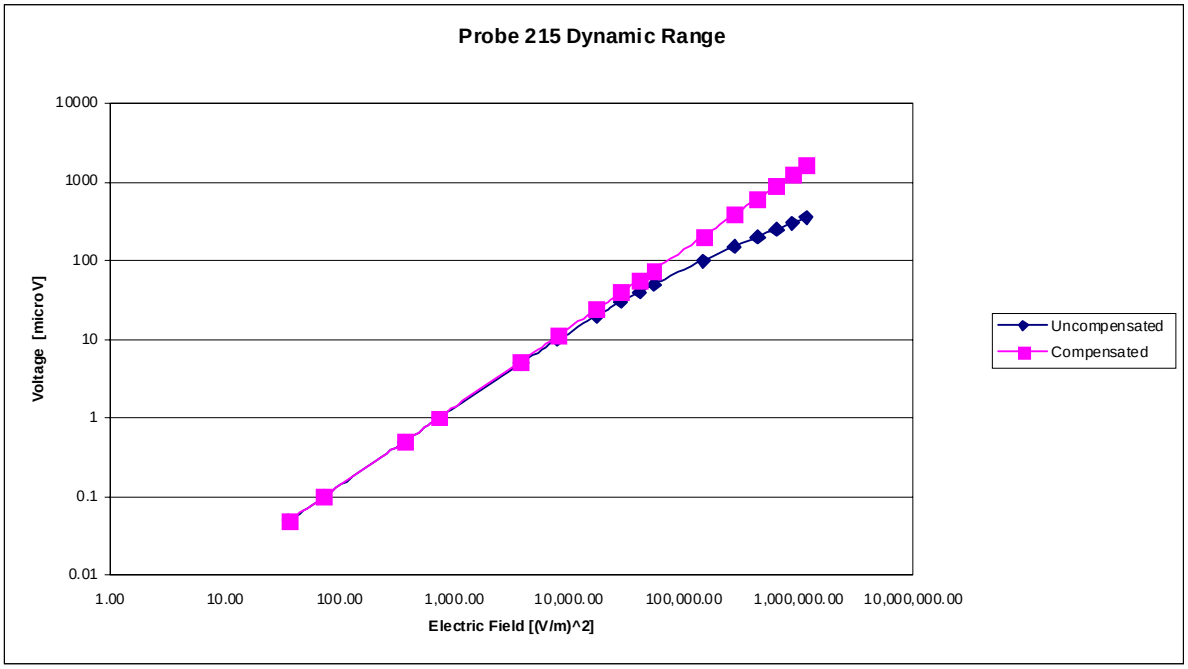
Isotropy Error 835 MHz (Air)



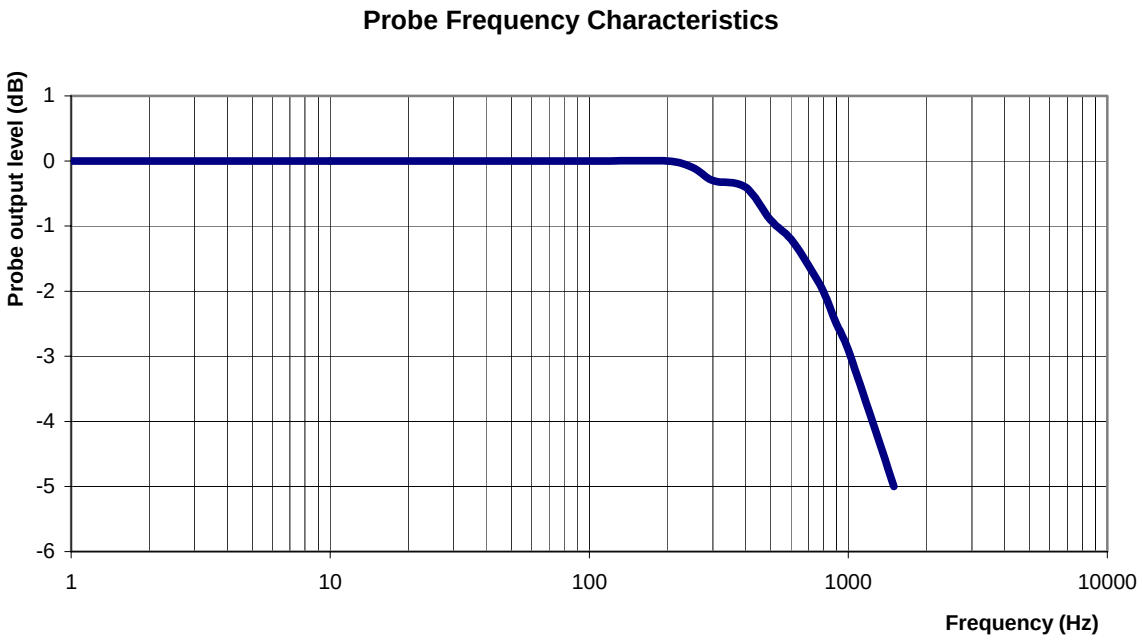


Isotropicity Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



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

Conversion Factor Uncertainty Assessment Measured

Sensitivity in Body Tissue

Frequency:		835 MHz	
Epsilon:	53.7 (+/-5%)	**Sigma:**	0.96 S/m (+/-5%)
ConvF			
Channel X:	6.3	7%(K=2)	
Channel Y:	6.3	7%(K=2)	
Channel Z:	6.3	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
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NCL CALIBRATION LABORATORIES

Calibration File No.: CP-1162

Client.: RFEL

C E R T I F I C A T E OF C A L I B R A T I O N

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 1900 MHz

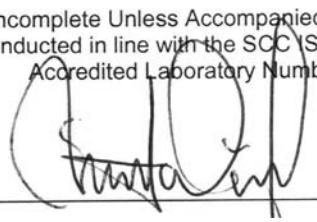
Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 215

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

!7 Bentley Ave
NEPEAN, ONTARIO
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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)”

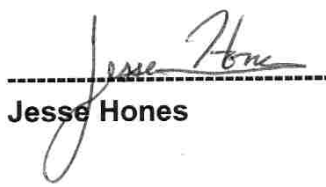
Conditions

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:	1900 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 $\mu V/(V/m)^2$
Channel Y:	1.2 $\mu V/(V/m)^2$
Channel Z:	1.2 $\mu V/(V/m)^2$
Diode Compression Point:	95 mV

Sensitivity in Body Tissue Measured

Frequency: 1900 MHz

Epsilon: 51.9 (+/-5%) **Sigma:** 1.56 S/m (+/-5%)

ConvF

Channel X: 5.0

Channel Y: 5.0

Channel Z: 5.0

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

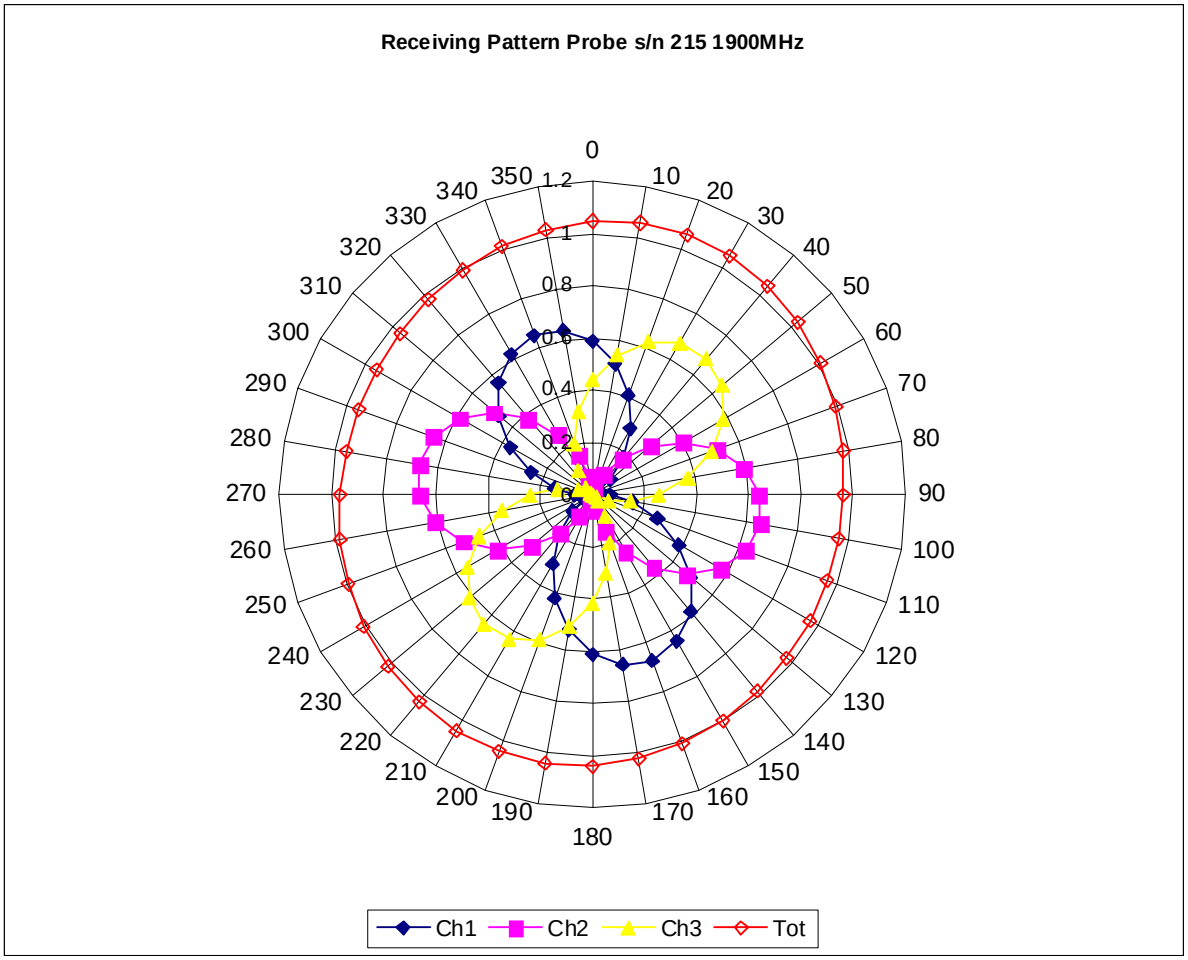
Boundary Effect:

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.

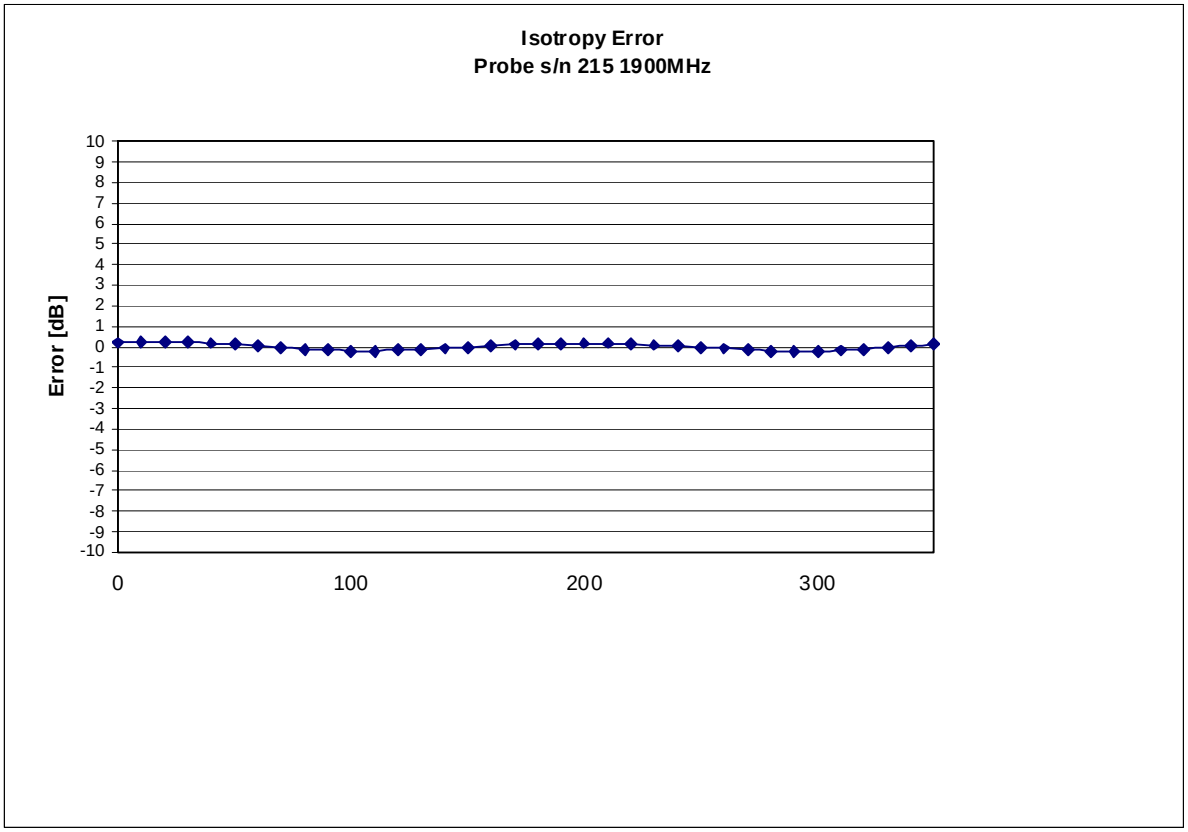
Spatial Resolution:

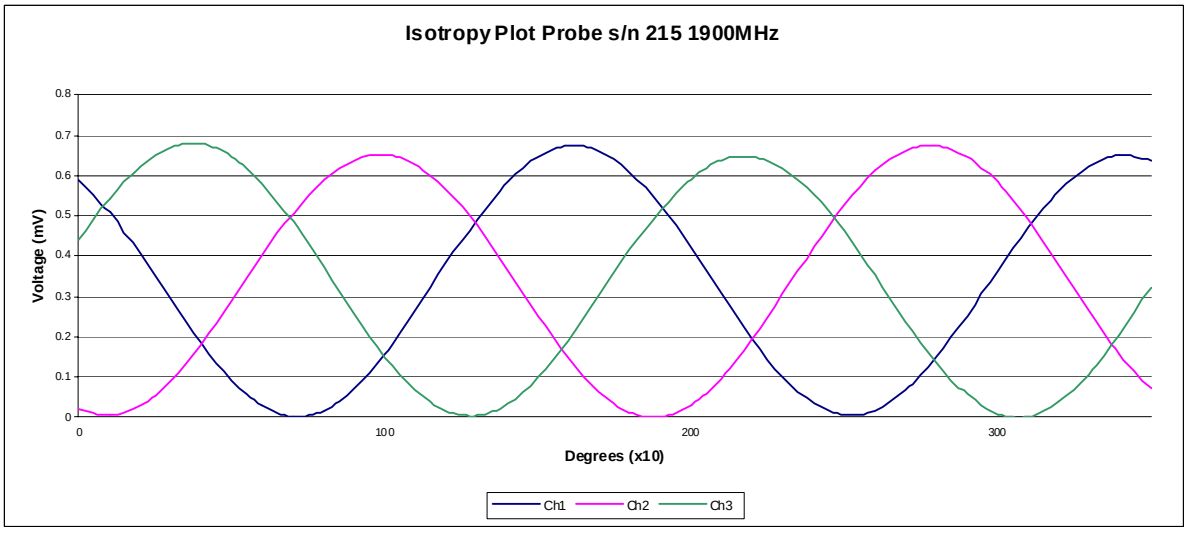
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 1900 MHz (Air)



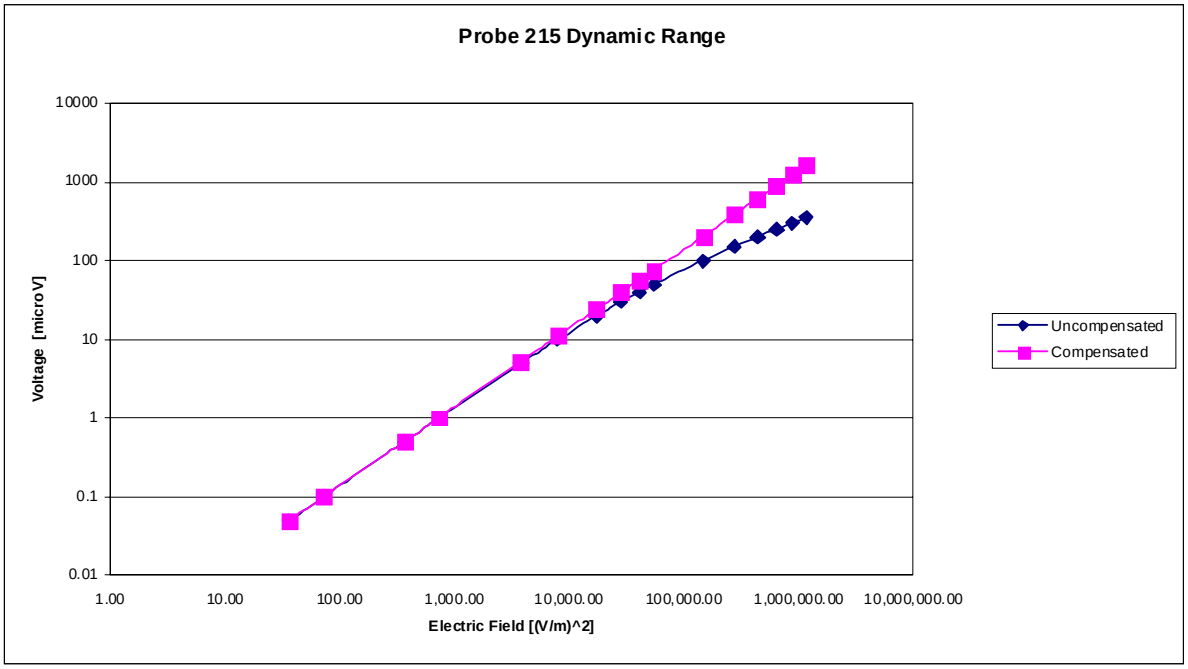
Isotropy Error 1900 MHz (Air)



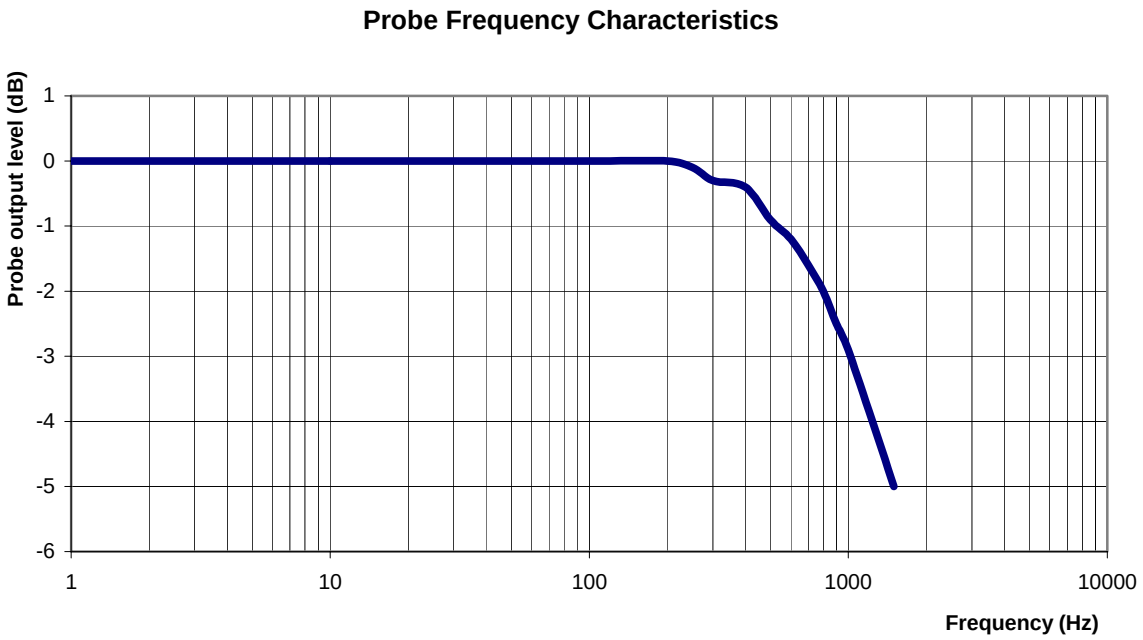


Isotropicity Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



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

Conversion Factor Uncertainty Assessment Measured

Sensitivity in Body Tissue

Frequency:		1900 MHz	
Epsilon:	51.9 (+/-5%)	**Sigma:**	1.56 S/m (+/-5%)
ConvF			
Channel X:	5.0	7%(K=2)	
Channel Y:	5.0	7%(K=2)	
Channel Z:	5.0	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-1164

Client.: RFEL

C E R T I F I C A T E OF C A L I B R A T I O N

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

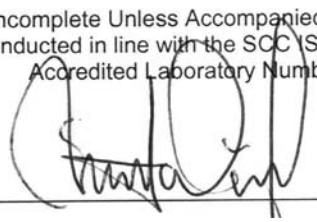
Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: 215

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

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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)”

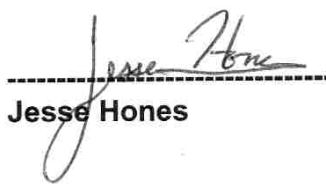
Conditions

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

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.

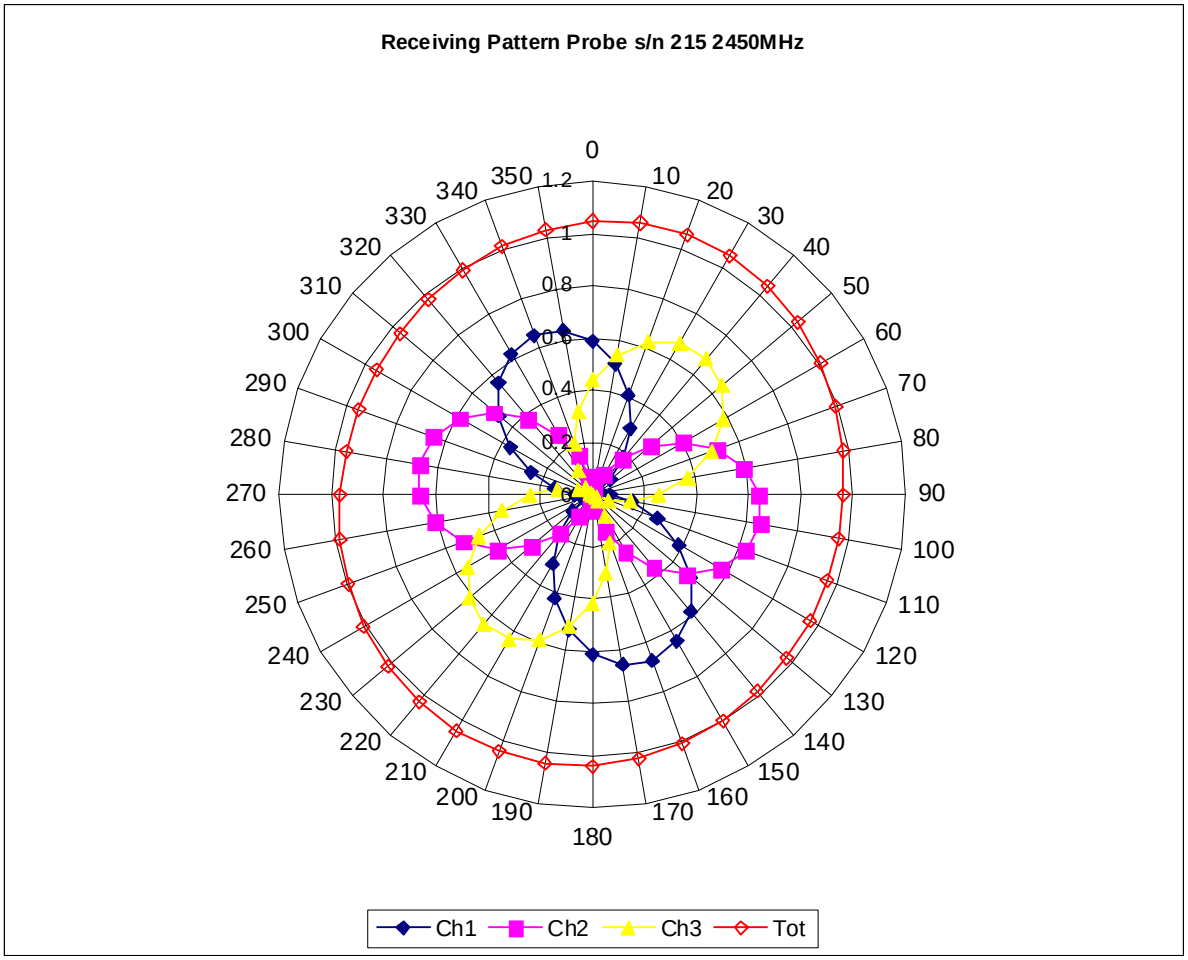
Boundary Effect:

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.

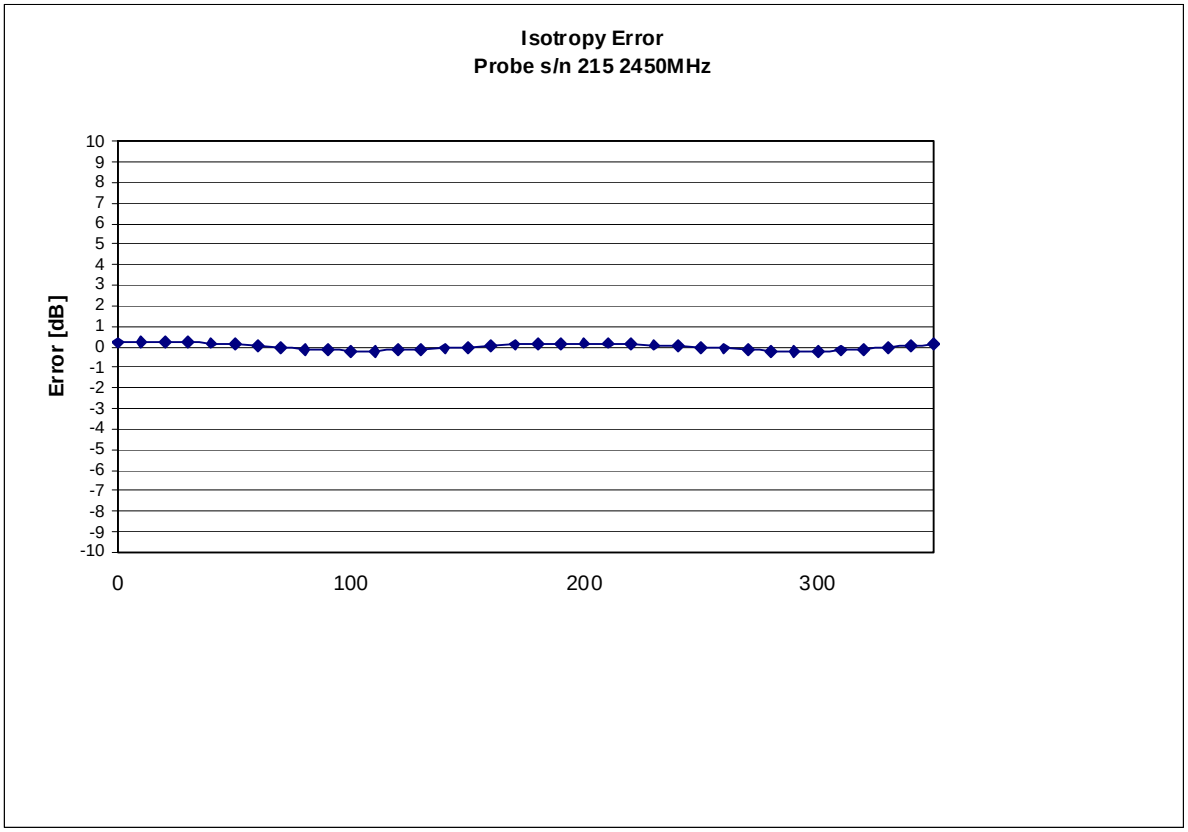
Spatial Resolution:

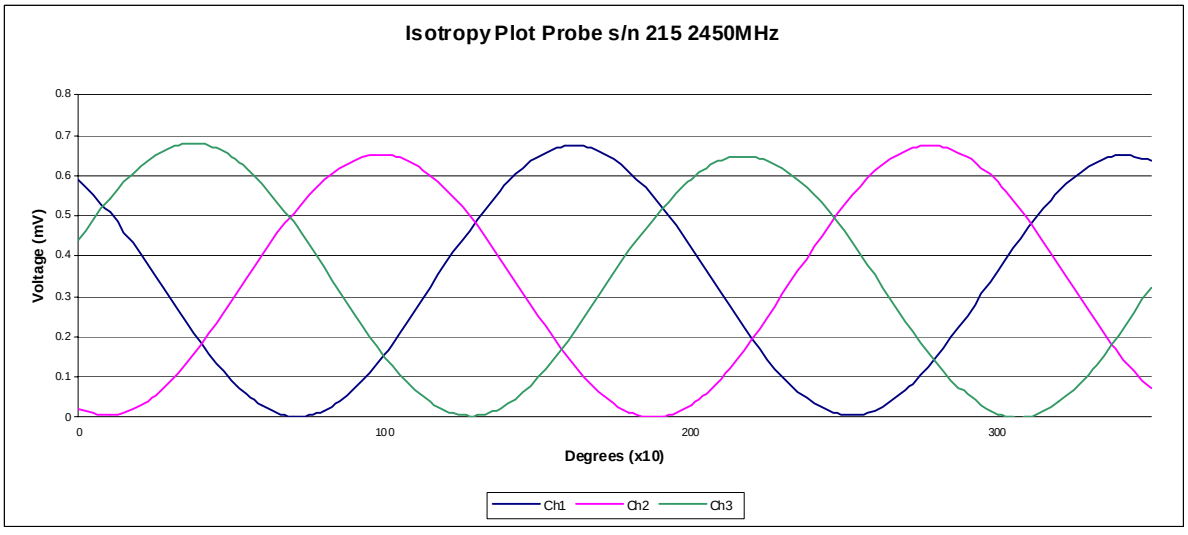
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 2450 MHz (Air)



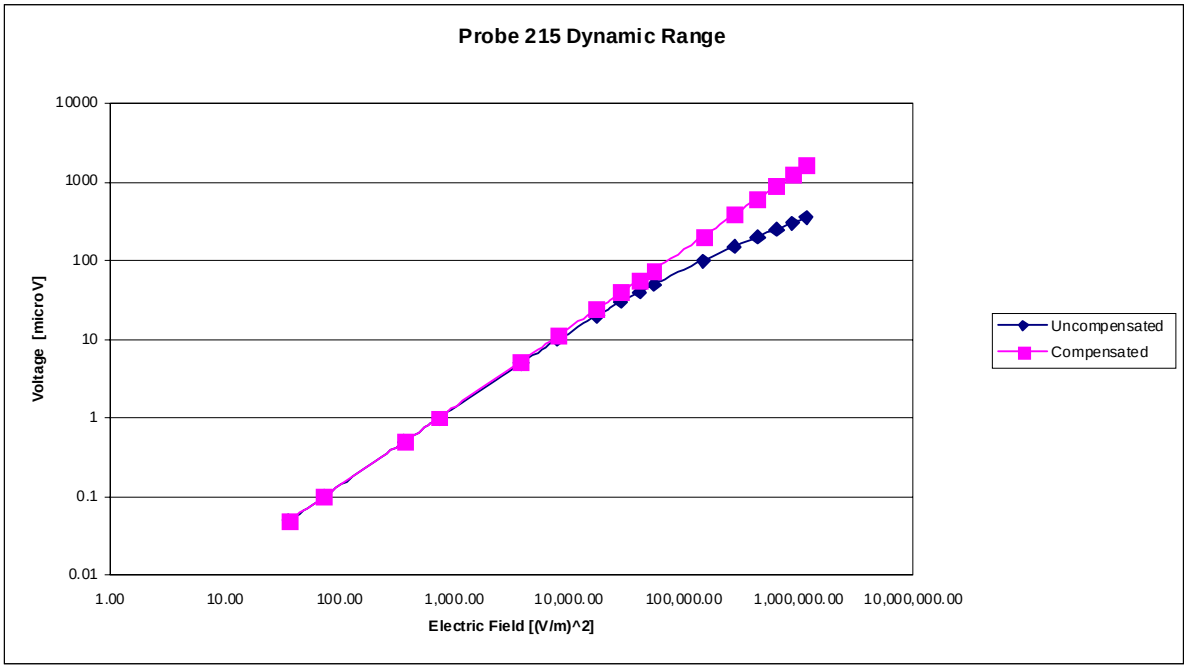
Isotropy Error 2450 MHz (Air)



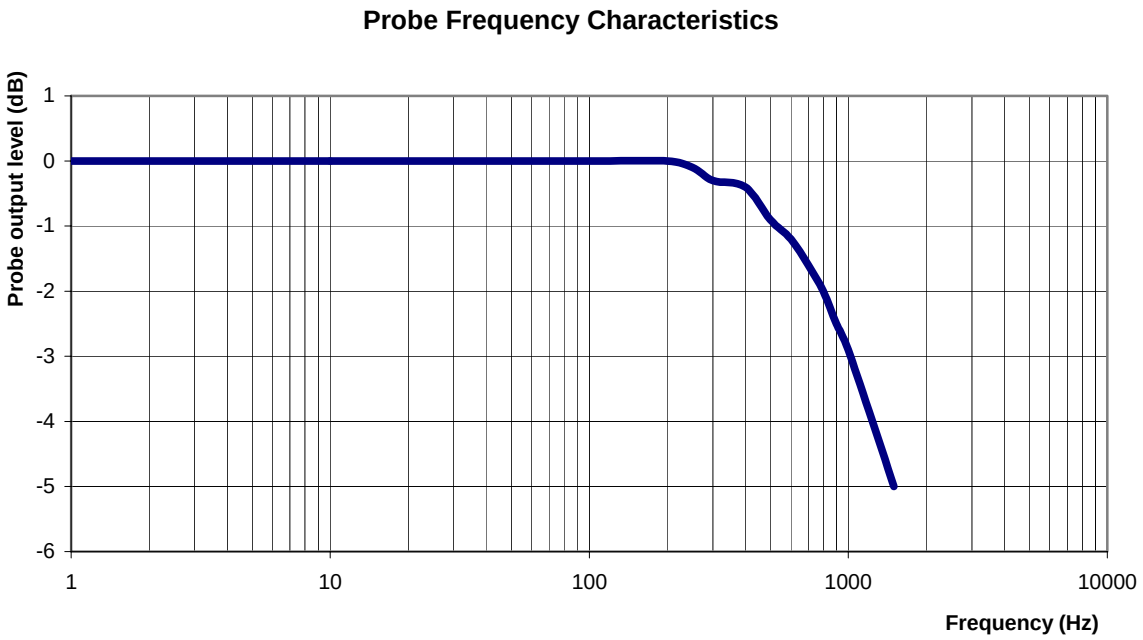


Isotropicity Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



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

C E R T I F I C A T E OF C A L I B R A T I O N

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.

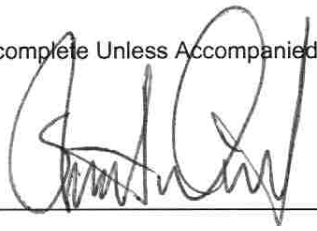
Equipment: Miniature Isotropic RF Probe 5200 MHz
BODY Calibration
Manufacturer: APREL Laboratories
Model No.: E-020
Serial No.: E030-001

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

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CANADA K2R 1E6

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TEL: (613) 820-4988
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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

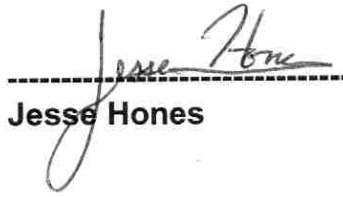
Conditions

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

Sensitivity in Body Tissue Measured

Frequency: 5200 MHz

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

ConvF:

Channel X: 4.4

Channel Y: 4.4

Channel Z: 4.4

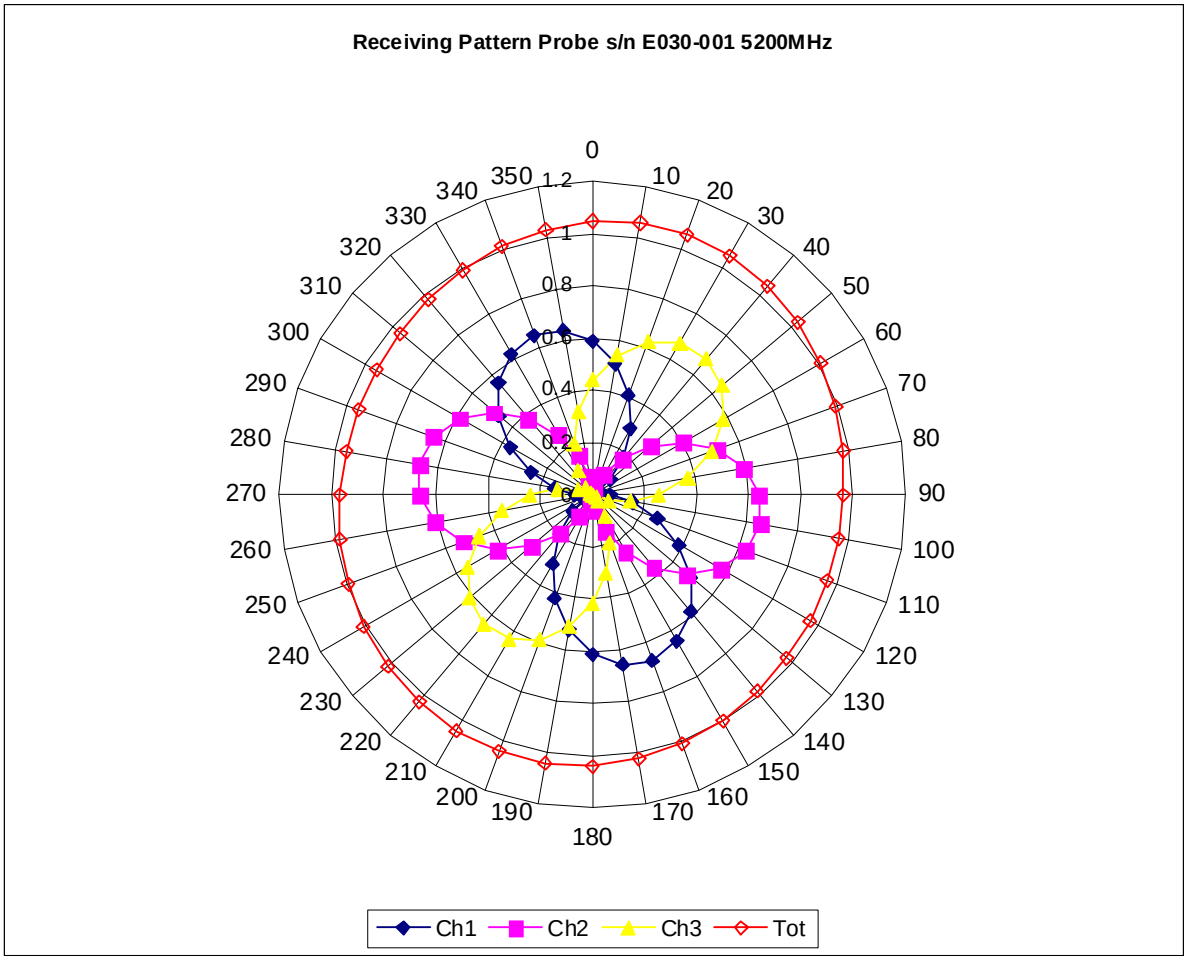
Boundary Effect:

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.

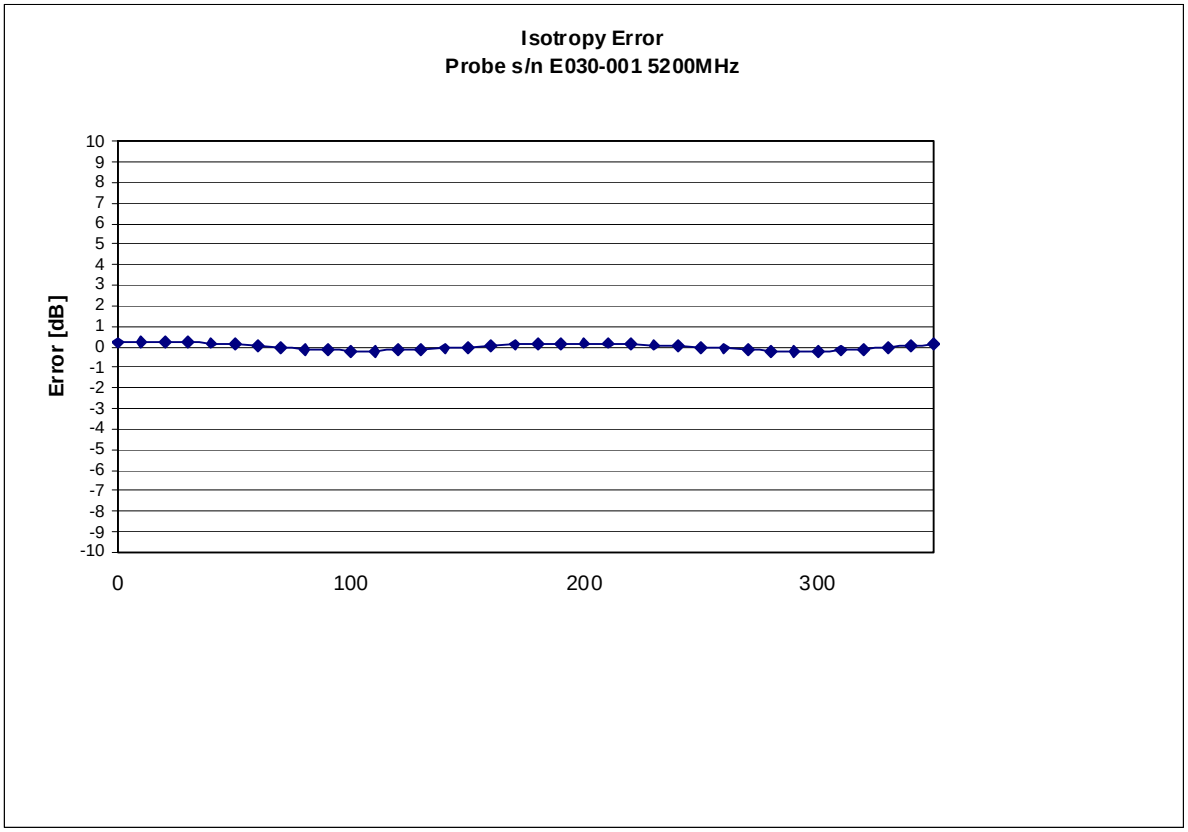
Spatial Resolution:

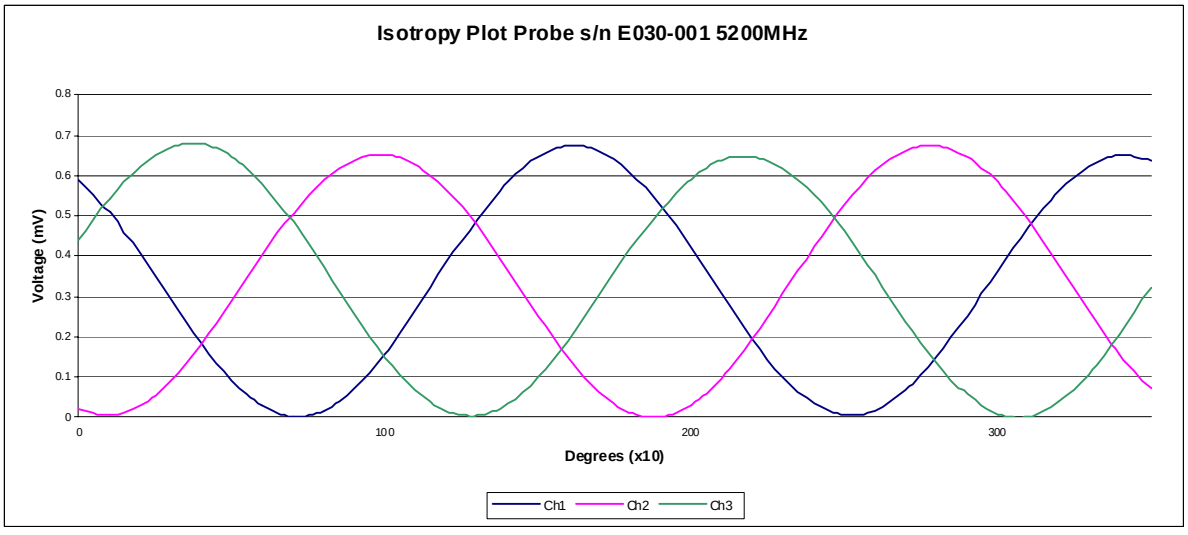
The measured probe tip diameter is 2.5mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 5200 MHz (Air)



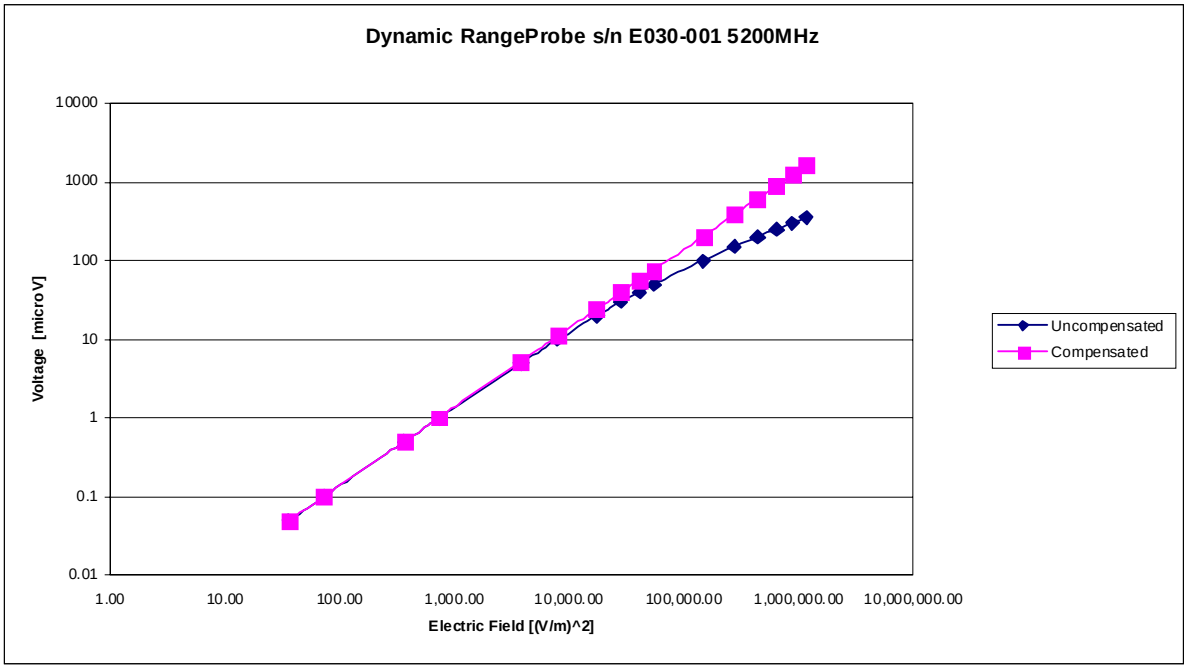
Isotropy Error 5200 MHz (Air)



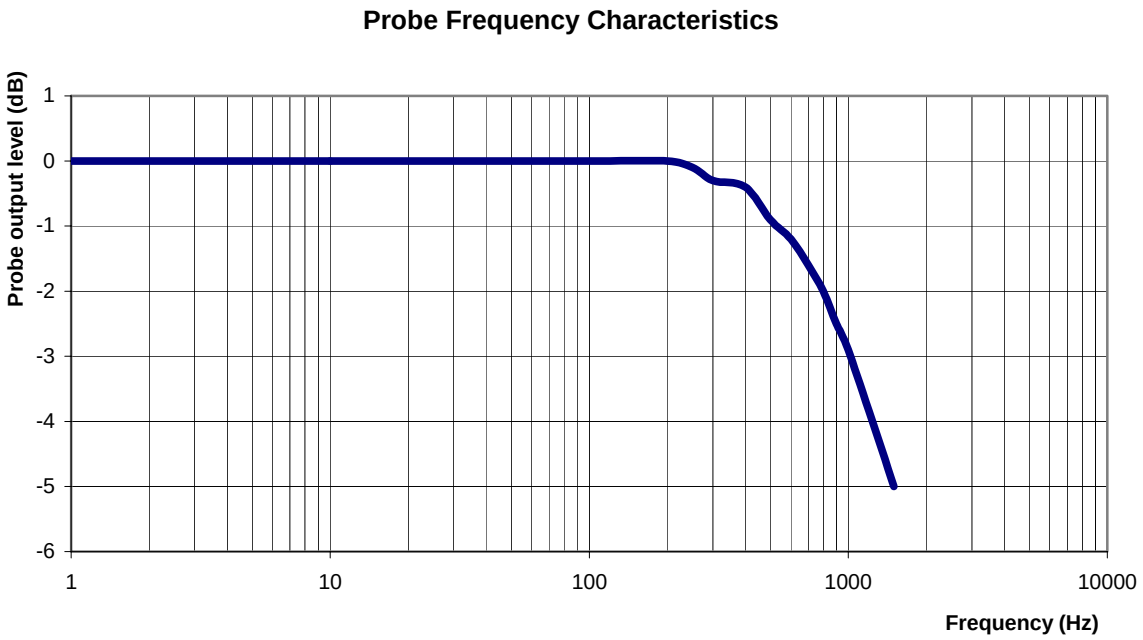


Isotropicity Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



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 MΩ.

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-1135

Client.: RFEL

C E R T I F I C A T E OF C A L I B R A T I O N

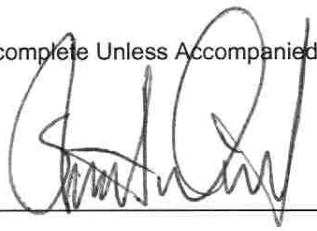
It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

Equipment: Miniature Isotropic RF Probe 5600 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: 14th 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

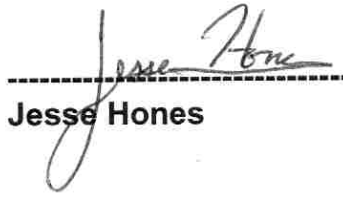
Conditions

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:	5600 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 $\mu V/(V/m)^2$
Channel Y:	1.2 $\mu V/(V/m)^2$
Channel Z:	1.2 $\mu V/(V/m)^2$
Diode Compression Point:	95 mV

Sensitivity in Body Tissue Measured

Frequency: 5600 MHz

Epsilon: 46.76 **Sigma:** 5.84 S/m

ConvF:

Channel X: 4.0

Channel Y: 4.0

Channel Z: 4.0

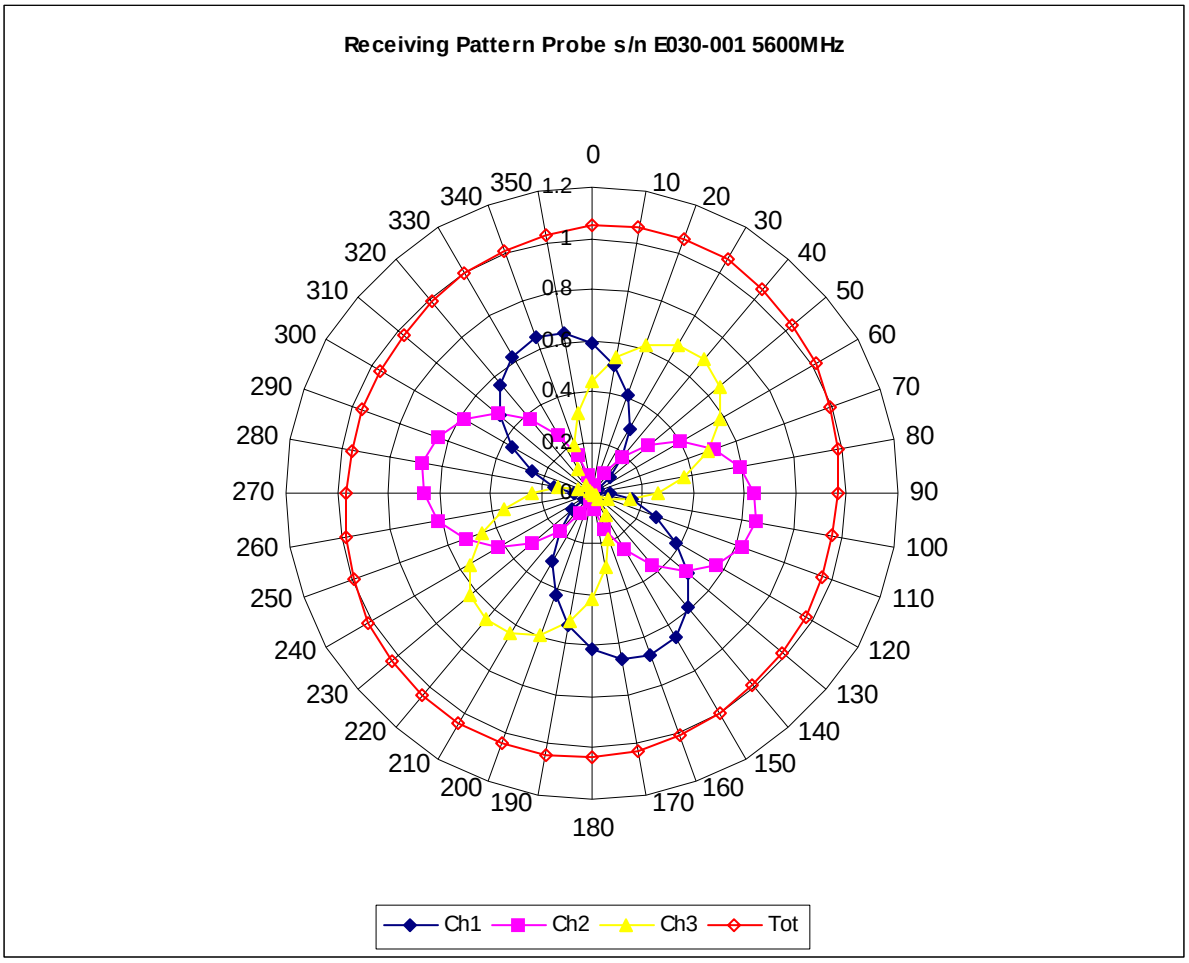
Boundary Effect:

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.

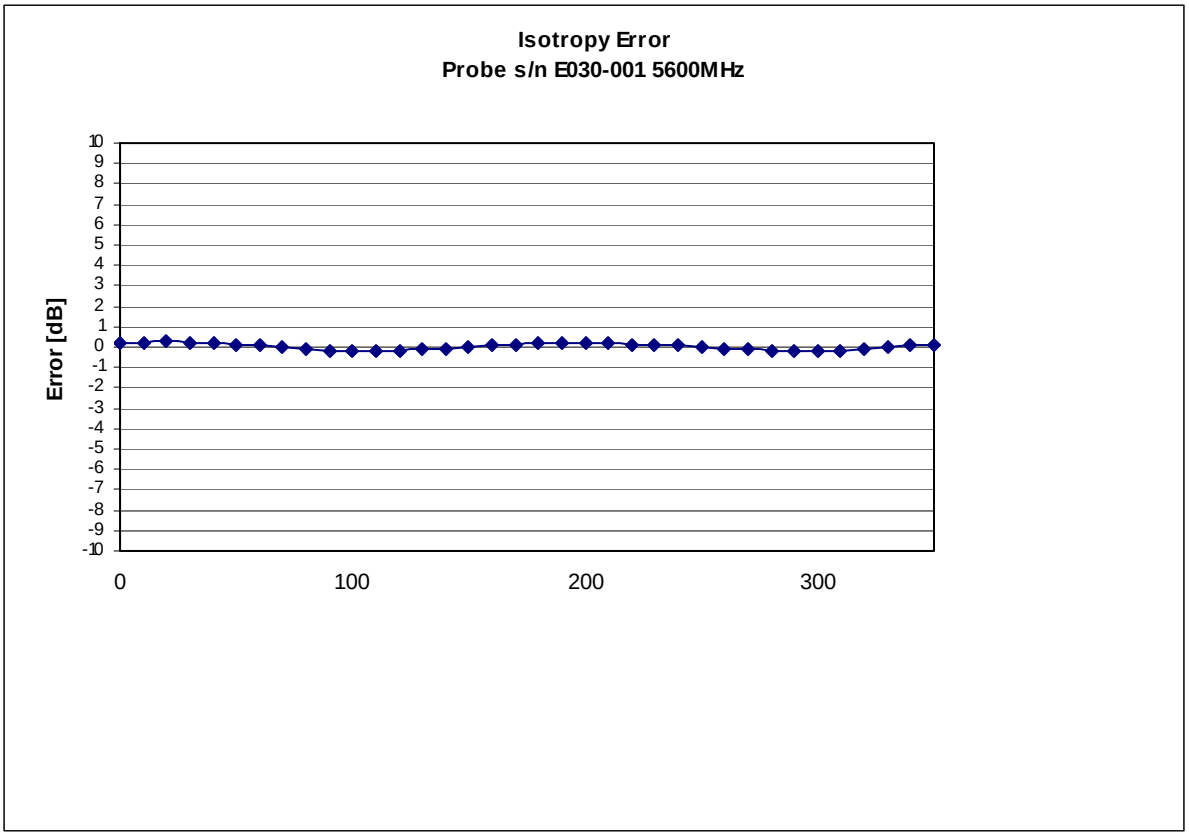
Spatial Resolution:

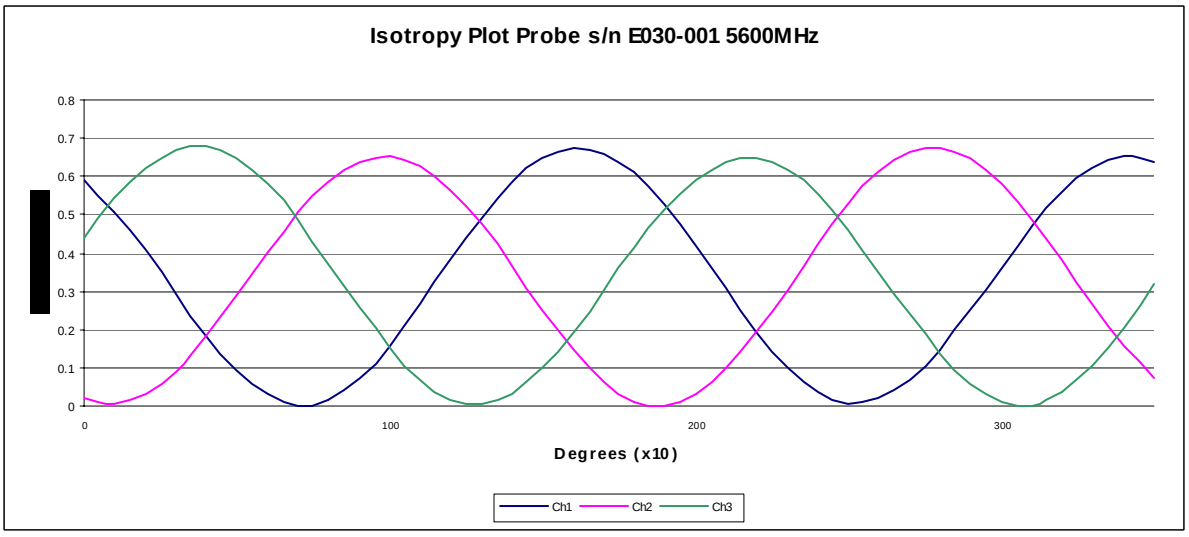
The measured probe tip diameter is 2.5mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 5600 MHz (Air)



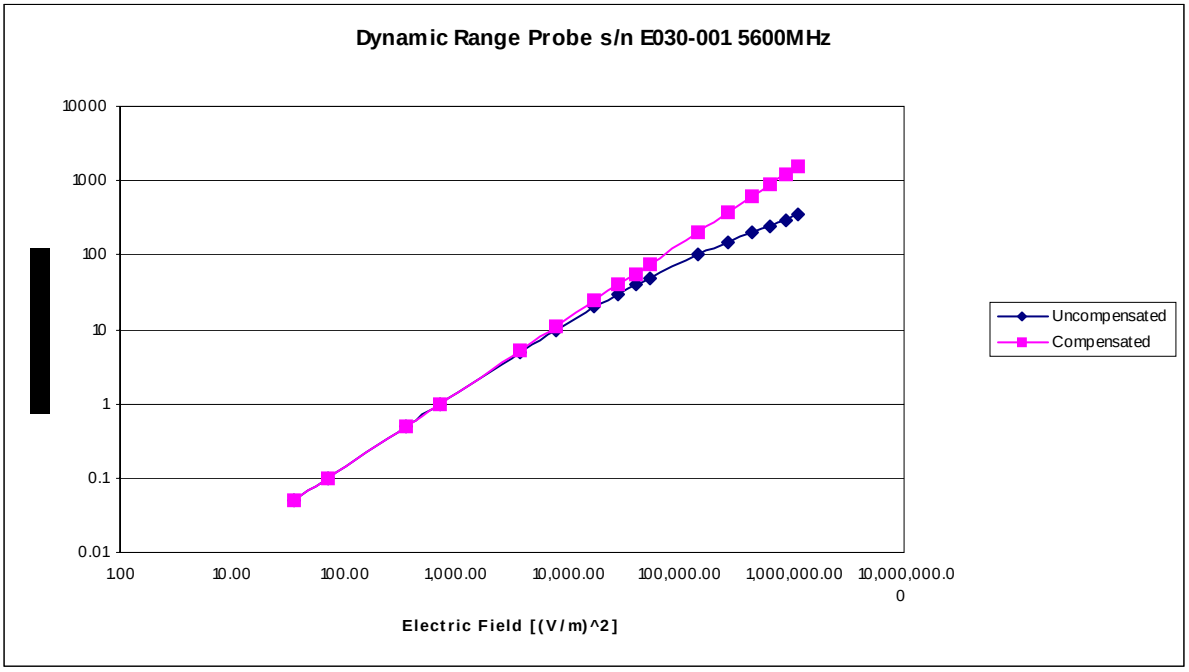
Isotropy Error 5600 MHz (Air)



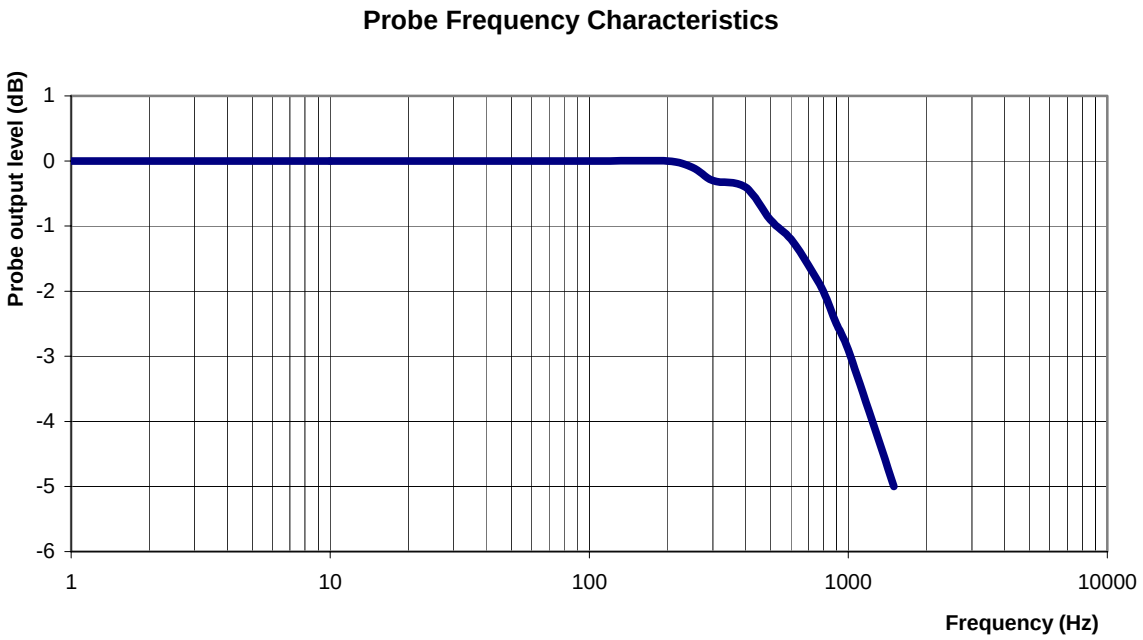


Isotropicity Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



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:		5600 MHz	
Epsilon:	46.76	**Sigma:**	5.84 S/m
ConvF			
Channel X:	4.0	7%(K=2)	
Channel Y:	4.0	7%(K=2)	
Channel Z:	4.0	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 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

C E R T I F I C A T E OF C A L I B R A T I O N

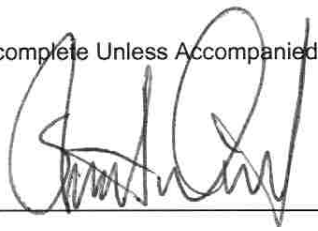
It is certified that the equipment identified below has been calibrated in the **NCL CALIBRATION LABORATORIES** by qualified personnel following recognized procedures and using transfer standards traceable to NRC/NIST.

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: 14h 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

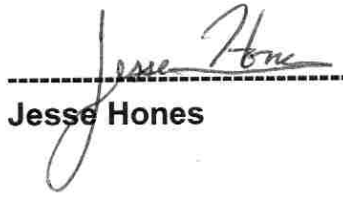
Conditions

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

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

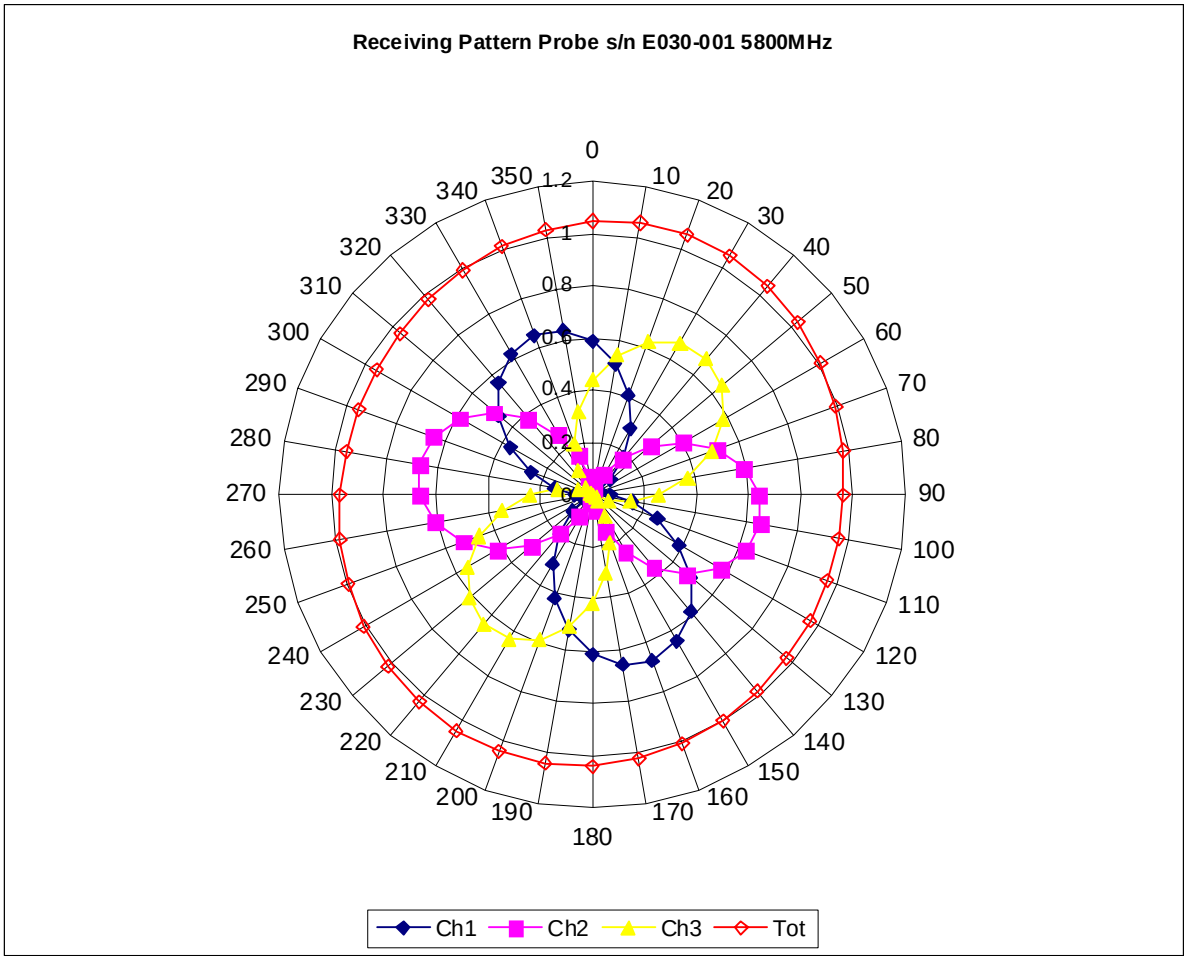
Boundary Effect:

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.

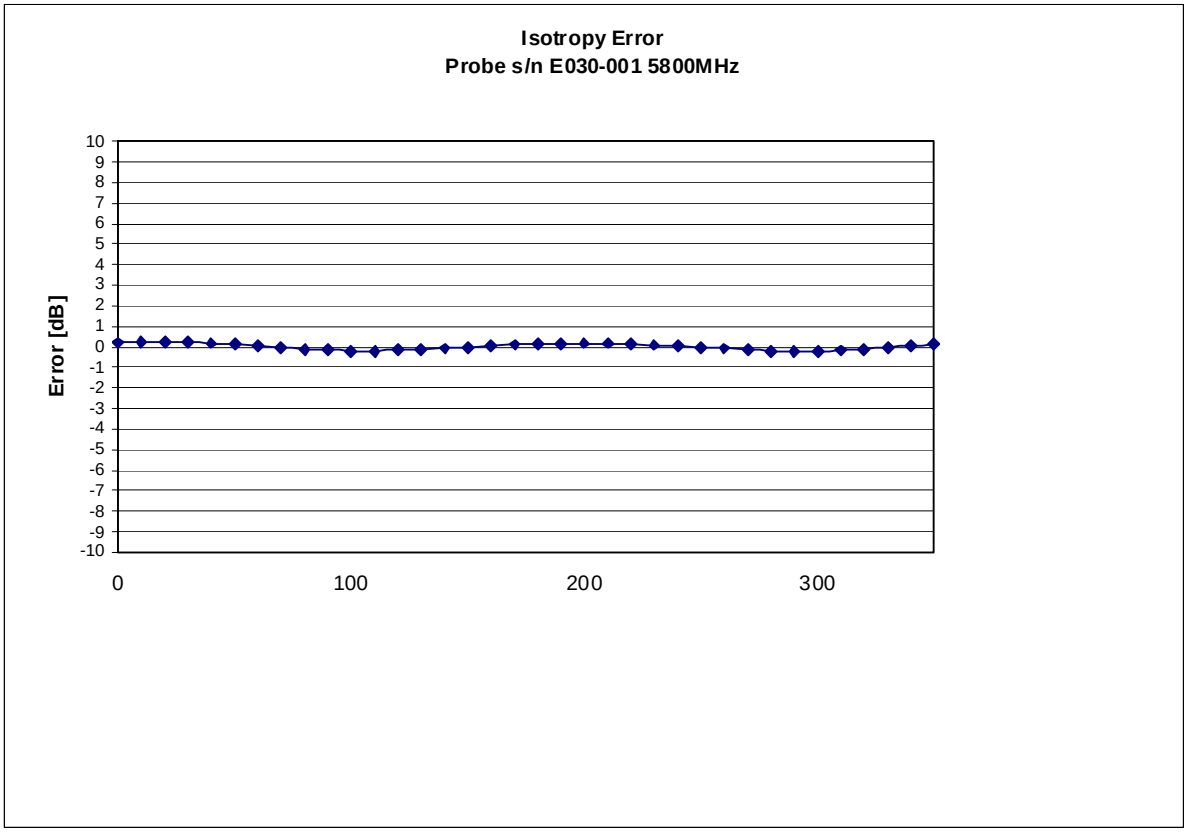
Spatial Resolution:

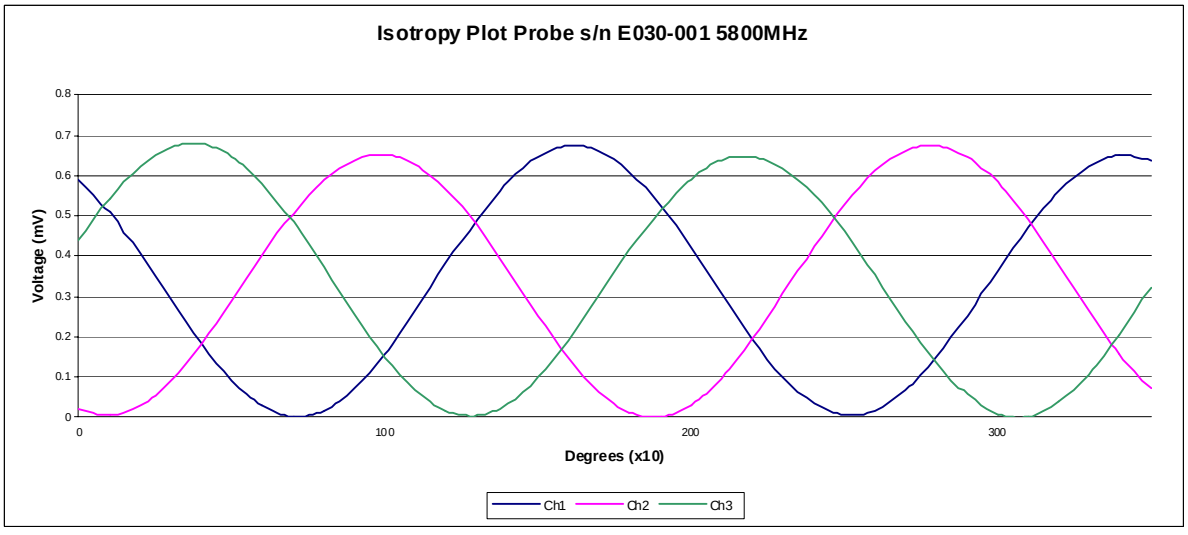
The measured probe tip diameter is 2.5mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 5800 MHz (Air)



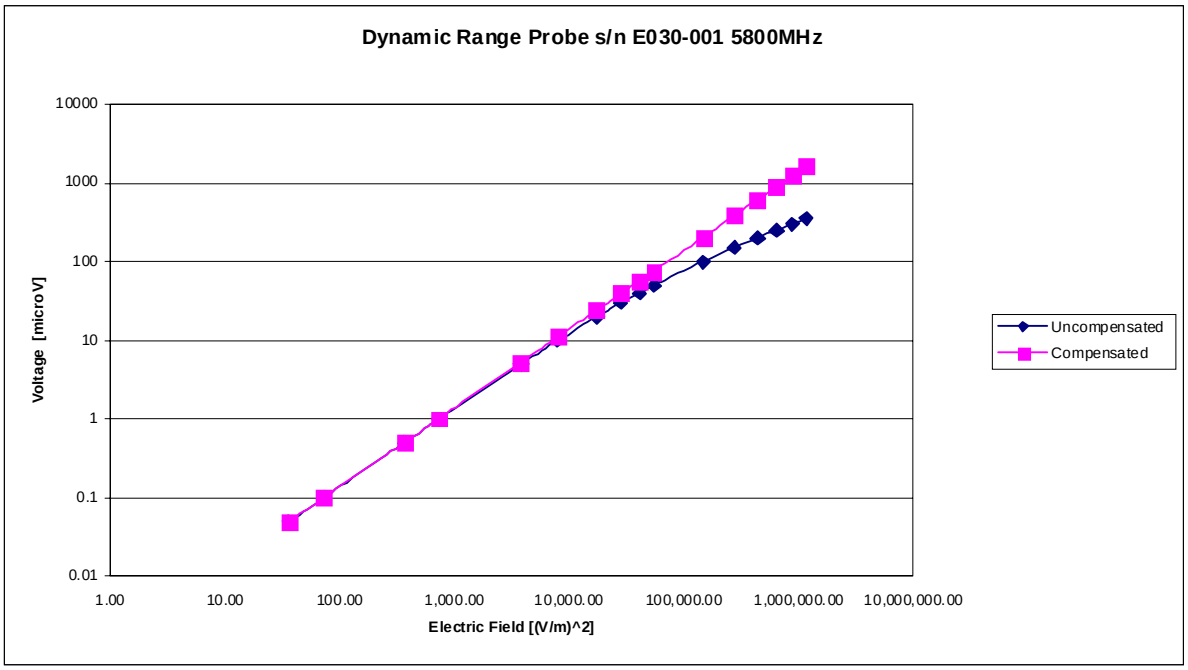
Isotropy Error 5800 MHz (Air)



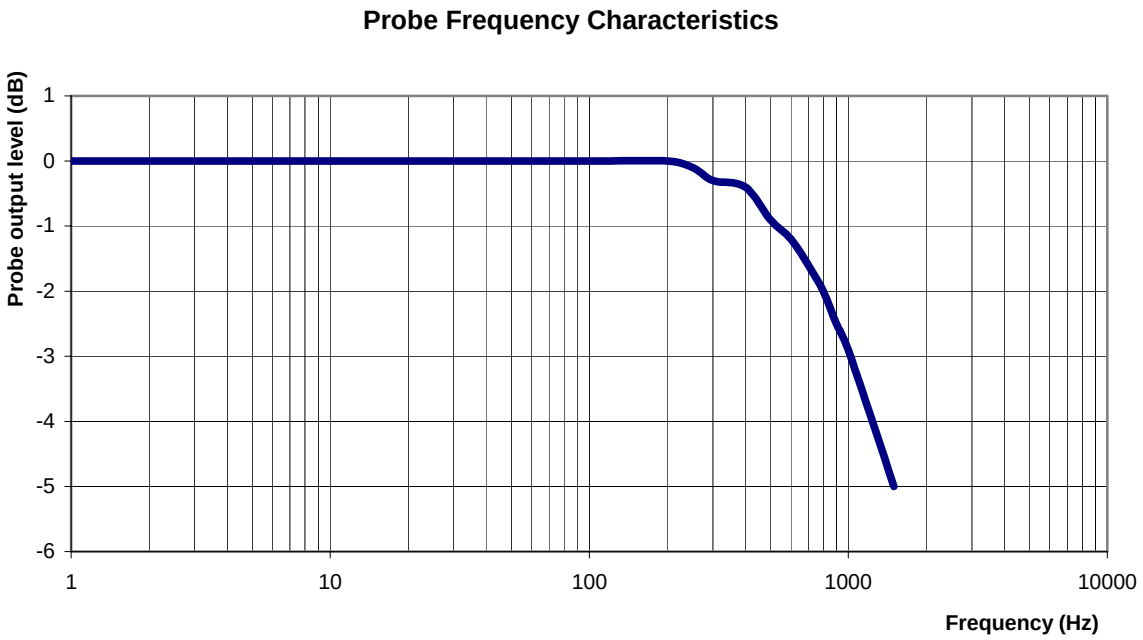


Isotropicity Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



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 MΩ.

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-1179
Project Number: RFEL-DC-835B-5549

C E R T I F I C A T E OF C A L I B R A T I O N

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-835-S-2
Frequency: 835 MHz
Serial No: 180-00561

Customer: RFEL
Body Calibration

Calibrated: 16th November 2010
Released on: 16th 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

Conditions

Dipole 180-00561 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

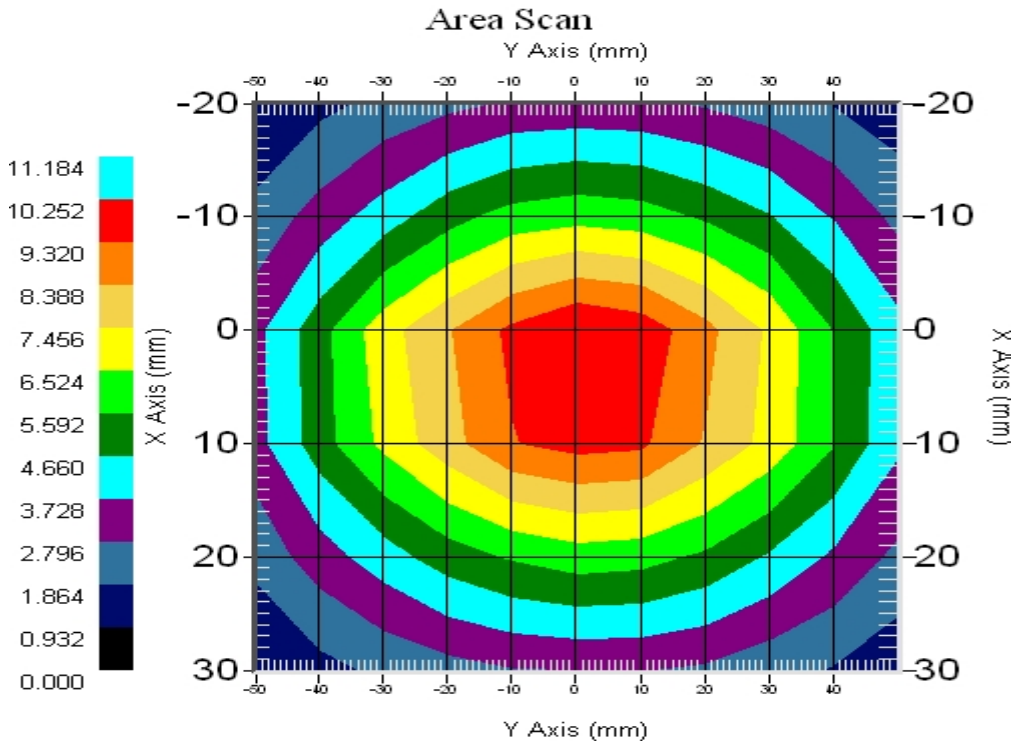
Length: 161.0 mm
Height: 89.8 mm

Electrical Specification

SWR: 1.143U
Return Loss: -24.058 dB
Impedance: 55.519 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
835 MHz	9.81	6.3	14.87



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

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 180-00561. 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 2225.

References

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

Conditions

Dipole 180-00561 was a new 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
161.0 mm	89.8 mm	162.1 mm	89.8 mm

Tissue Validation

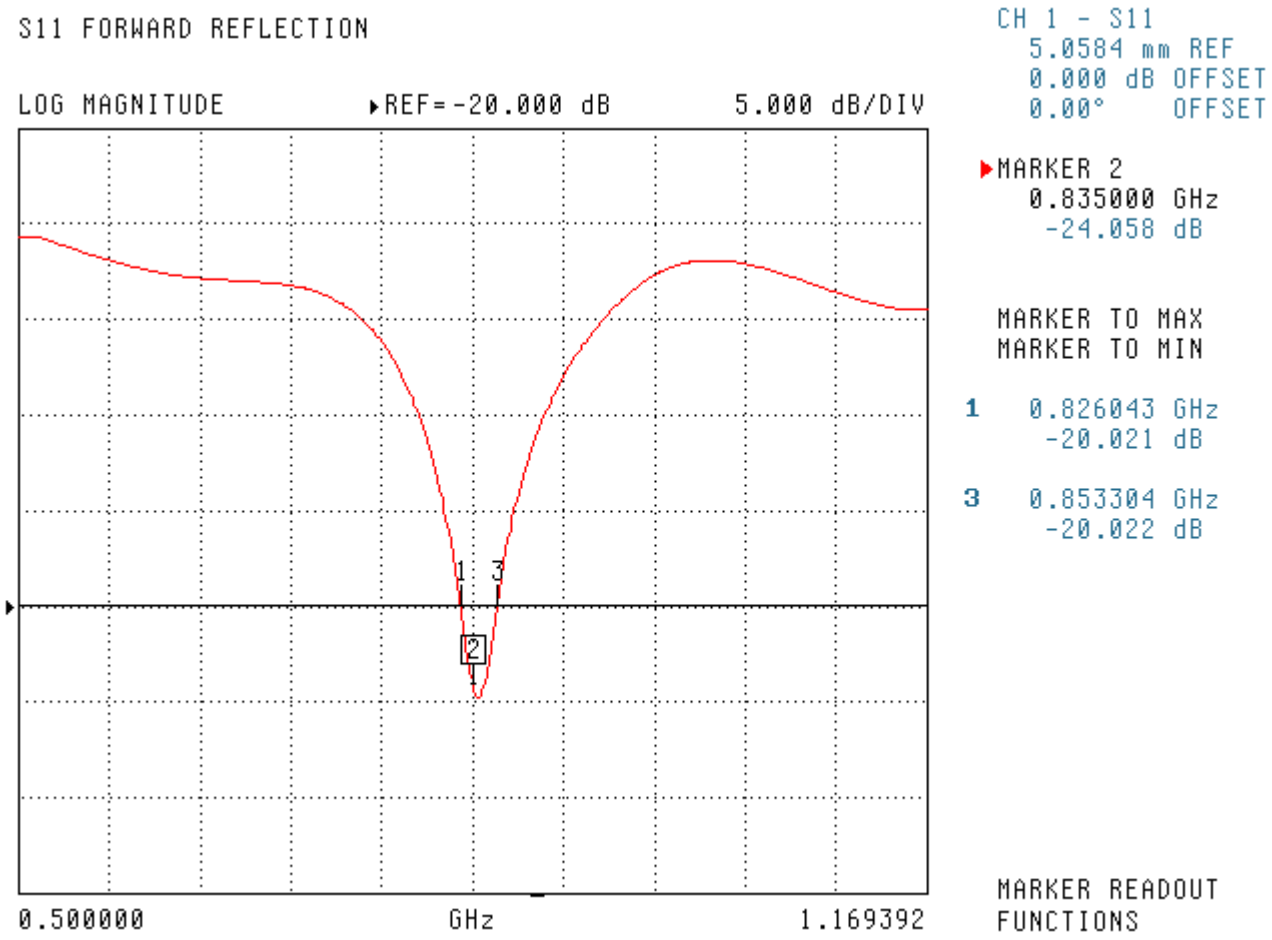
Body Tissue 835MHz	Measured
Dielectric constant, ε_r	57.19
Conductivity, σ [S/m]	0.97

Electrical Calibration

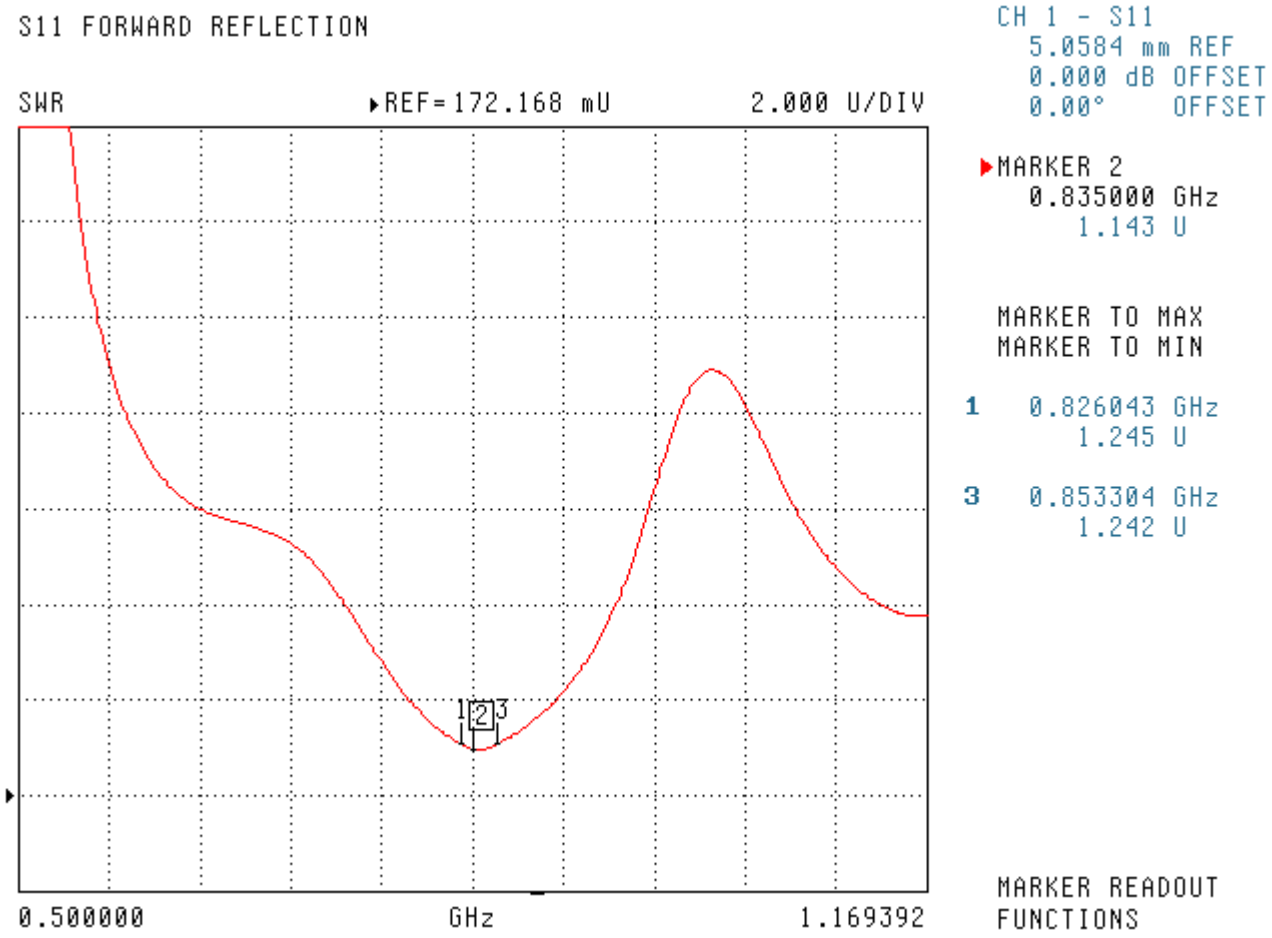
Test	Result
S11 RL	-24.058dB
SWR	1.143U
Impedance	55.519 Ω

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

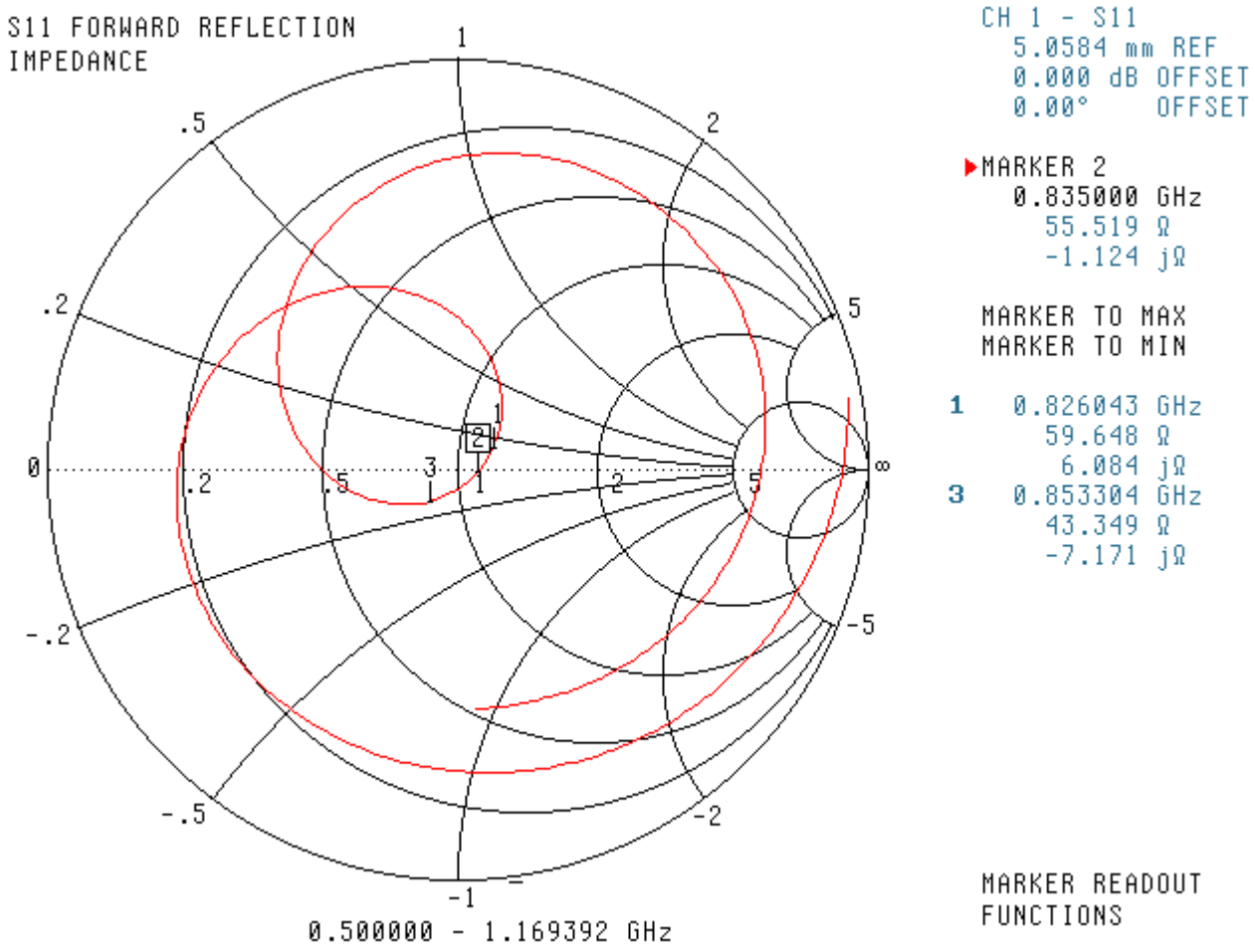
S11 Parameter Return Loss



SWR

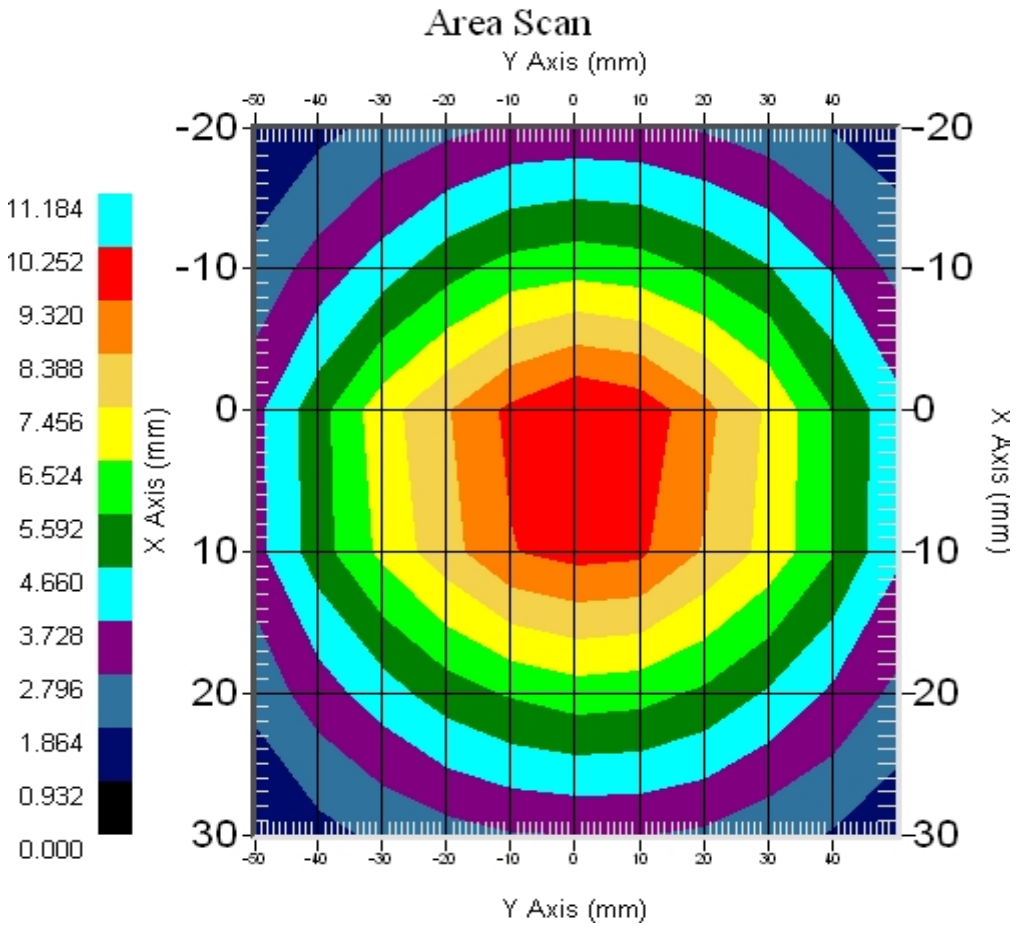


Smith Chart Dipole Impedance



System Validation Results Using the Electrically Calibrated Dipole

Body Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
835 MHz	9.81	6.3	14.87



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-1180
Project Number: RFEL-DC-1900B-5550

C E R T I F I C A T E OF C A L I B R A T I O N

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-1900-S-2
Frequency: 1900 MHz
Serial No: 210-00713

Customer: RFEL
Body Calibration

Calibrated: 16 November 2010
Released on: 16th 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

Conditions

Dipole 210-00713 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

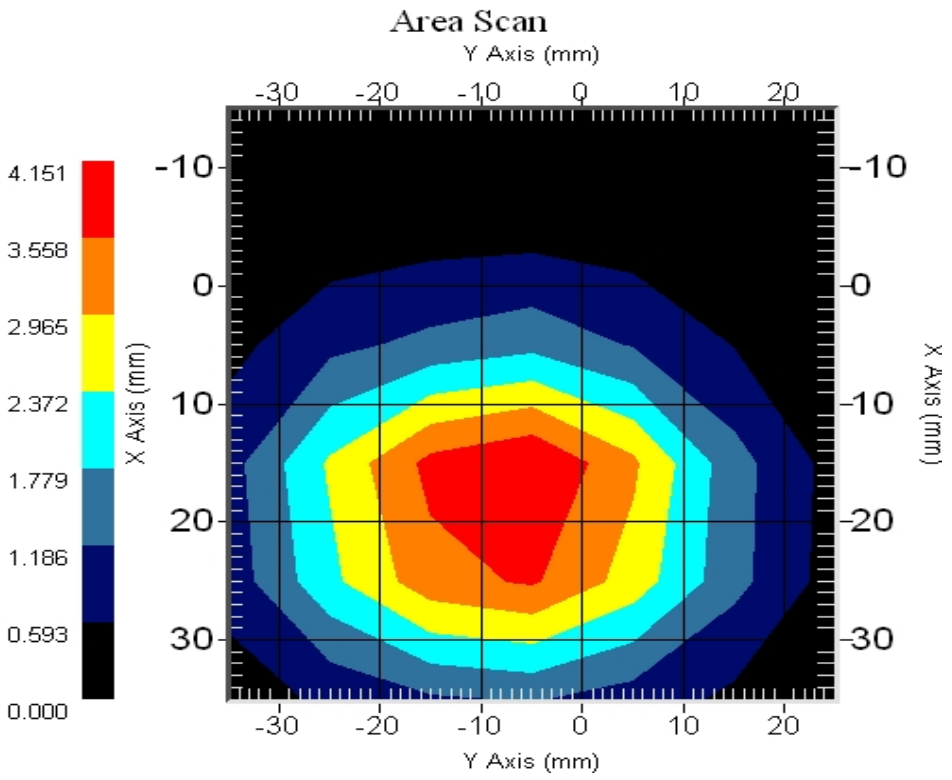
Length: 67.1 mm
Height: 38.9 mm

Electrical Specification

SWR: 1.122U
Return Loss: -24.913dB
Impedance: 53.469Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
1900 MHz	40.9	20.9	71.7



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

Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole 210-00713. 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 210-00713 was new taken from stock.

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

Dipole Calibration Results

Mechanical Verification

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

Tissue Validation

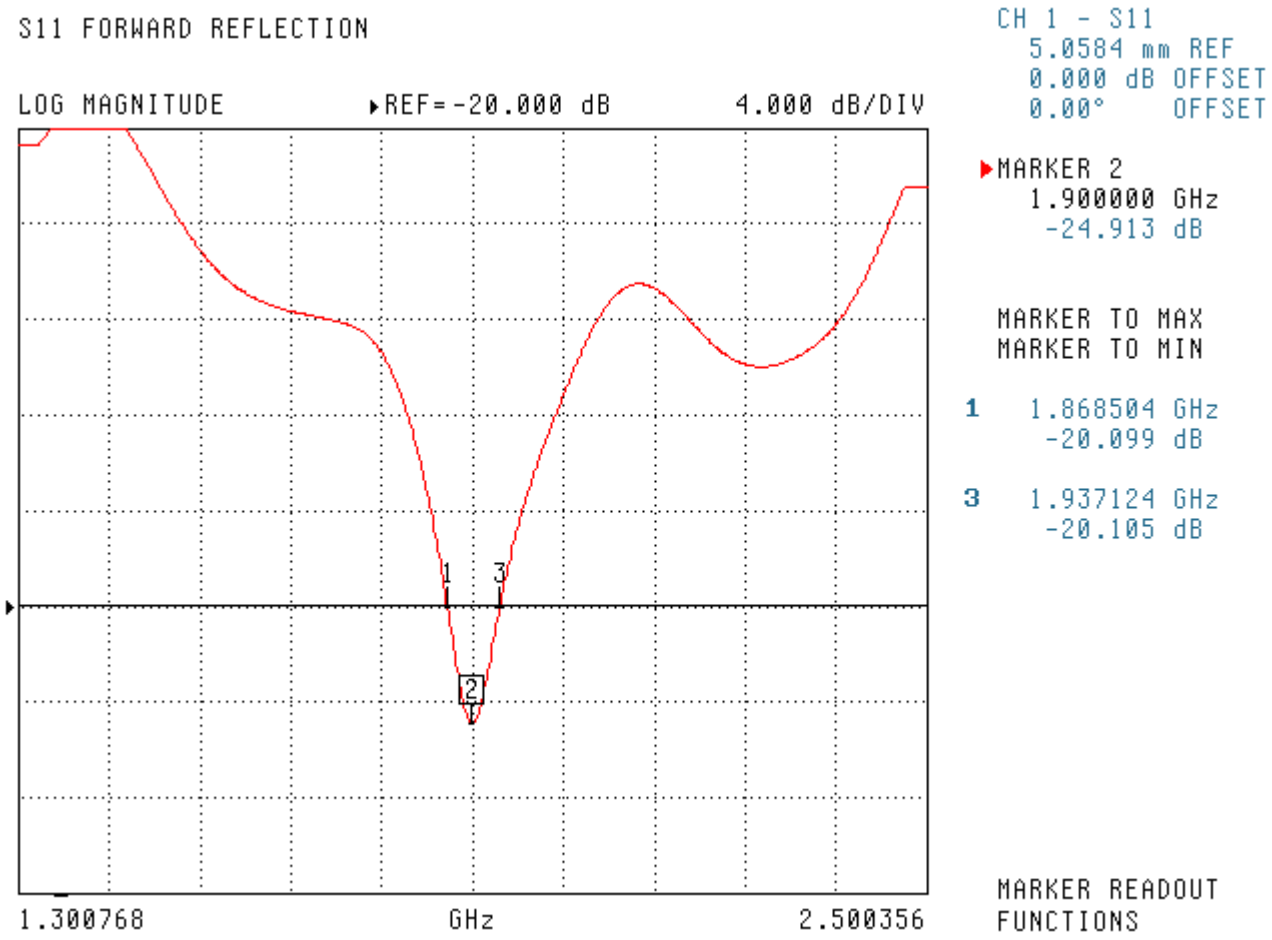
Body Tissue 1900 MHz	Measured
Dielectric constant, ε_r	53.87
Conductivity, σ [S/m]	1.55

Electrical Calibration

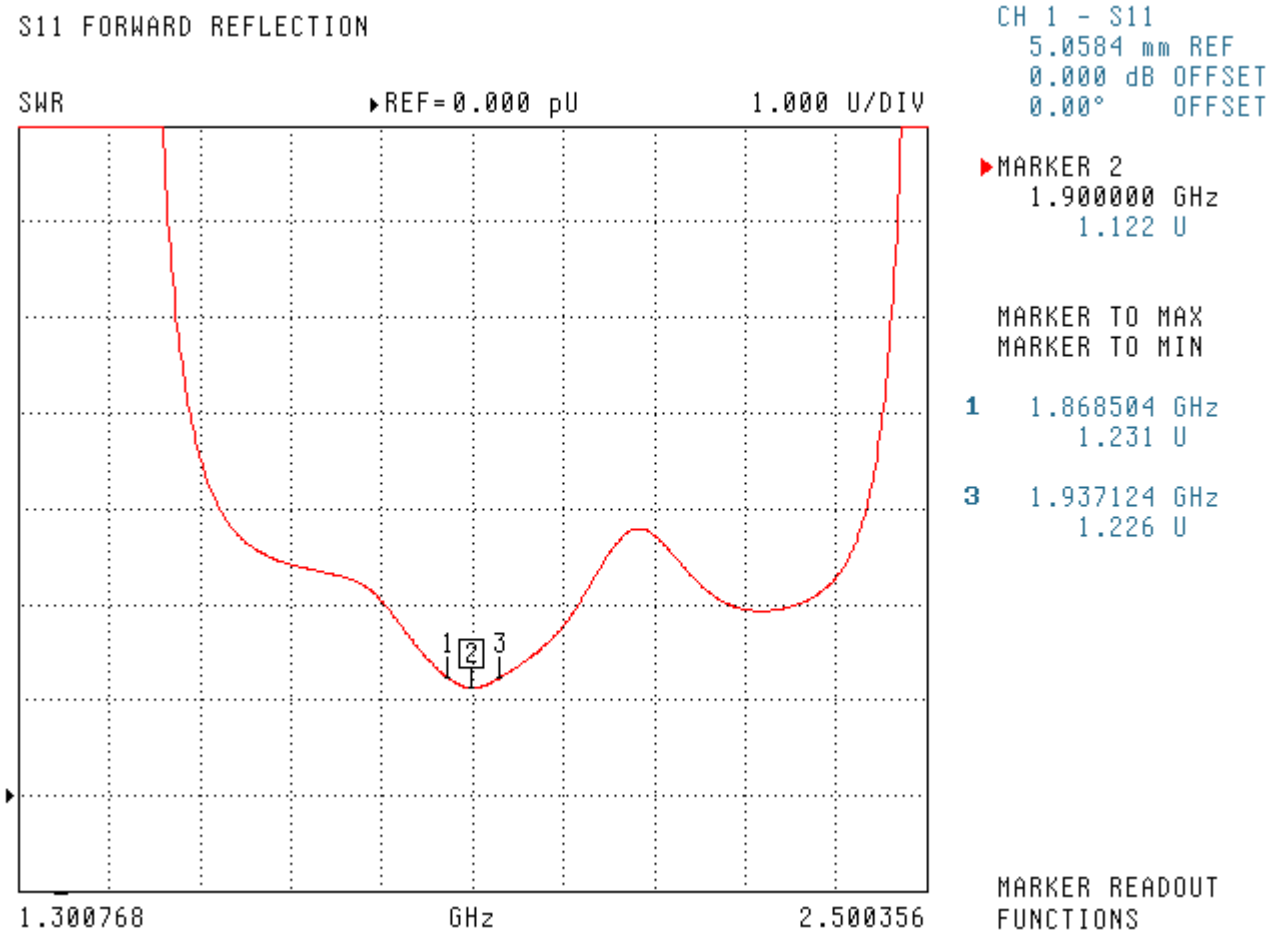
Test	Result
S11 R/L	-24.913dB
SWR	1.122U
Impedance	53.469 Ω

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

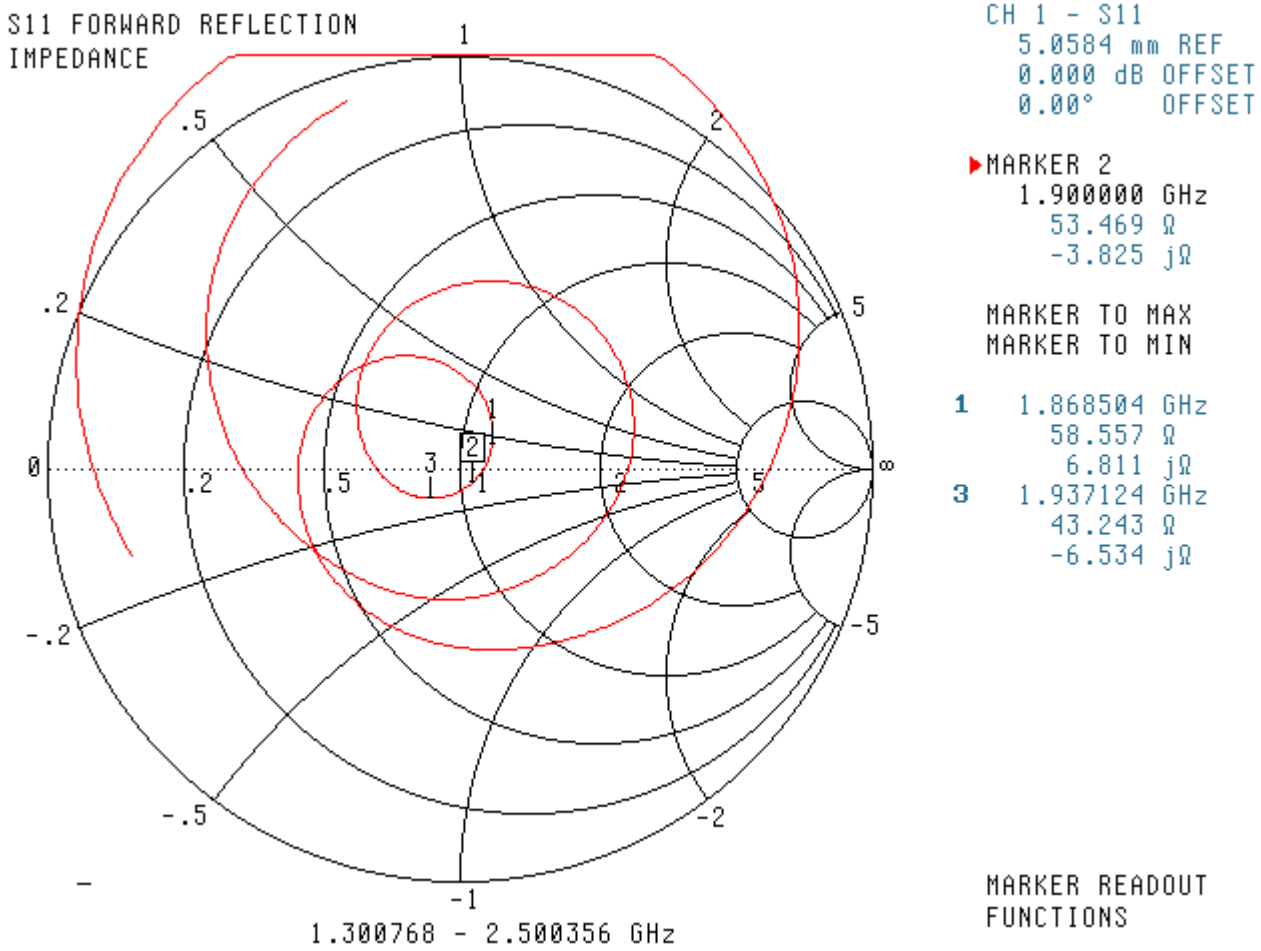
S11 Parameter Return Loss



SWR

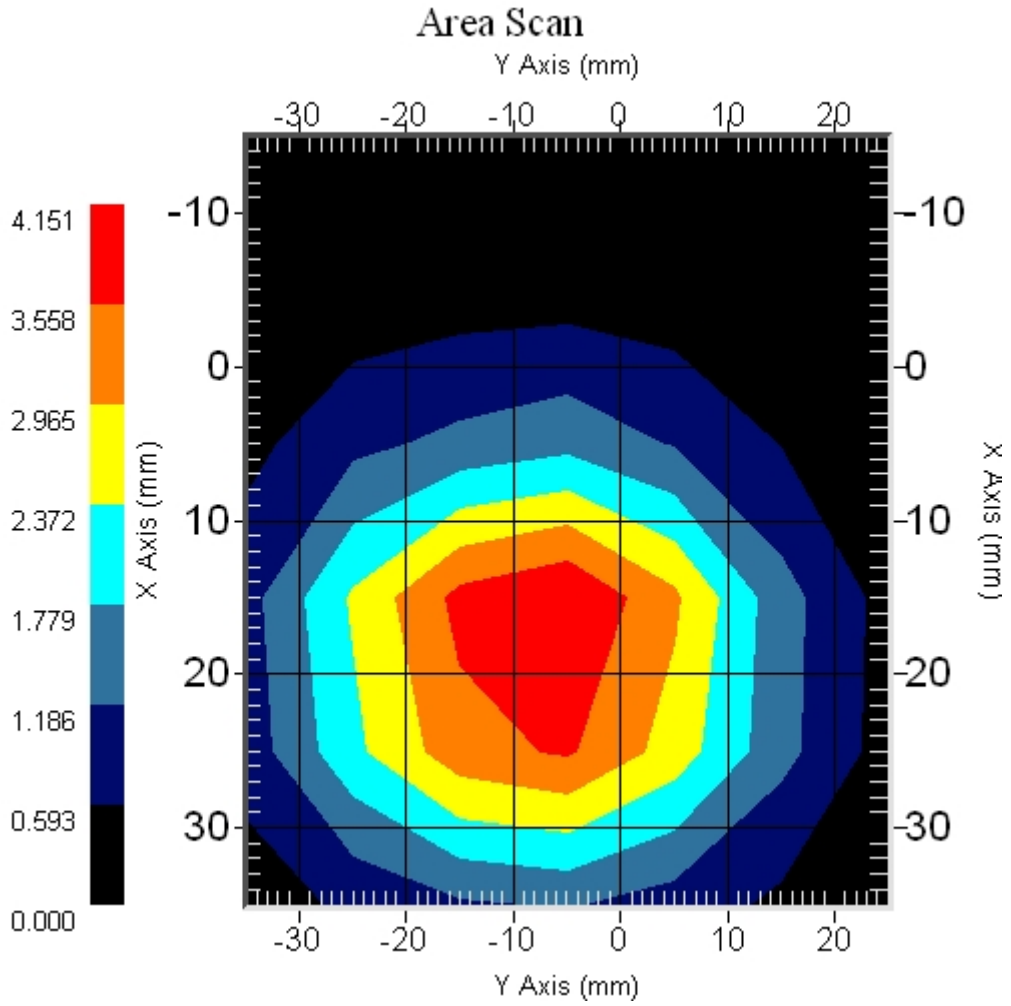


Smith Chart Dipole Impedance



System Validation Results Using the Electrically Calibrated Dipole

Body Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
1900 MHz	40.9	20.9	71.7



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 2010.

NCL CALIBRATION LABORATORIES

Calibration File No: DC-1182
Project Number: RFEB-5552

C E R T I F I C A T E OF C A L I B R A T I O N

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

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

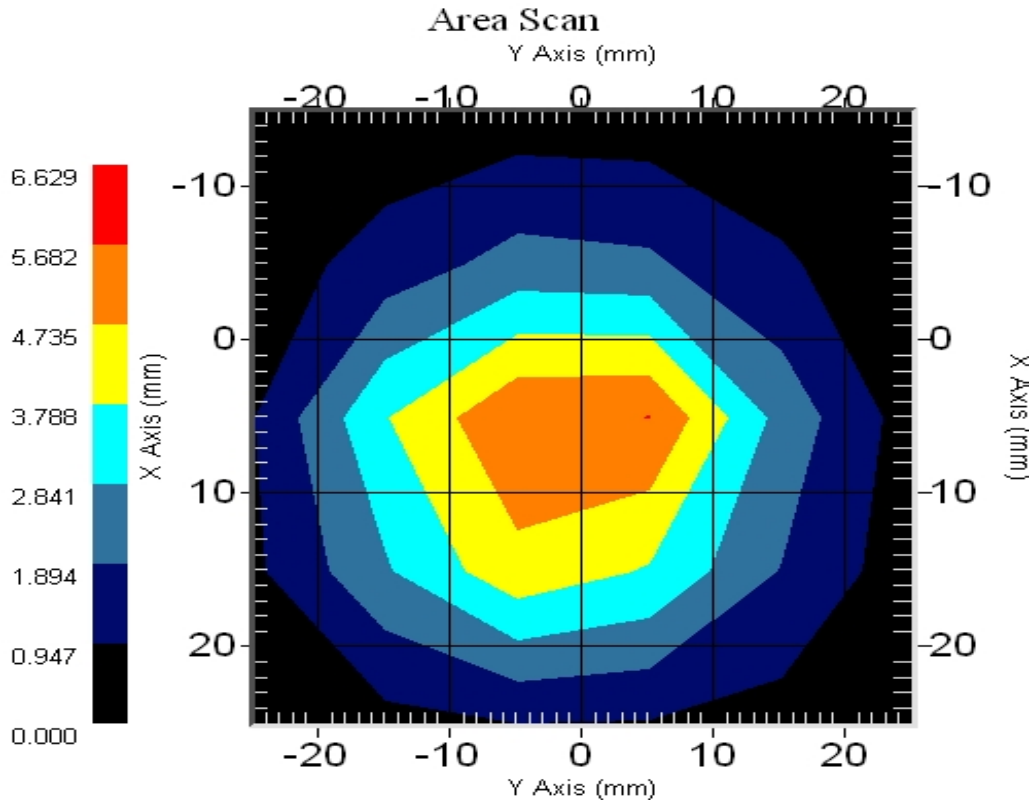
Length: 51.5 mm
Height: 30.4 mm

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

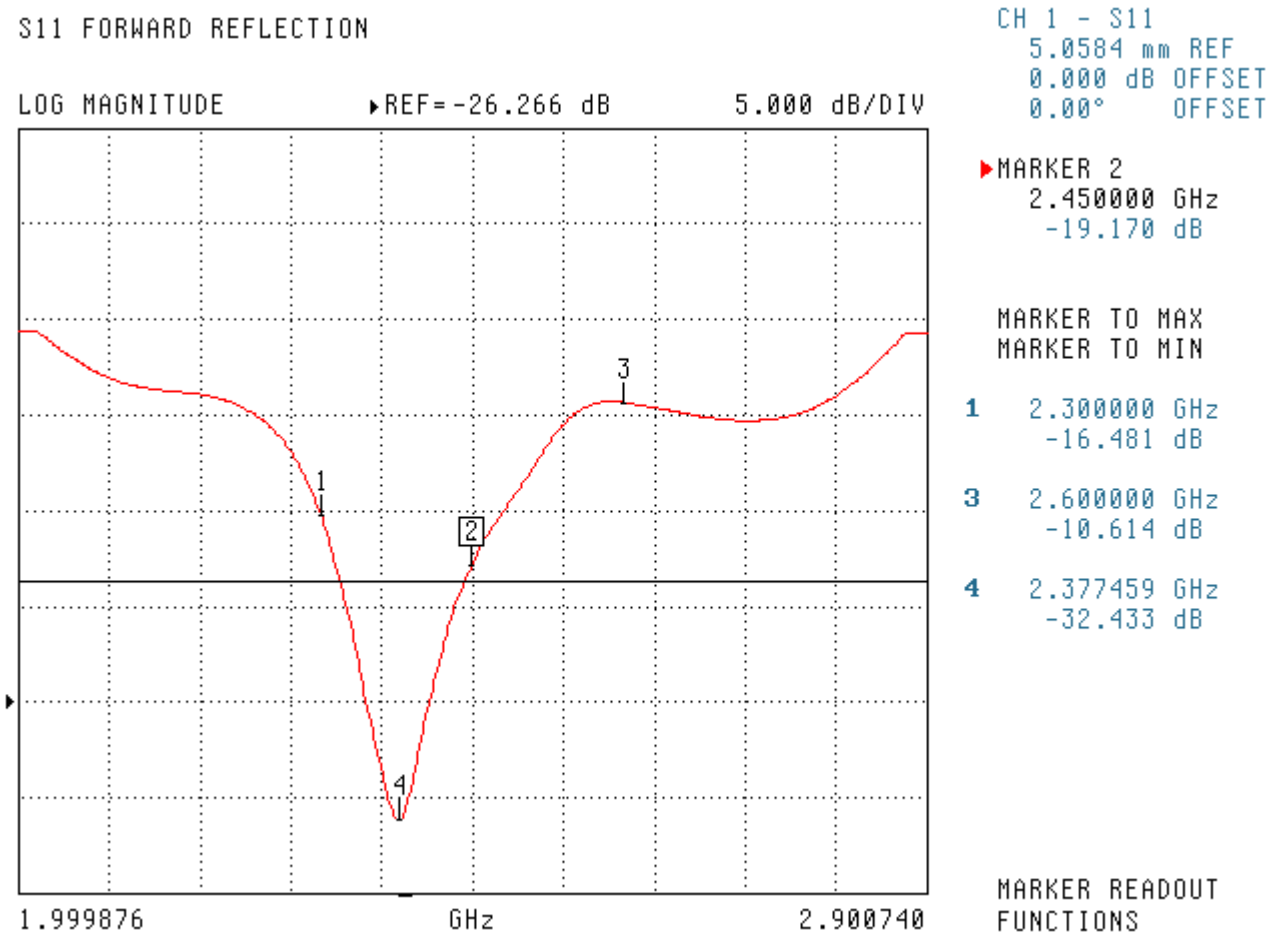
Body Tissue 2450 MHz	Measured
Dielectric constant, ε_r	52.0
Conductivity, σ [S/m]	1.92

Electrical Calibration

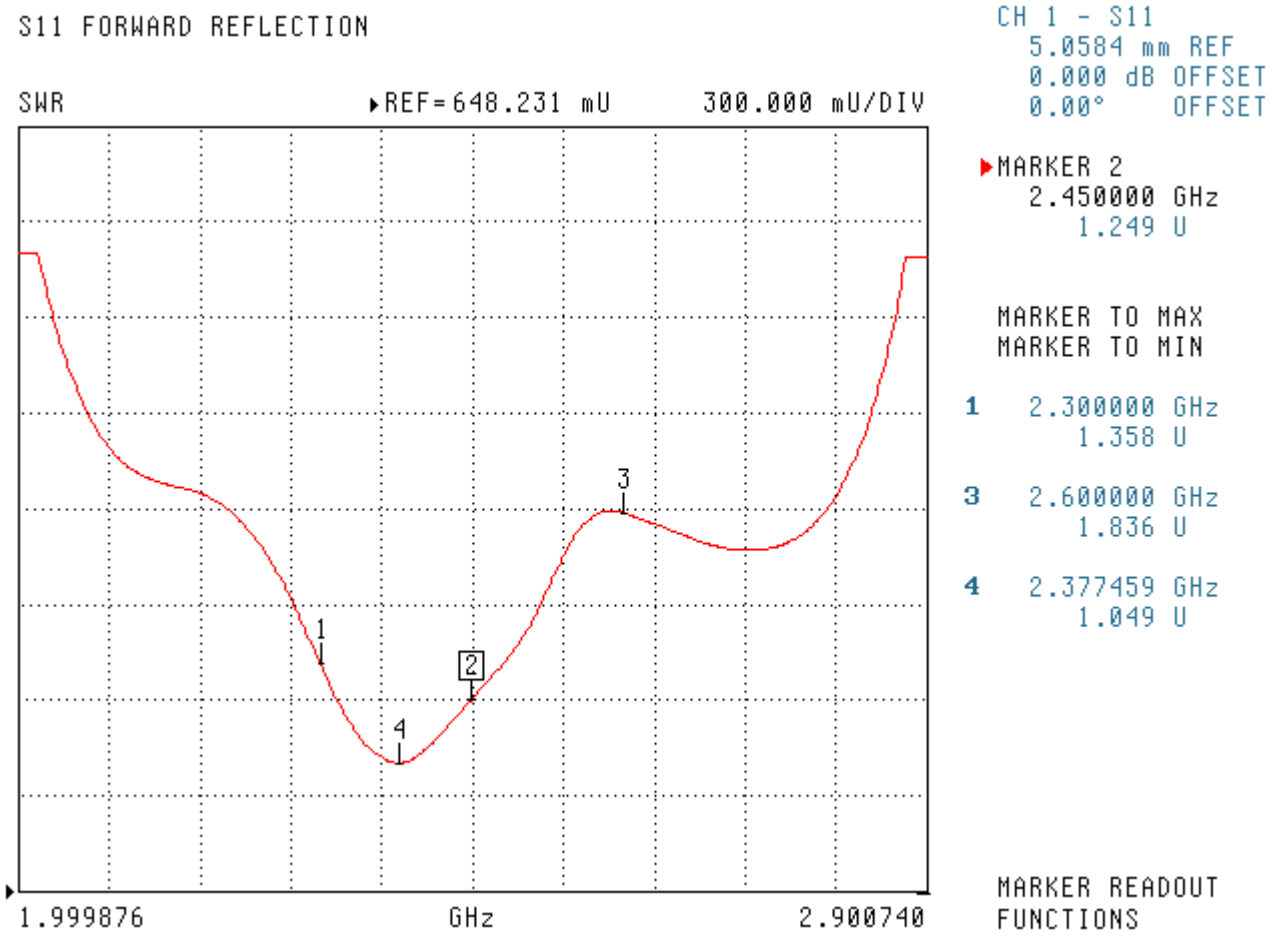
Test	Result
S11 R/L	-19.170 dB
SWR	1.249 U
Impedance	42.223 Ω

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

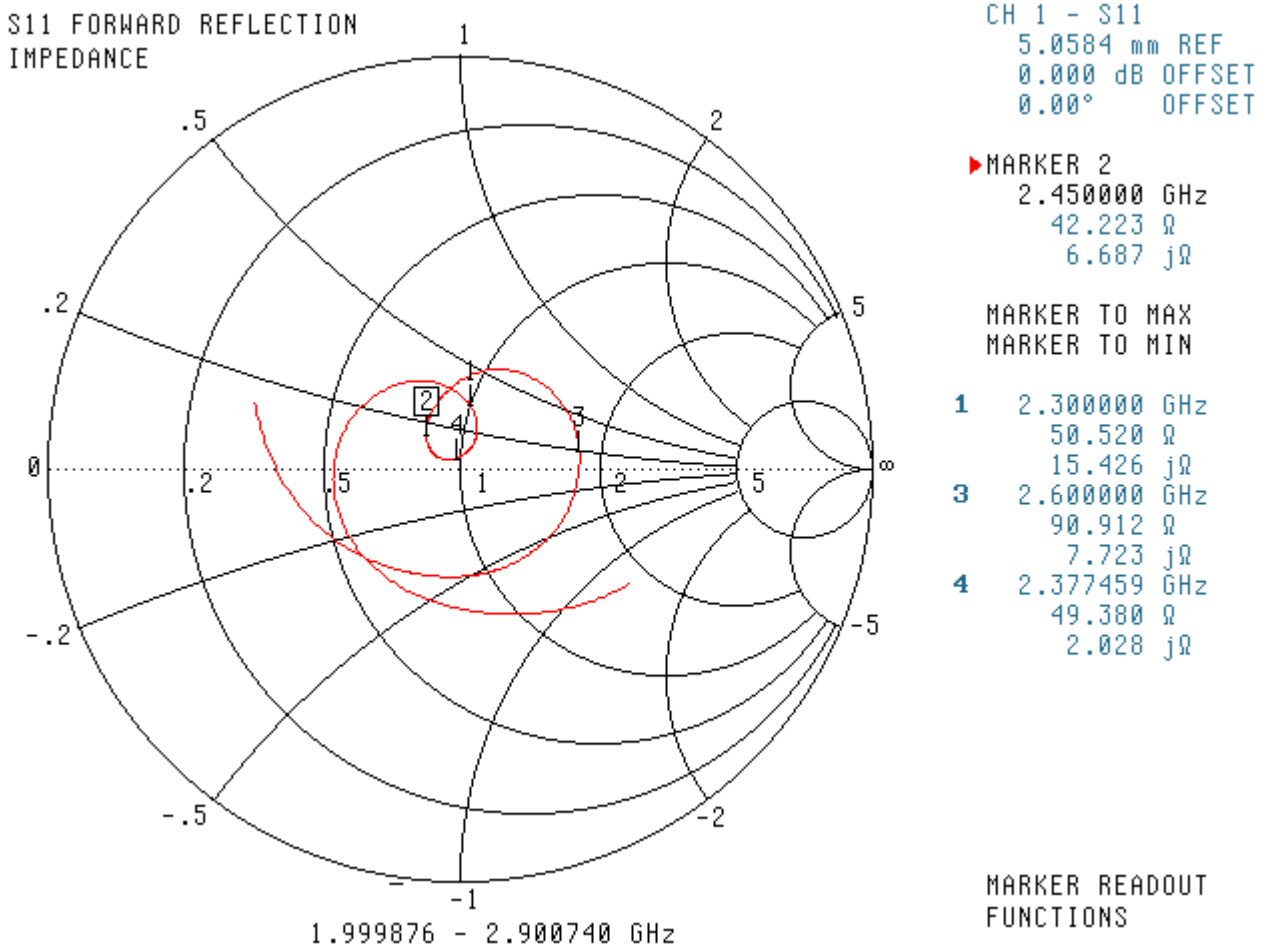
S11 Parameter Return Loss



SWR



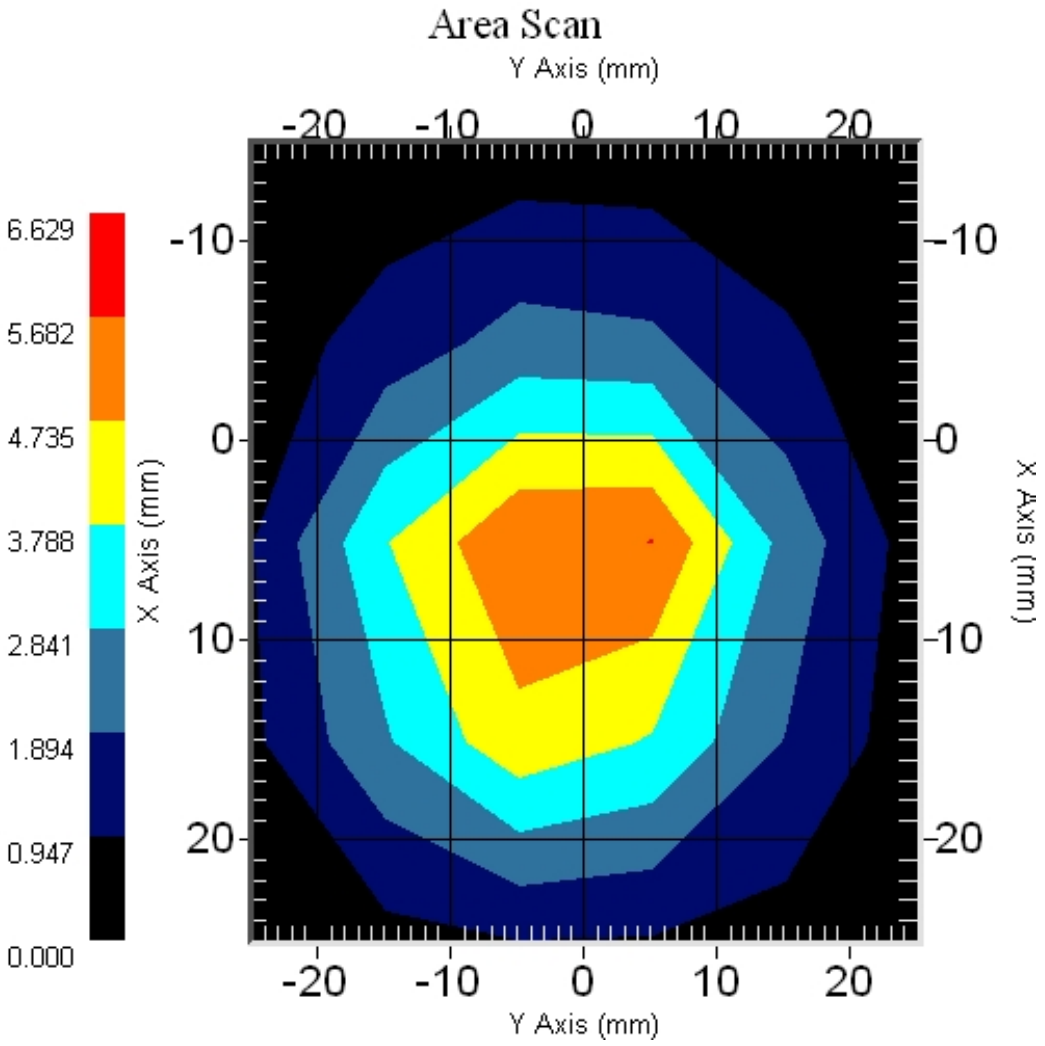
Smith Chart Dipole Impedance



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

C E R T I F I C A T E OF C A L I B R A T I O N

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

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

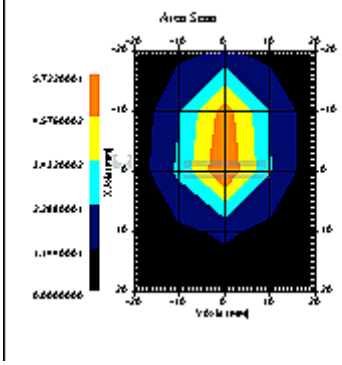
SWR: 1.006 U
Return Loss: -50.321 dB
Impedance: 50.247 Ω

Electrical Specification 5800MHz

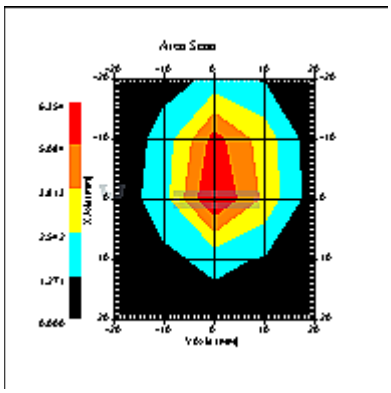
SWR: 1.021 U
Return Loss: -39.852 dB
Impedance: 49.261 Ω

System Validation Results

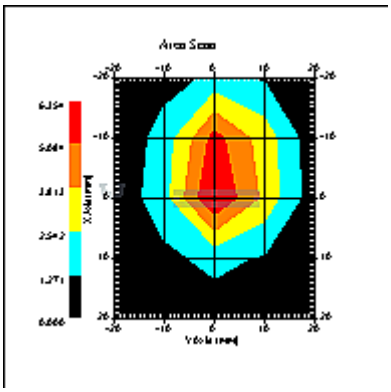
Frequency	1 Gram	10 Gram	Peak
5200 MHz	59.81	19.01	-
5600 MHz	63.10	20.60	-
5800 MHz	61.36	19.73	-



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

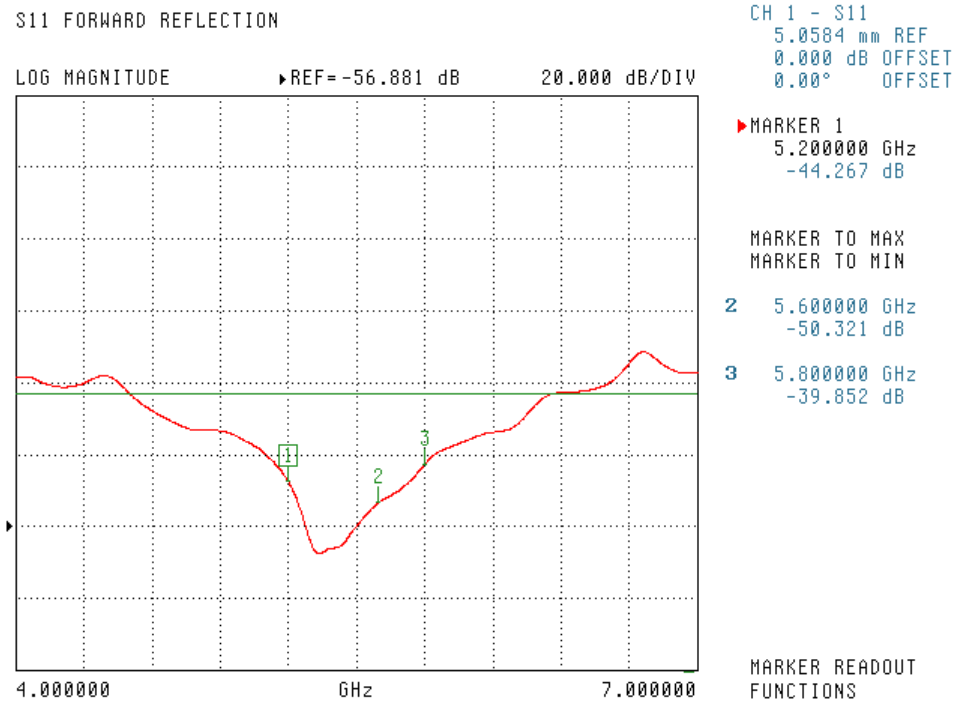
SWR: 1.006 U
Return Loss: -50.321 dB
Impedance: 50.247 Ω

Electrical Specification 5800MHz

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

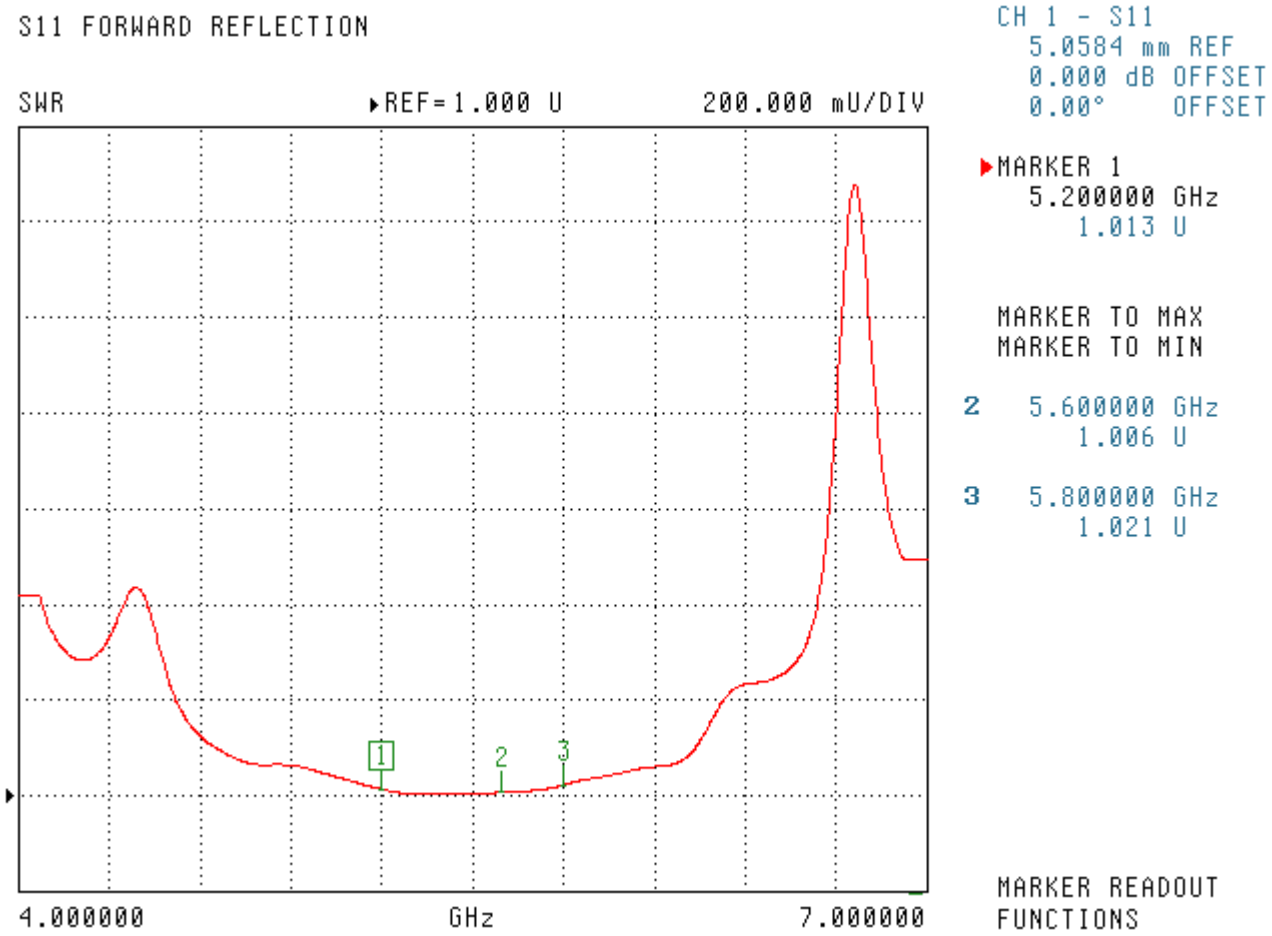
The Following Graphs are the results as displayed on the Vector Network Analyzer.

S11 Parameter Return Loss

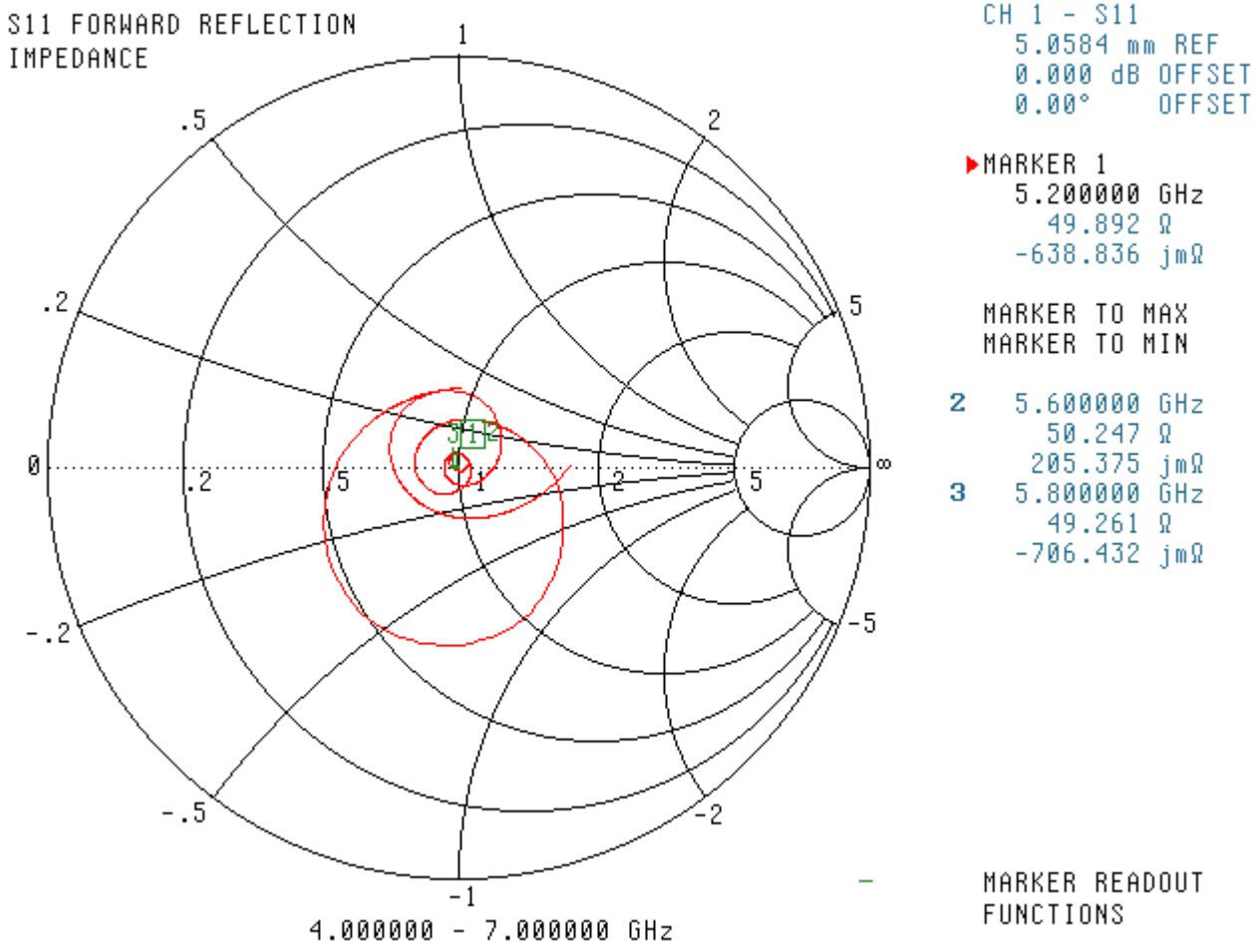


This page has been reviewed for content and attested to by signature within this document.

SWR

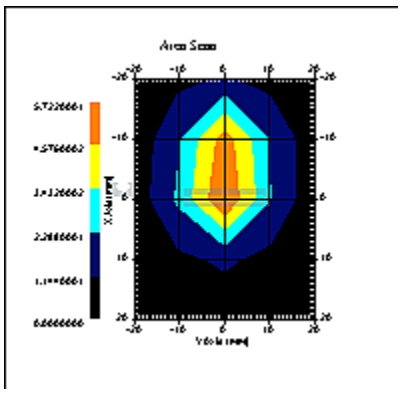


Smith Chart Dipole Impedance

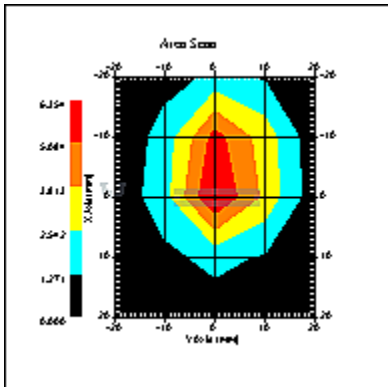


System Validation Results Using the Electrically Calibrated Dipole

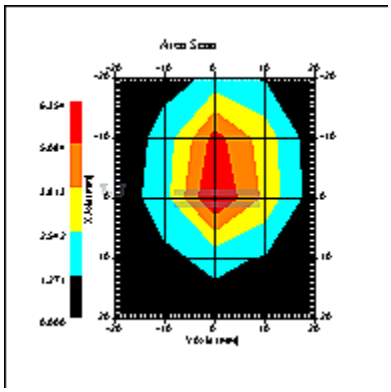
Frequency	1 Gram	10 Gram	Peak
5200 MHz	59.81	19.01	-
5600 MHz	63.10	20.60	-
5800 MHz	61.36	19.73	-



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 ± 10%
Pinna thickness is 6 mm ± 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
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CANADA K2R 1E6

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