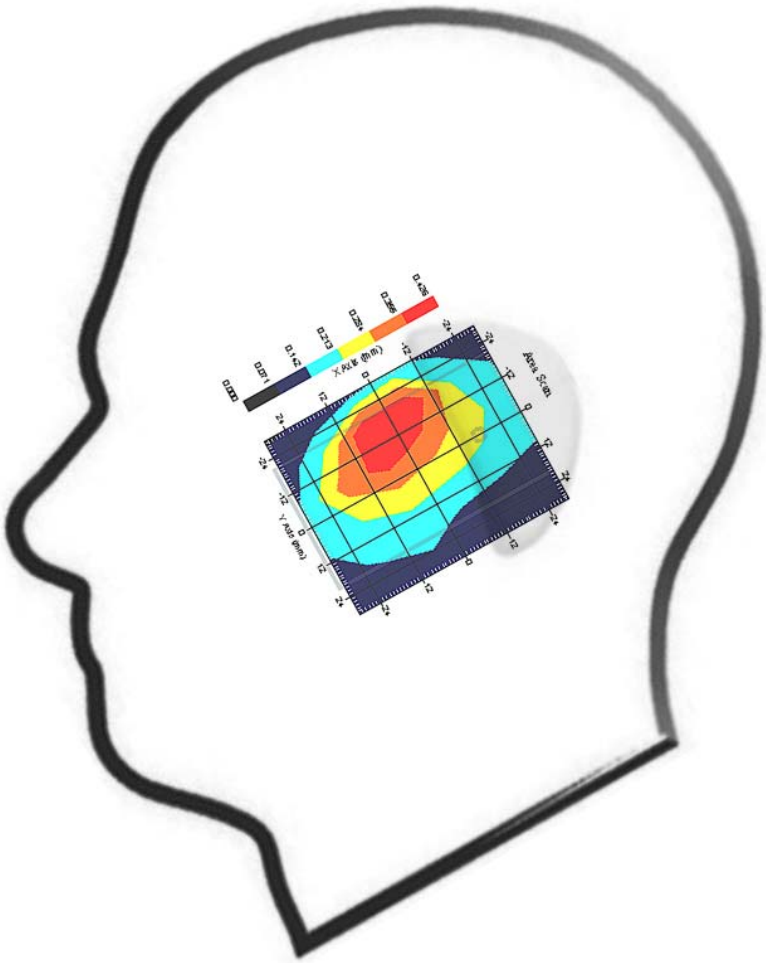
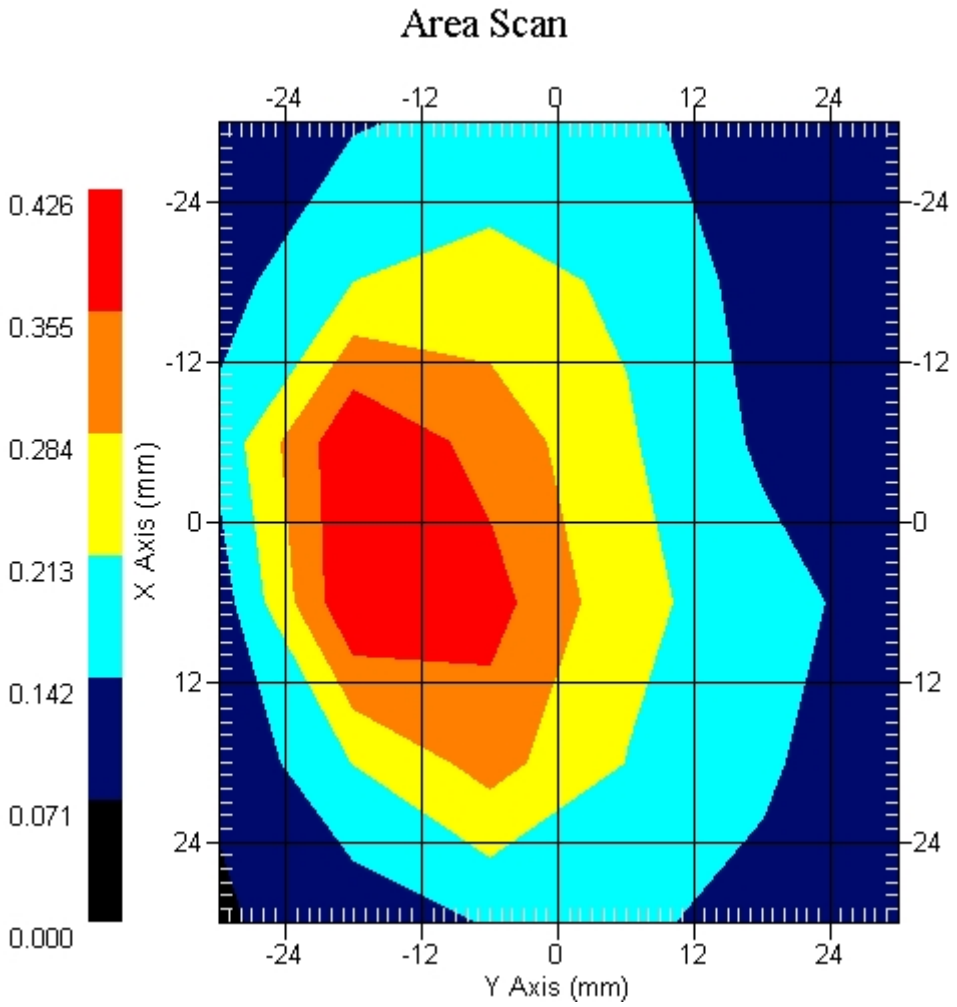
Measurement Data
Crest Factor : 8
Temperature : 20.20 °C
Ambient Temp. : 21.00 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.182 W/kg
Power Drift-Finish: 0.186 W/kg
Power Drift (%) : 2.310

DUT Position : 15° Tilt
Channel : 661

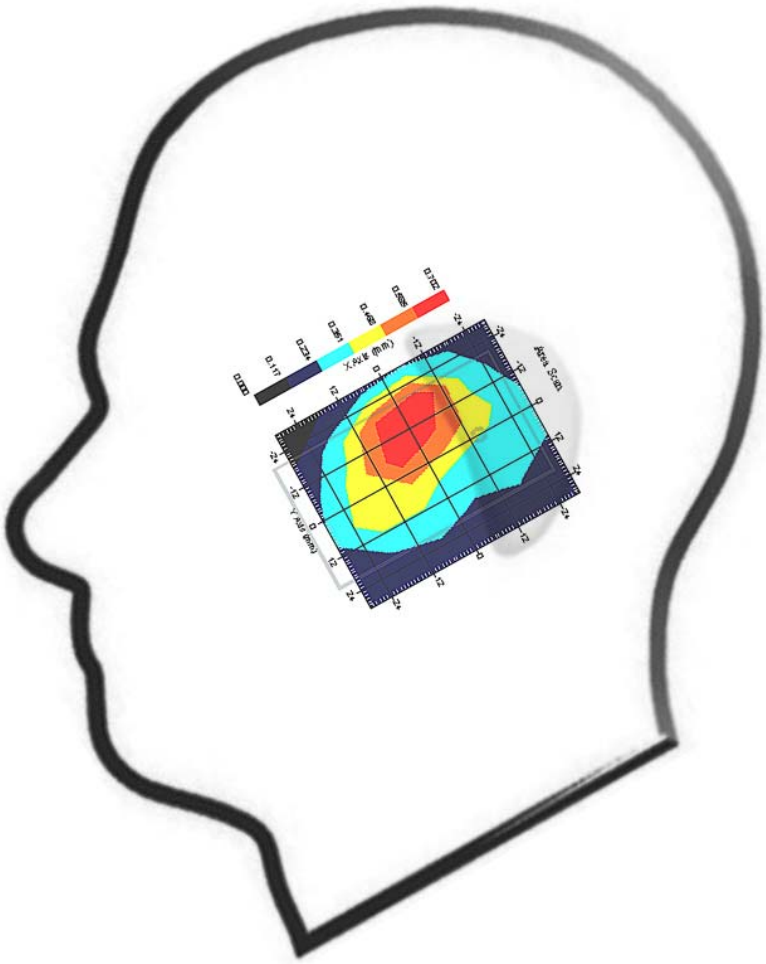


1 gram SAR value : 0.394 W/kg
10 gram SAR value : 0.250 W/kg
Area Scan Peak SAR : 0.423 W/kg
Zoom Scan Peak SAR : 0.960 W/kg

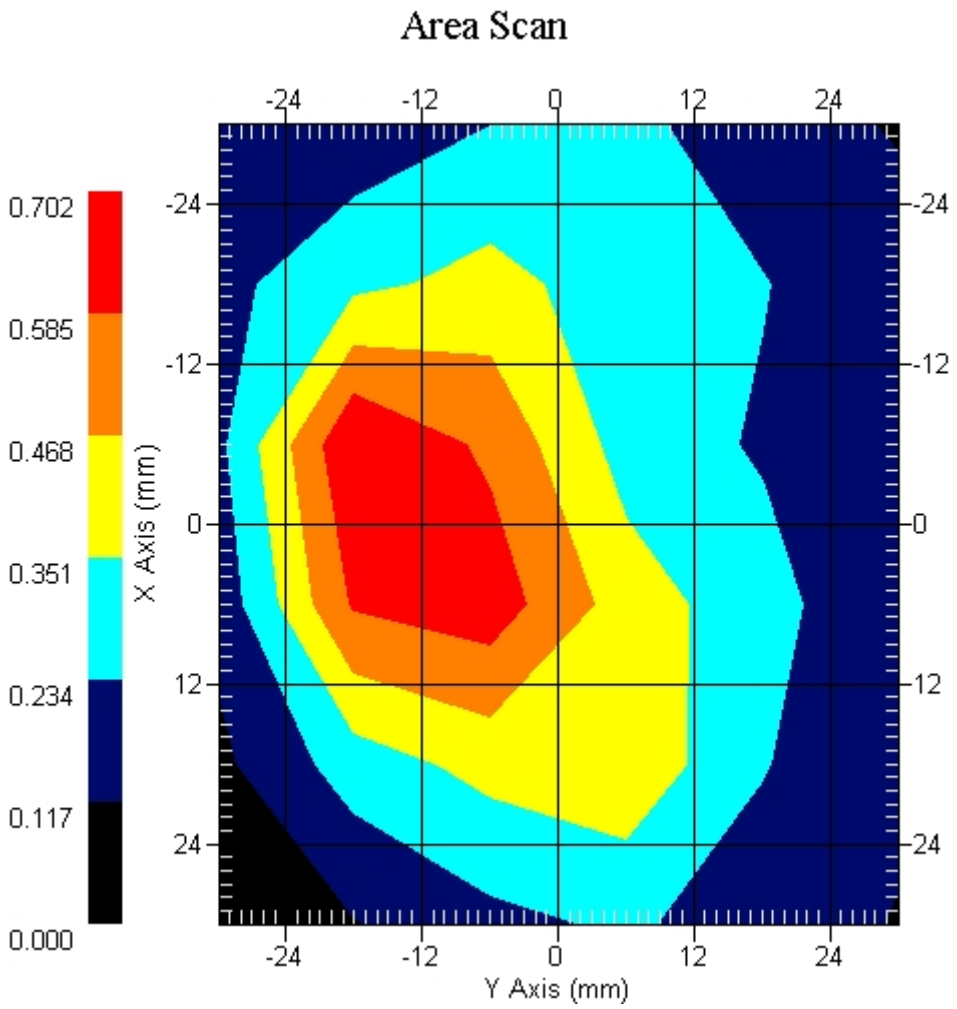

Area Scan
-24
-12
0
12
24
0.426
0.355
0.284
0.213
0.142
0.071
0.000
X Axis (mm)
Y Axis (mm)

Measurement Data
Crest Factor : 8
Temperature : 20.20 °C
Ambient Temp. : 21.00 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.307 W/kg
Power Drift-Finish: 0.307 W/kg
Power Drift (%) : -0.013

DUT Position : 15° Tilt
Channel : 810



1 gram SAR value : 0.535 W/kg
10 gram SAR value : 0.285 W/kg
Area Scan Peak SAR : 0.700 W/kg
Zoom Scan Peak SAR : 1.054 W/kg


Area Scan
-24
-12
0
12
24
0.702
0.585
0.468
0.351
0.234
0.117
0.000
X Axis (mm)
Y Axis (mm)

ALSAS-10U VER 2.3.6 APREL Laboratories

SAR Test Report-PCS 1900 (Distance 0.5cm)

Report Date : 06-Aug-2008
Measurement Date : 06-Aug-2008

Product Data
Device Name : COMPASS
Type : Other
Model : GT7XX (X: 00~99)
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 74.5 mm
Width : 42.3 mm
Depth : 27.6 mm
Antenna Type : Internal

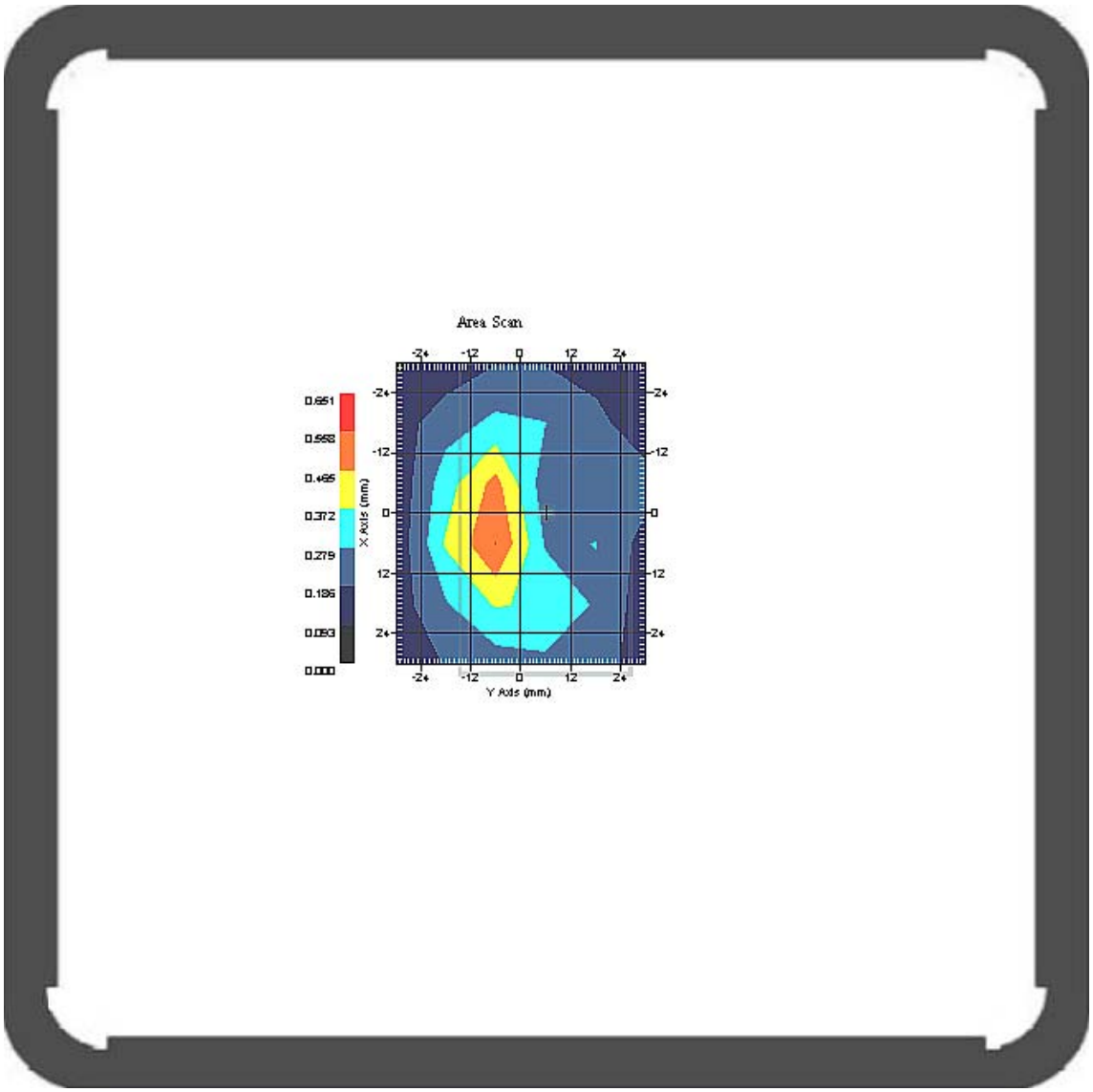
Phantom Data
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Location : Center

Tissue Data
Type : BODY
Serial No. : 324-B
Frequency : 1900.00 MHz
Last Calib. Date : 06-Aug-2007
Temperature : 20.20 °C
Ambient Temp. : 20.80 °C
Humidity : 48.00 RH%
Epsilon : 54.19 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

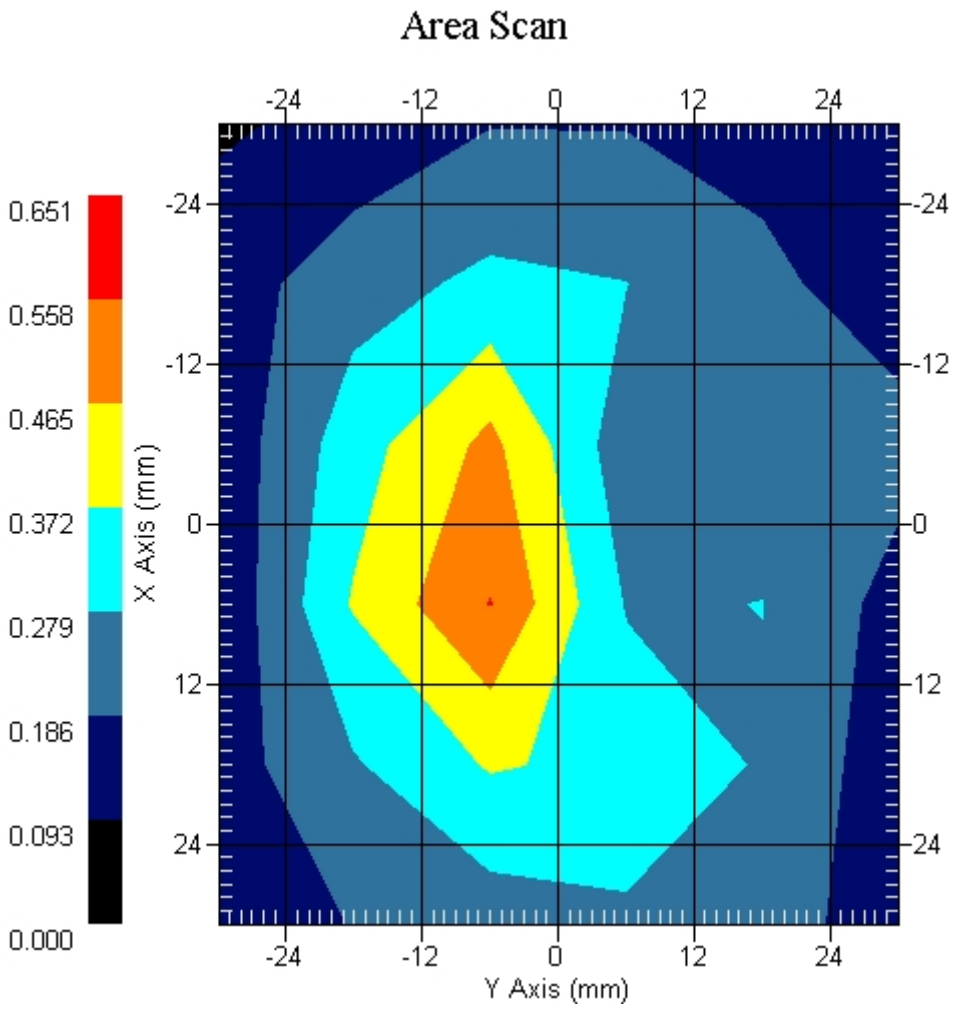
Probe Data
Name : Probe 265
Model : E020
Type : E-Field Triangle
Serial No. : 265
Last Calib. Date : 09-May-2008
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 5.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.140 W/kg
Power Drift-Finish: 0.138 W/kg
Power Drift (%) : -1.428

DUT Position : Touch EUT Front
Channel : 512

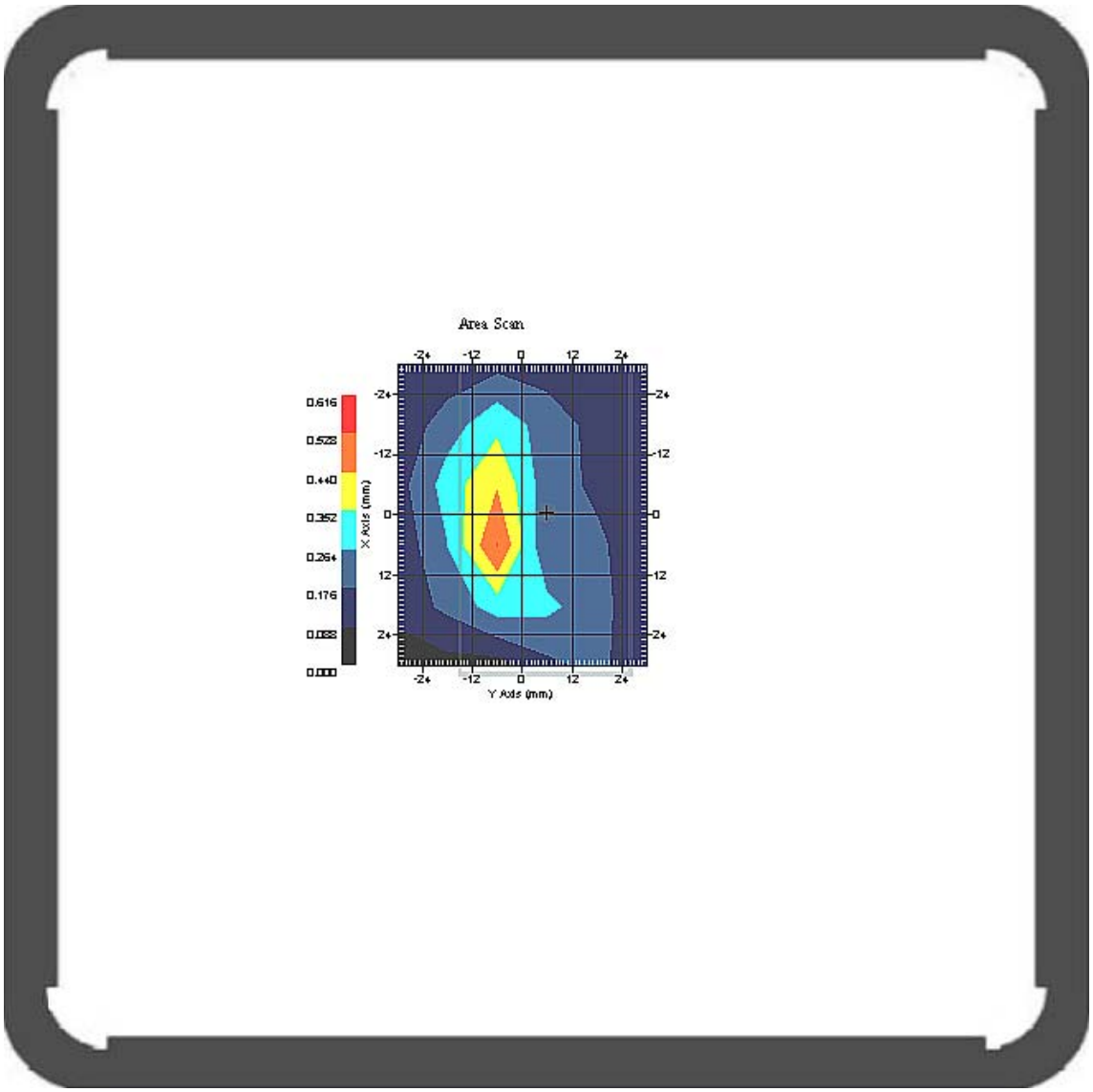


1 gram SAR value : 0.494 W/kg
10 gram SAR value : 0.319 W/kg
Area Scan Peak SAR : 0.560 W/kg
Zoom Scan Peak SAR : 0.959 W/kg

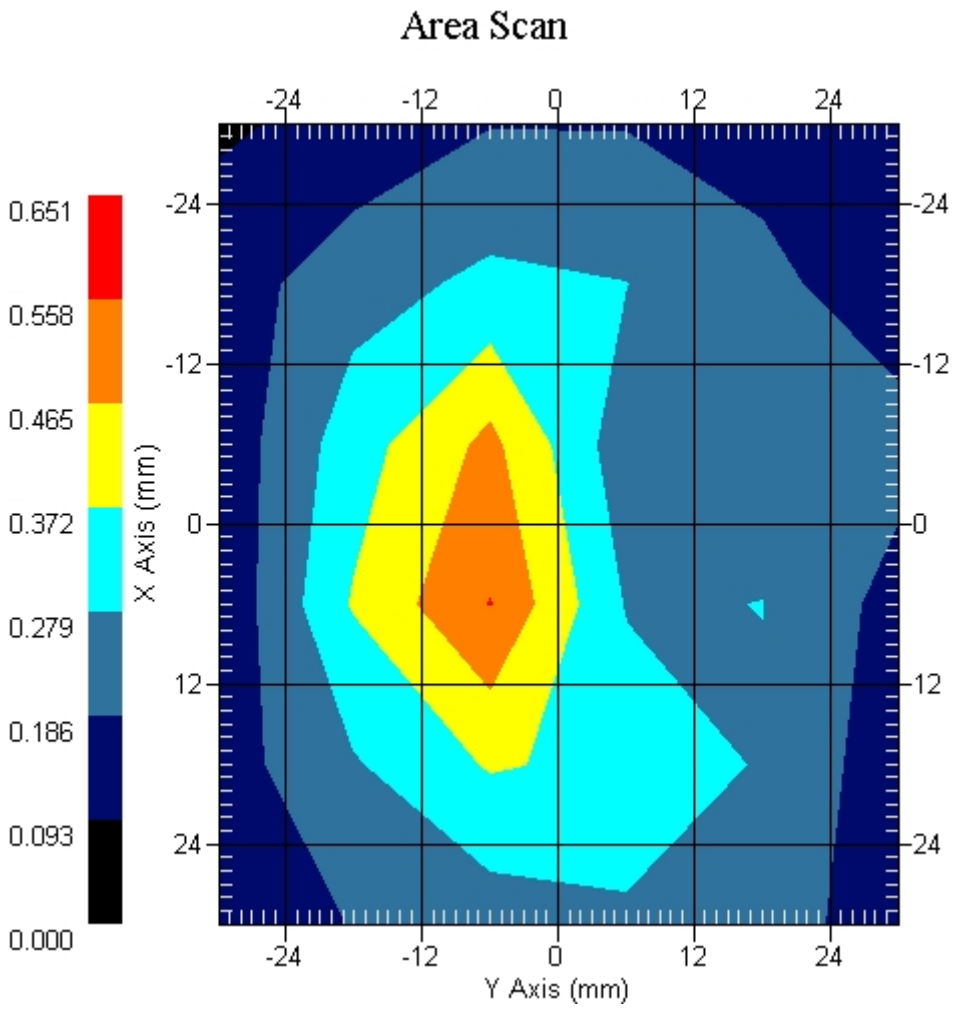

Area Scan
0.651
0.558
0.465
0.372
0.279
0.186
0.093
0.000
X Axis (mm)
-24
-12
0
12
24
Y Axis (mm)

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.155 W/kg
Power Drift-Finish: 0.152 W/kg
Power Drift (%) : -1.935

DUT Position : Touch EUT Front
Channel : 661

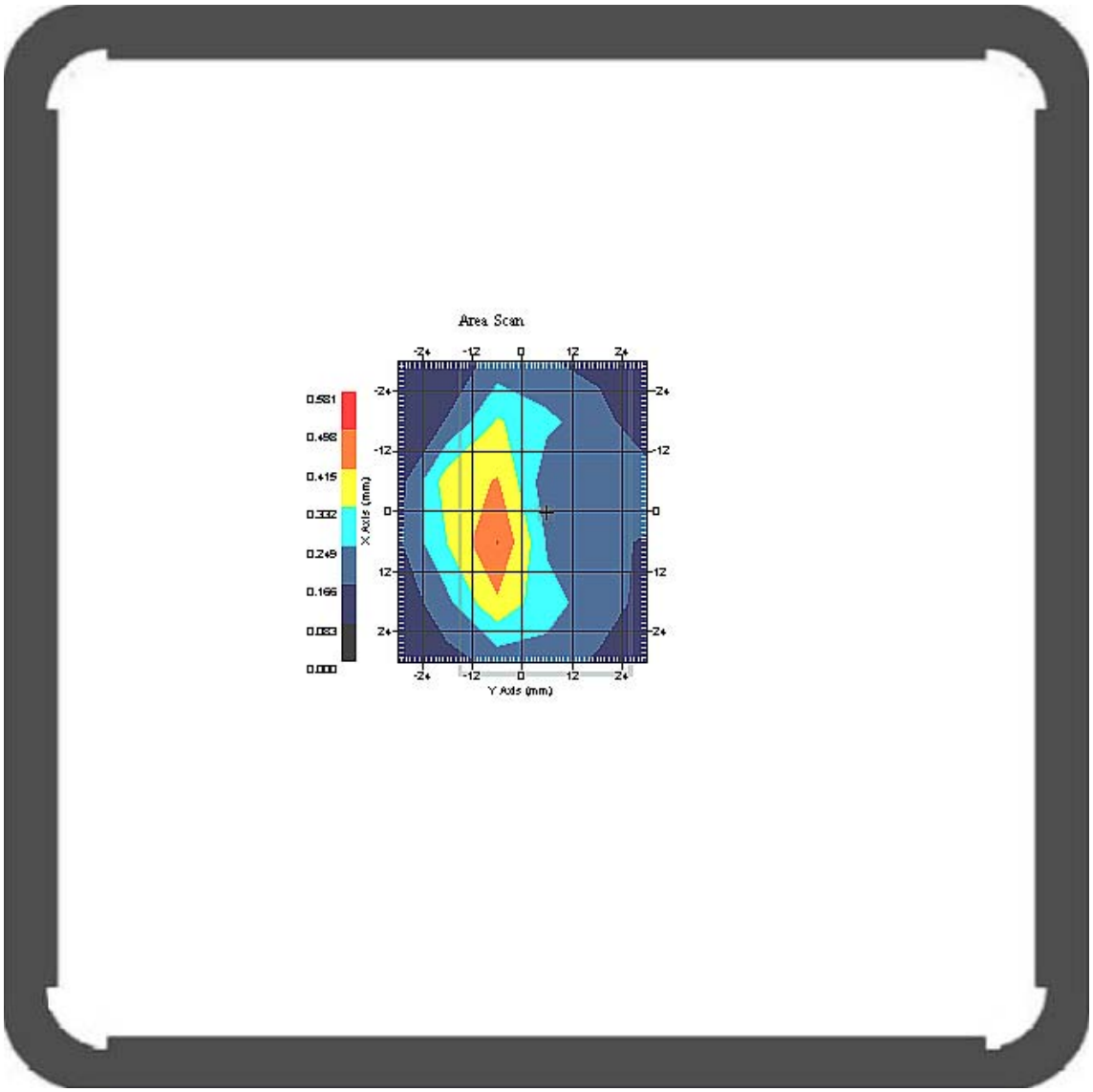


1 gram SAR value : 0.465 W/kg
10 gram SAR value : 0.289 W/kg
Area Scan Peak SAR : 0.530 W/kg
Zoom Scan Peak SAR : 0.964 W/kg

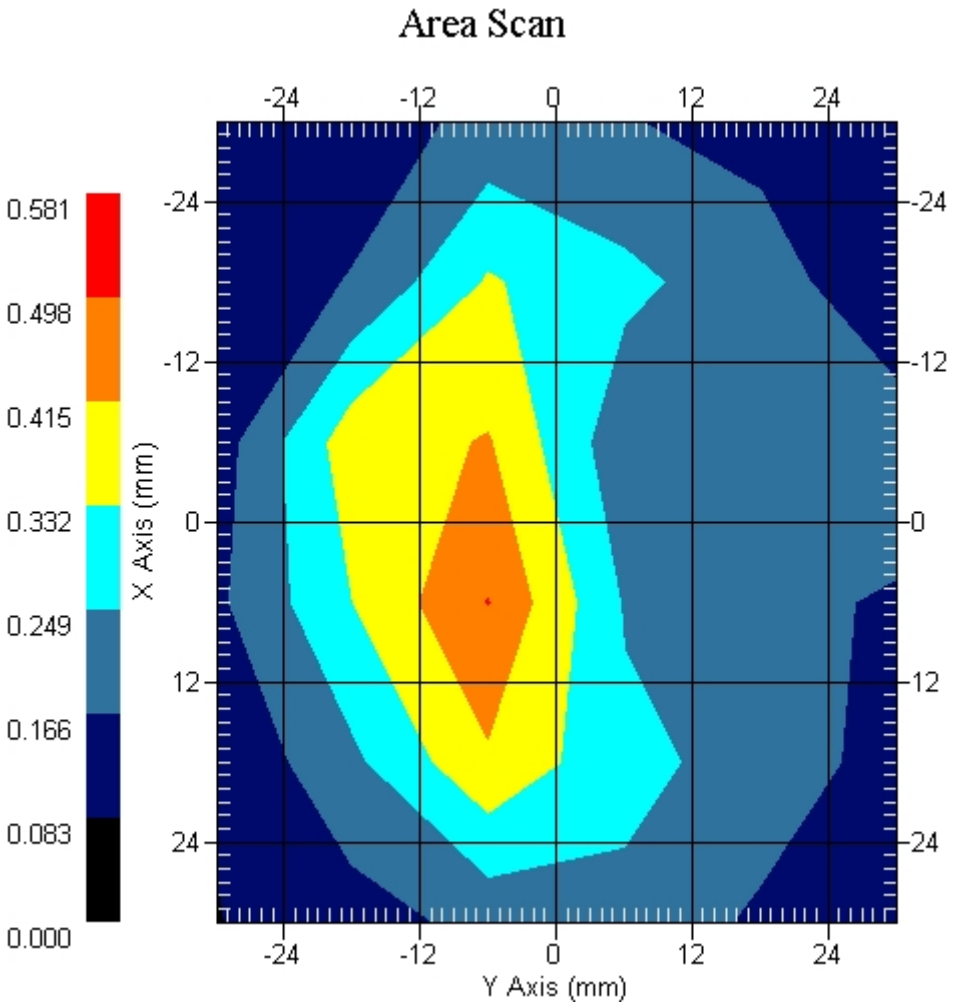

Area Scan
0.651
0.558
0.465
0.372
0.279
0.186
0.093
0.000
X Axis (mm)
-24
-12
0
12
24
Y Axis (mm)

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.128 W/kg
Power Drift-Finish: 0.131 W/kg
Power Drift (%) : 2.343

DUT Position : Touch EUT Front
Channel : 810

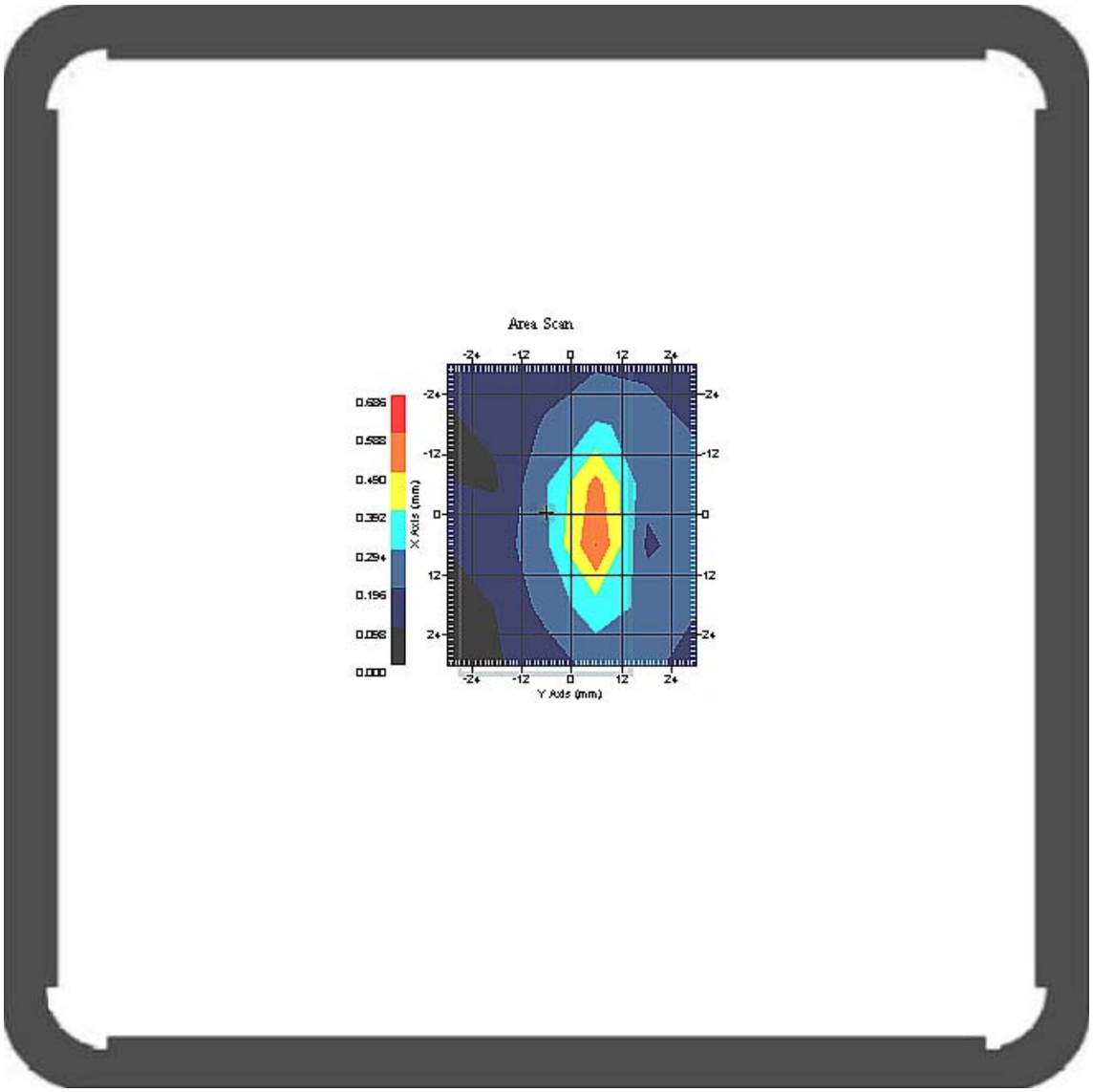


1 gram SAR value : 0.432 W/kg
10 gram SAR value : 0.252 W/kg
Area Scan Peak SAR : 0.500 W/kg
Zoom Scan Peak SAR : 0.928 W/kg

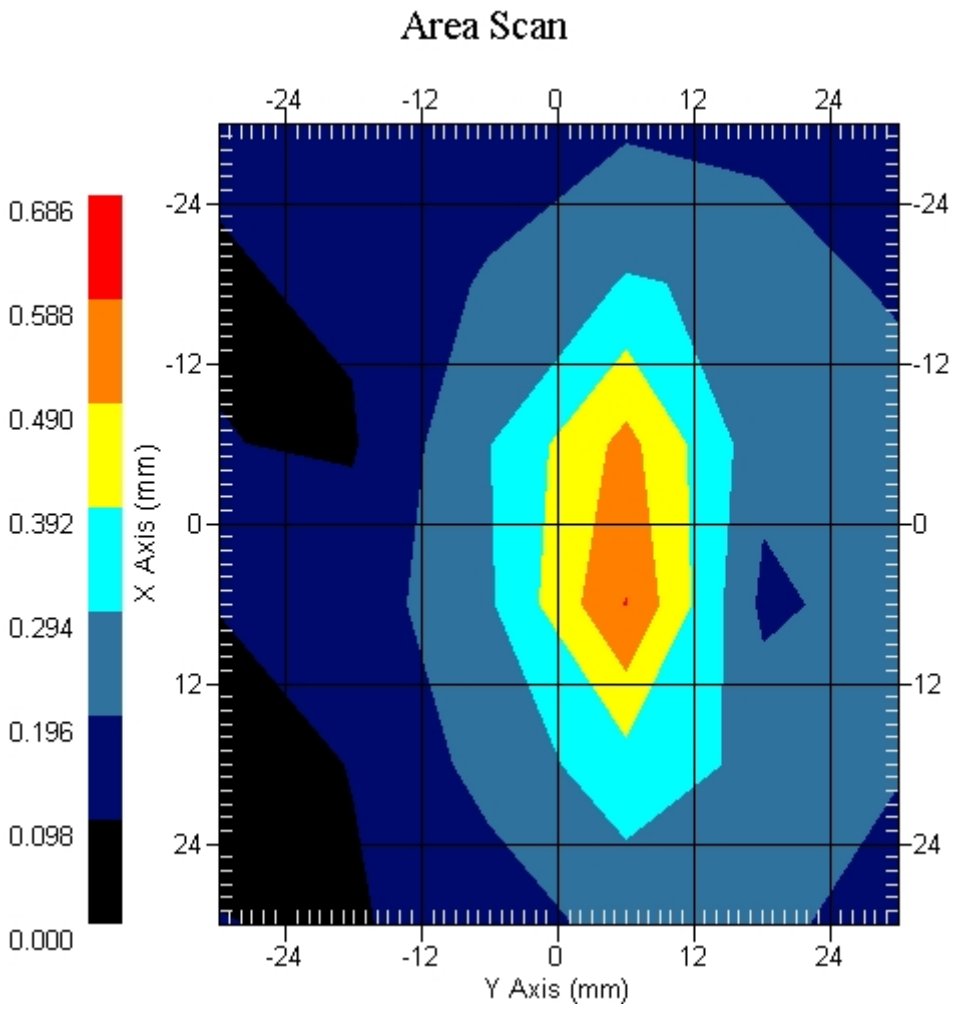

Area Scan
0.581
0.498
0.415
0.332
0.249
0.166
0.083
0.000
X Axis (mm)
Y Axis (mm)
-24
-12
0
12
24

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.157 W/kg
Power Drift-Finish: 0.156 W/kg
Power Drift (%) : -0.636

DUT Position : Touch EUT Back
Channel : 661



1 gram SAR value : 0.446 W/kg
10 gram SAR value : 0.272 W/kg
Area Scan Peak SAR : 0.512 W/kg
Zoom Scan Peak SAR : 0.941 W/kg


Area Scan
-24
-12
0
12
24
0.686
0.588
0.490
0.392
0.294
0.196
0.098
0.000
X Axis (mm)
Y Axis (mm)

ALSAS-10U VER 2.3.6 APREL Laboratories

SAR Test Report-PCS 1900 (Distance 0cm)

Report Date : 26-Sep-2008
Measurement Date : 26-Sep-2008

Product Data
Device Name : COMPASS
Type : Other
Model : GT7XX (X: 00~99)
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 74.5 mm
Width : 42.3 mm
Depth : 27.6 mm
Antenna Type : Internal

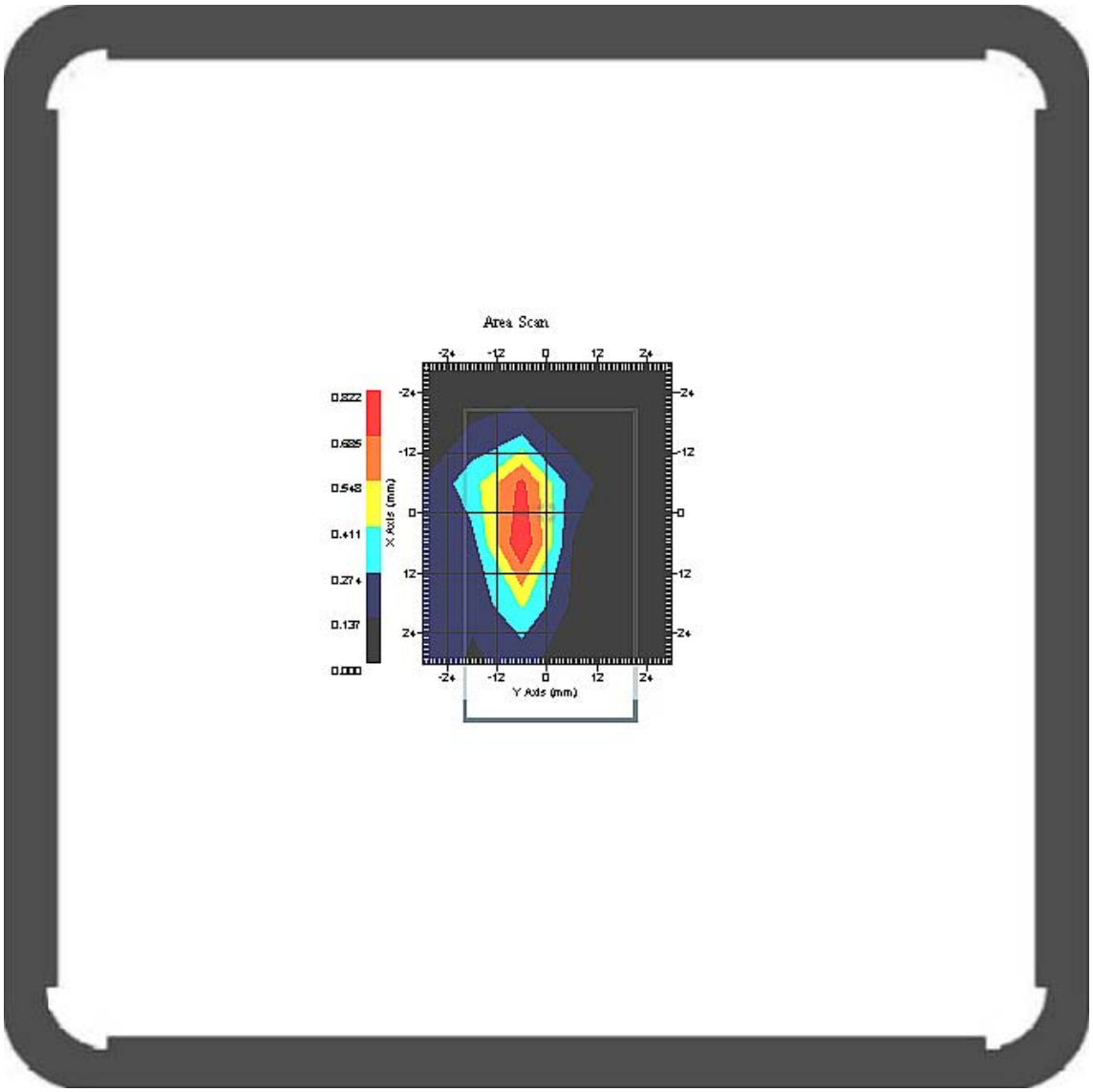
Phantom Data
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Location : Center

Tissue Data
Type : BODY
Serial No. : 324-B
Frequency : 1900.00 MHz
Last Calib. Date : 26-Sep-2007
Temperature : 20.00 °C
Ambient Temp. : 20.70 °C
Humidity : 48.00 RH%
Epsilon : 54.27 F/m
Sigma : 1.53 S/m
Density : 1000.00 kg/cu. m

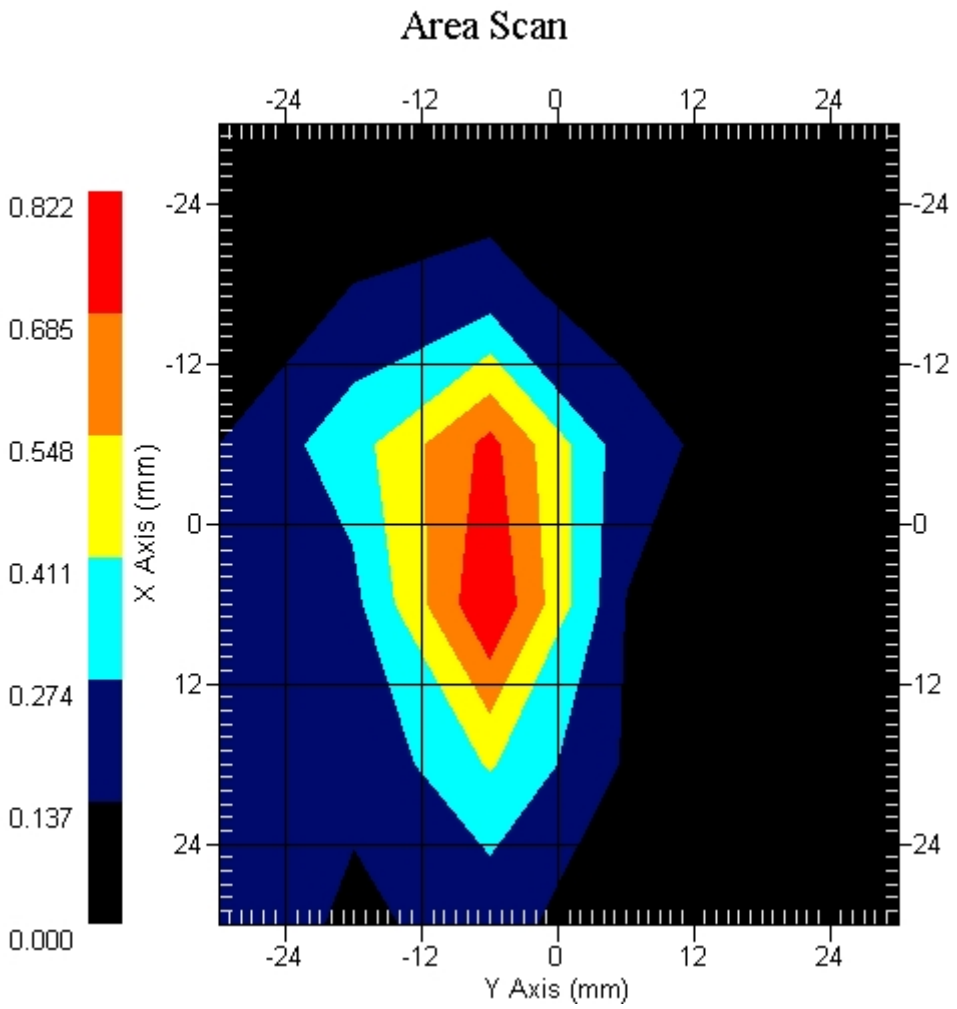
Probe Data
Name : Probe 265
Model : E020
Type : E-Field Triangle
Serial No. : 265
Last Calib. Date : 09-May-2008
Frequency : 1900.00 MHz
Duty Cycle Factor: 8
Conversion Factor: 5.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.426 W/kg
Power Drift-Finish: 0.410 W/kg
Power Drift (%) : -3.640

DUT Position : Touch EUT Front
Channel : 512

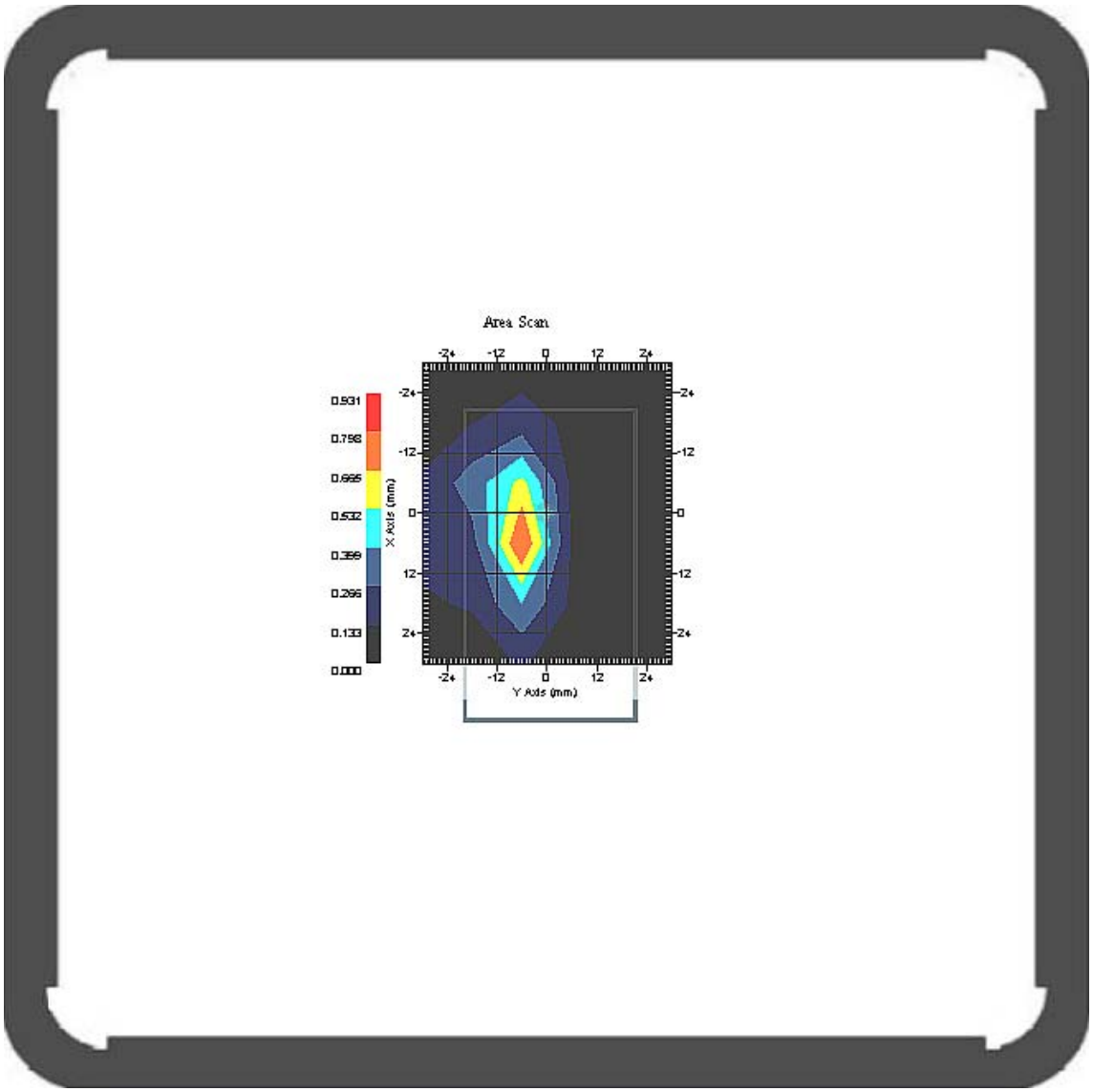


1 gram SAR value : 0.651 W/kg
10 gram SAR value : 0.394 W/kg
Area Scan Peak SAR : 0.820 W/kg
Zoom Scan Peak SAR : 1.441 W/kg

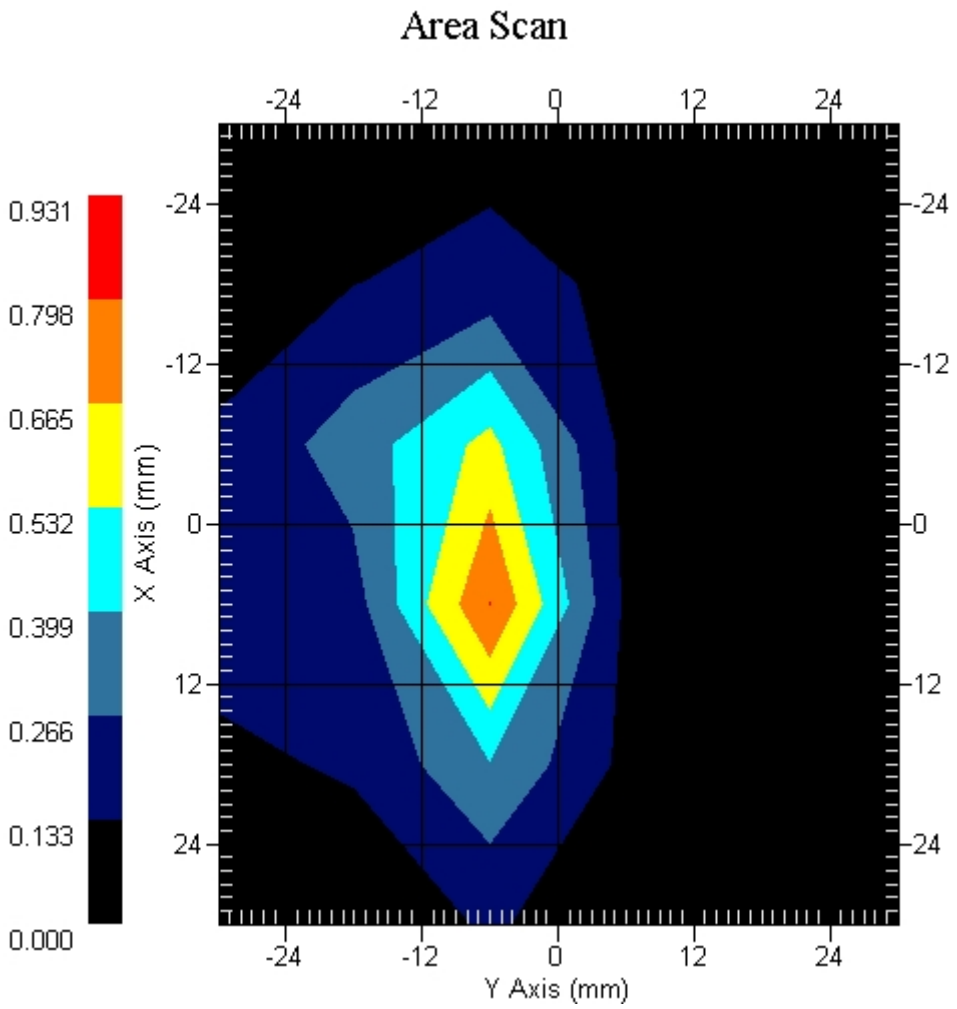

Area Scan
-24
-12
0
12
24
0.822
0.685
0.548
0.411
0.274
0.137
0.000
X Axis (mm)
Y Axis (mm)

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.412 W/kg
Power Drift-Finish: 0.422 W/kg
Power Drift (%) : 2.414

DUT Position : Touch EUT Front
Channel : 661

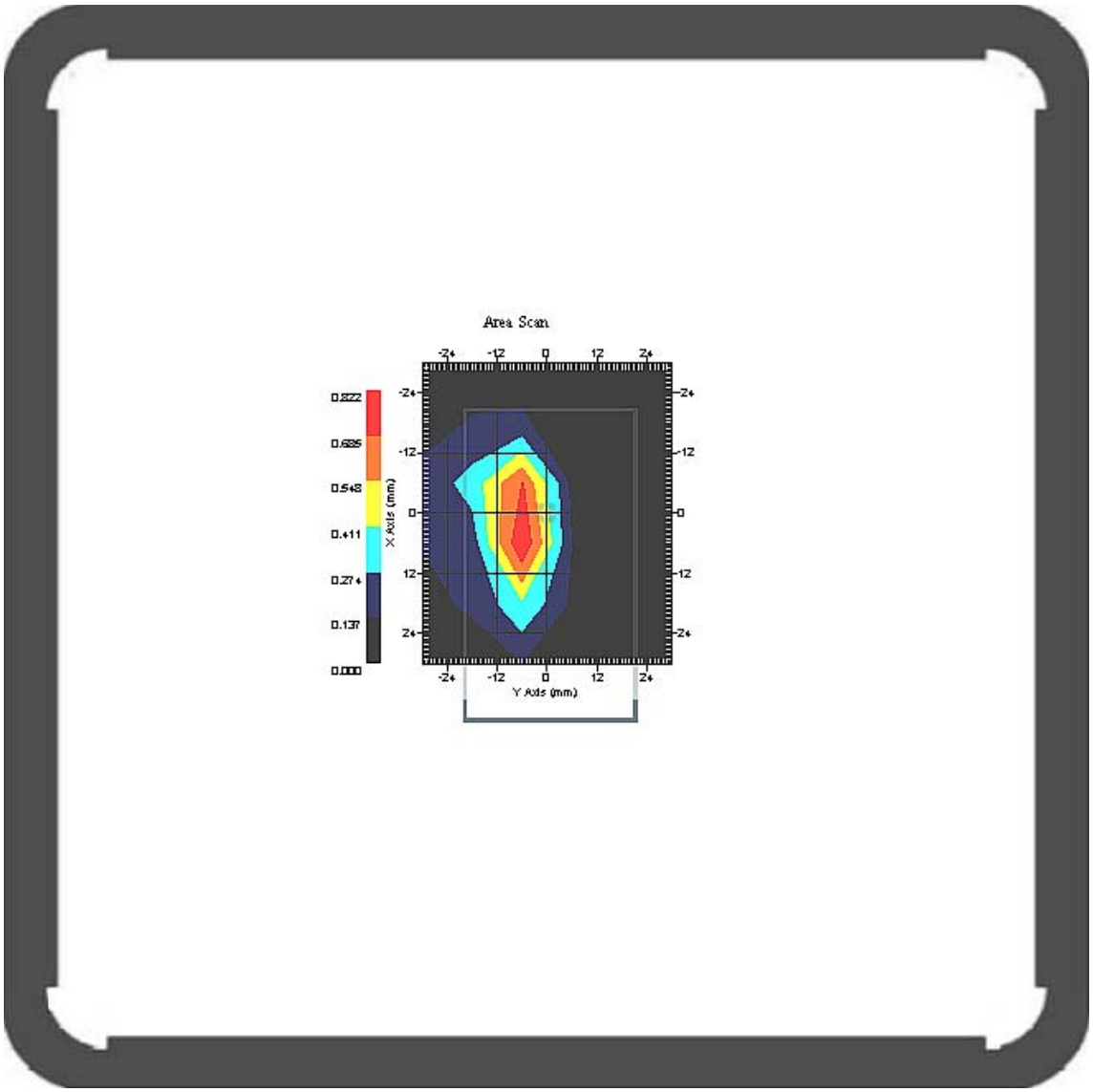


1 gram SAR value : 0.629 W/kg
10 gram SAR value : 0.375 W/kg
Area Scan Peak SAR : 0.800 W/kg
Zoom Scan Peak SAR : 1.415 W/kg

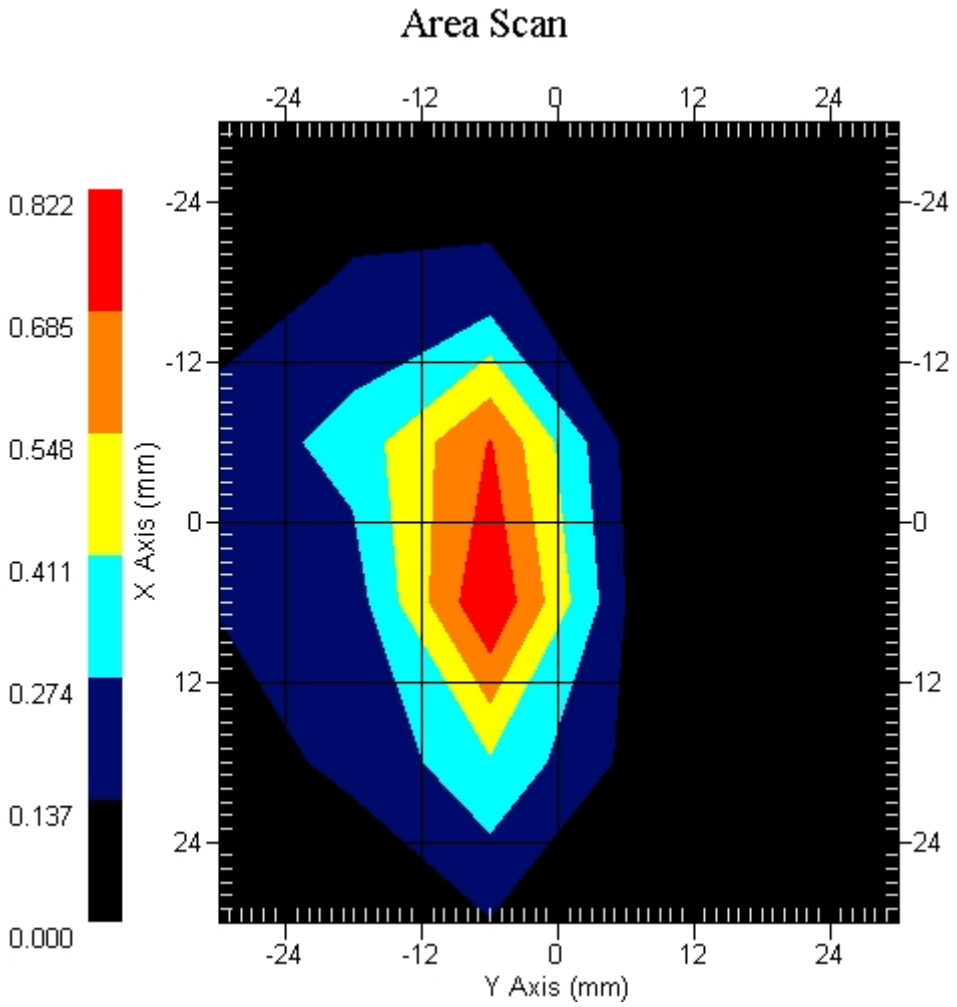

Area Scan
-24
-12
0
12
24
0.931
0.798
0.665
0.532
0.399
0.266
0.133
0.000
X Axis (mm)
Y Axis (mm)

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.417 W/kg
Power Drift-Finish: 0.413 W/kg
Power Drift (%) : -0.922

DUT Position : Touch EUT Front
Channel : 810

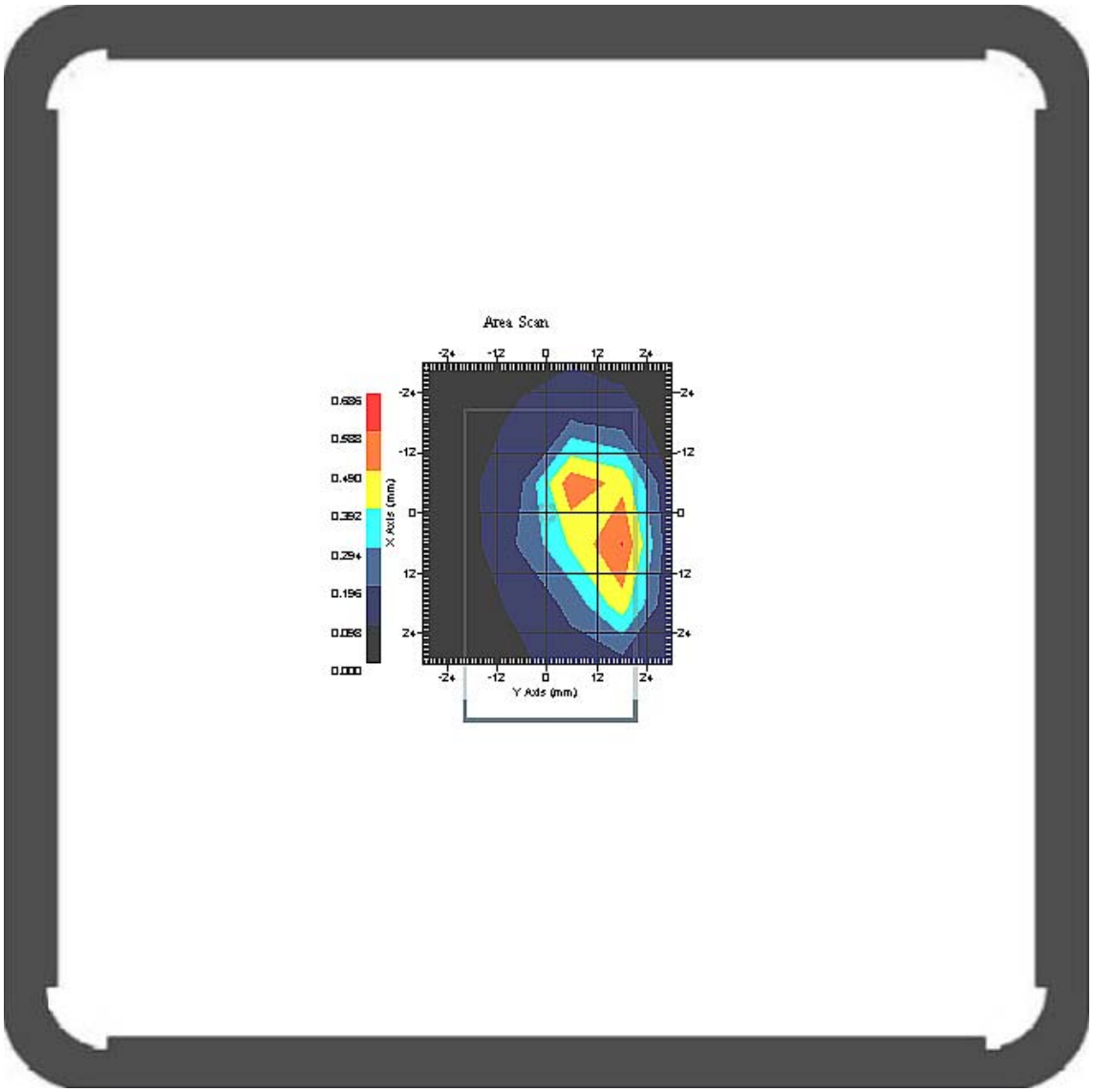


1 gram SAR value : 0.649 W/kg
10 gram SAR value : 0.391 W/kg
Area Scan Peak SAR : 0.820 W/kg
Zoom Scan Peak SAR : 1.439 W/kg

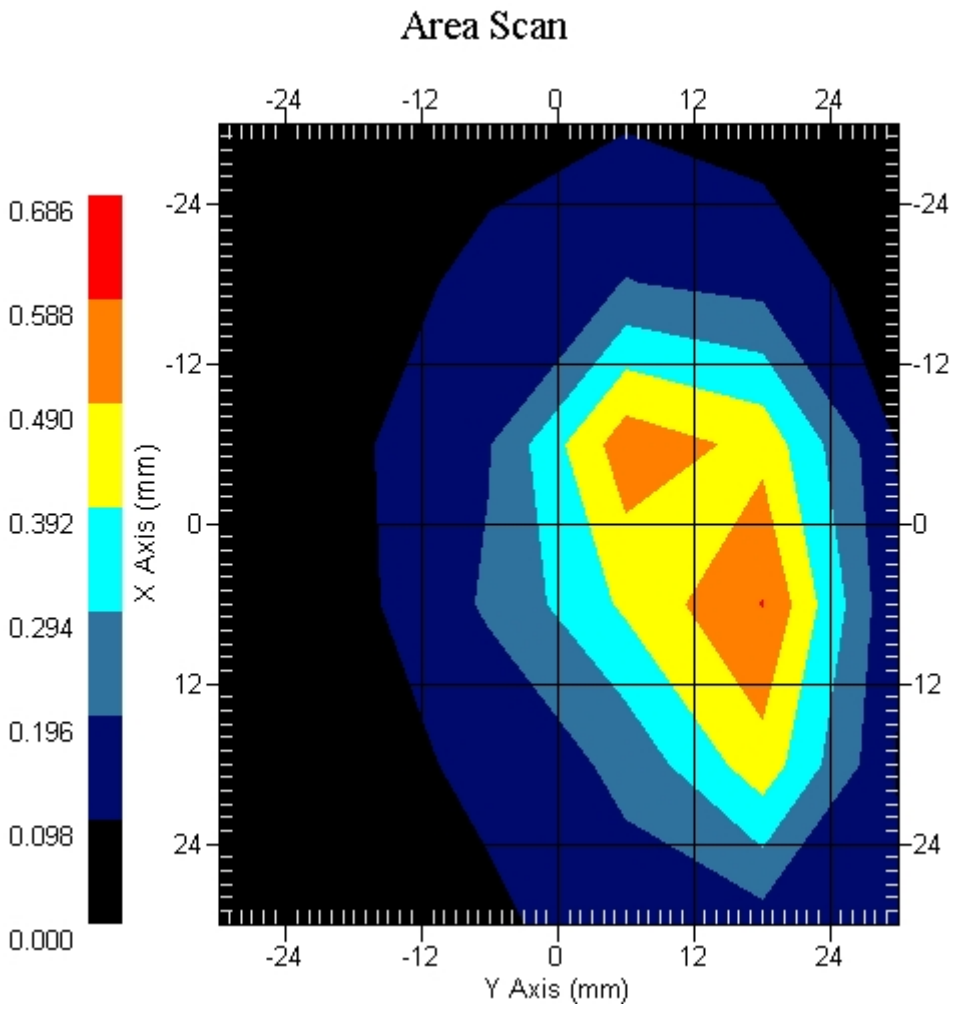

Area Scan
0.822
0.685
0.548
0.411
0.274
0.137
0.000
X Axis (mm)
Y Axis (mm)
-24
-12
0
12
24

Measurement Data
Crest Factor : 8
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.300 W/kg
Power Drift-Finish: 0.296 W/kg
Power Drift (%) : -1.333

DUT Position : Touch EUT Back
Channel : 512



1 gram SAR value : 0.445 W/kg
10 gram SAR value : 0.223 W/kg
Area Scan Peak SAR : 0.605 W/kg
Zoom Scan Peak SAR : 1.154 W/kg


Area Scan
-24
-12
0
12
24
0.686
0.588
0.490
0.392
0.294
0.196
0.098
0.000
X Axis (mm)
Y Axis (mm)

ALSAS-10U VER 2.3.6 APREL Laboratories

SAR Test Report-PCS 1900 GPRS (Distance 0.5cm)

Report Date : 06-Aug-2008
Measurement Date : 06-Aug-2008

Product Data
Device Name : COMPASS
Type : Other
Model : GT7XX (X: 00~99)
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 74.5 mm
Width : 42.3 mm
Depth : 27.6 mm
Antenna Type : Internal

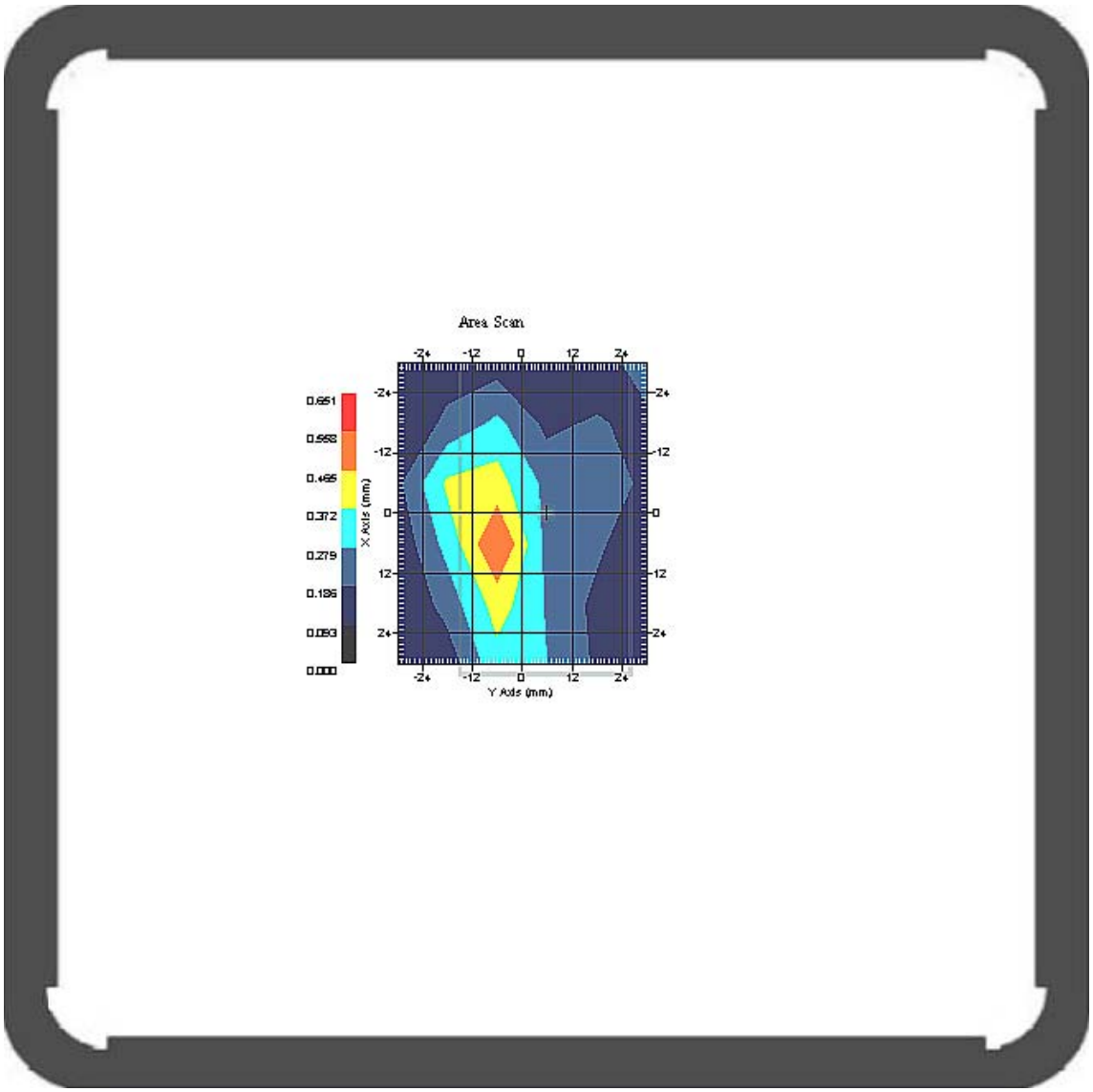
Phantom Data
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Location : Center

Tissue Data
Type : BODY
Serial No. : 324-B
Frequency : 1900.00 MHz
Last Calib. Date : 06-Aug-2007
Temperature : 20.20 °C
Ambient Temp. : 20.80 °C
Humidity : 48.00 RH%
Epsilon : 54.19 F/m
Sigma : 1.56 S/m
Density : 1000.00 kg/cu. m

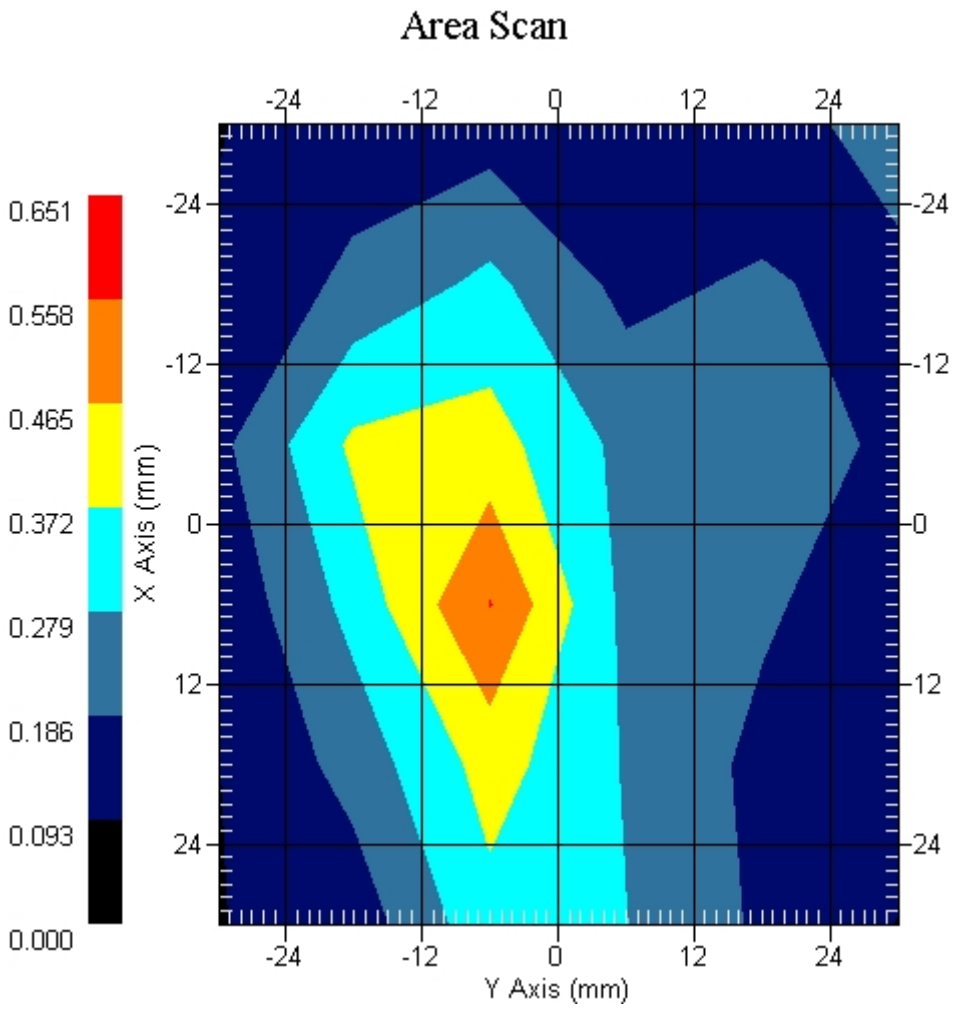
Probe Data
Name : Probe 265
Model : E020
Type : E-Field Triangle
Serial No. : 265
Last Calib. Date : 09-May-2008
Frequency : 1900.00 MHz
Duty Cycle Factor: 4
Conversion Factor: 5.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.124 W/kg
Power Drift-Finish: 0.127 W/kg
Power Drift (%) : 2.419

DUT Position : Touch EUT Front
Channel : 512

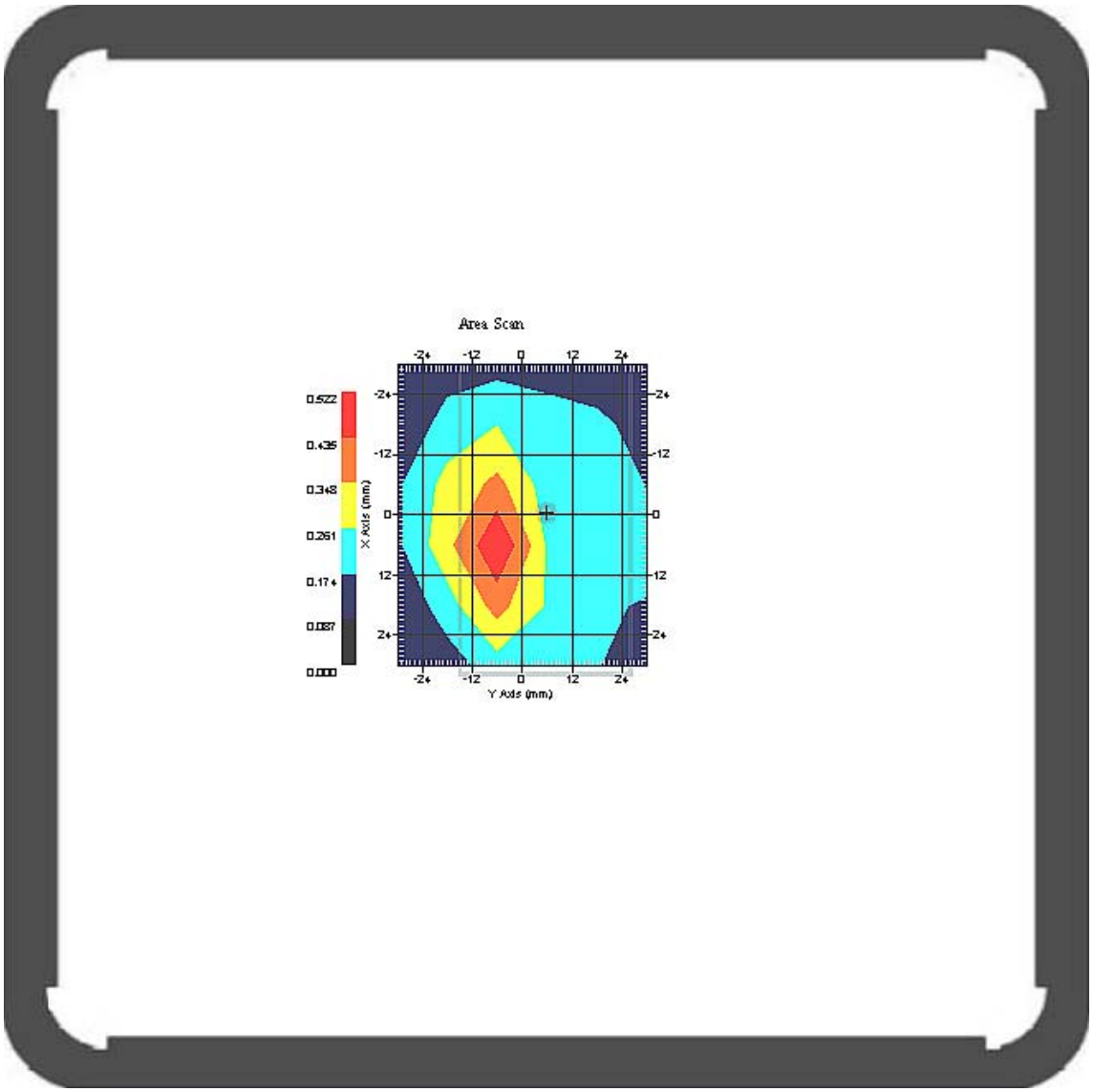


1 gram SAR value : 0.492 W/kg
10 gram SAR value : 0.319 W/kg
Area Scan Peak SAR : 0.560 W/kg
Zoom Scan Peak SAR : 0.952 W/kg

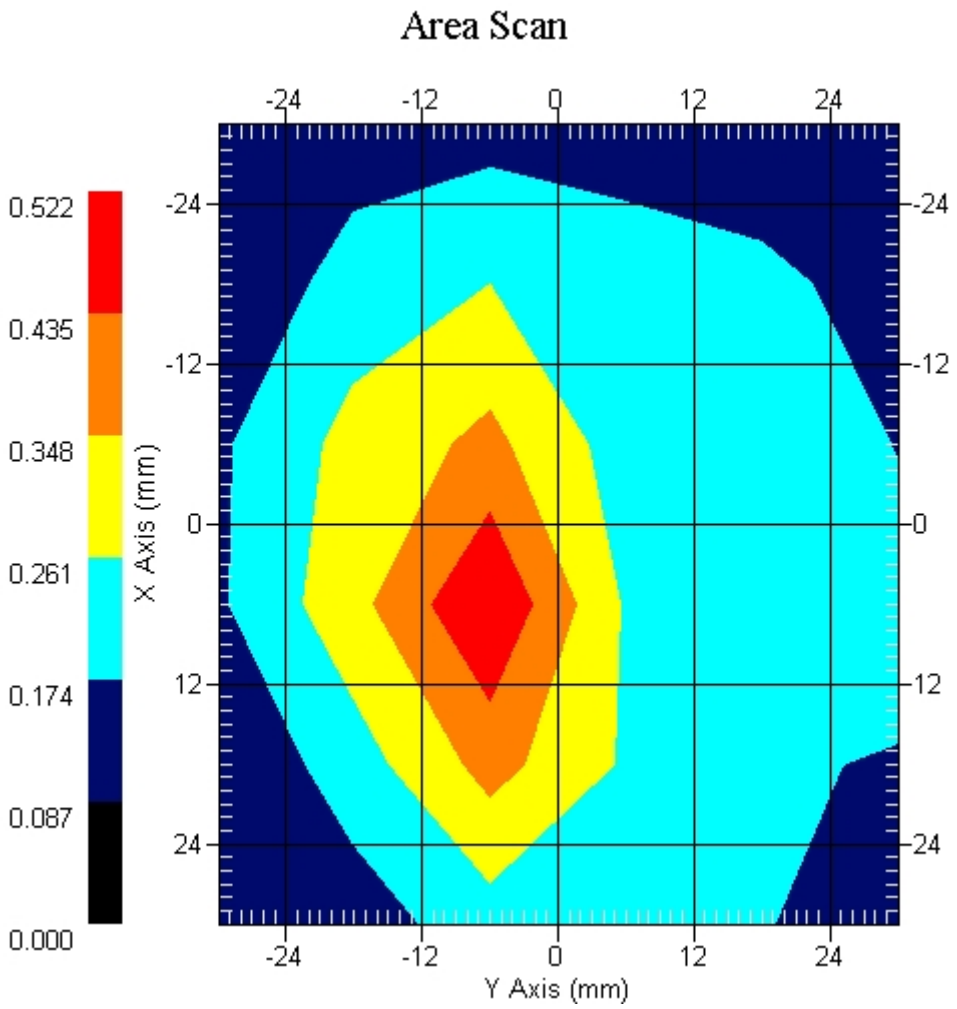

Area Scan
-24
-12
0
12
24
0.651
0.558
0.465
0.372
0.279
0.186
0.093
0.000
X Axis (mm)
Y Axis (mm)

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.133 W/kg
Power Drift-Finish: 0.136 W/kg
Power Drift (%) : 2.255

DUT Position : Touch EUT Front
Channel : 661

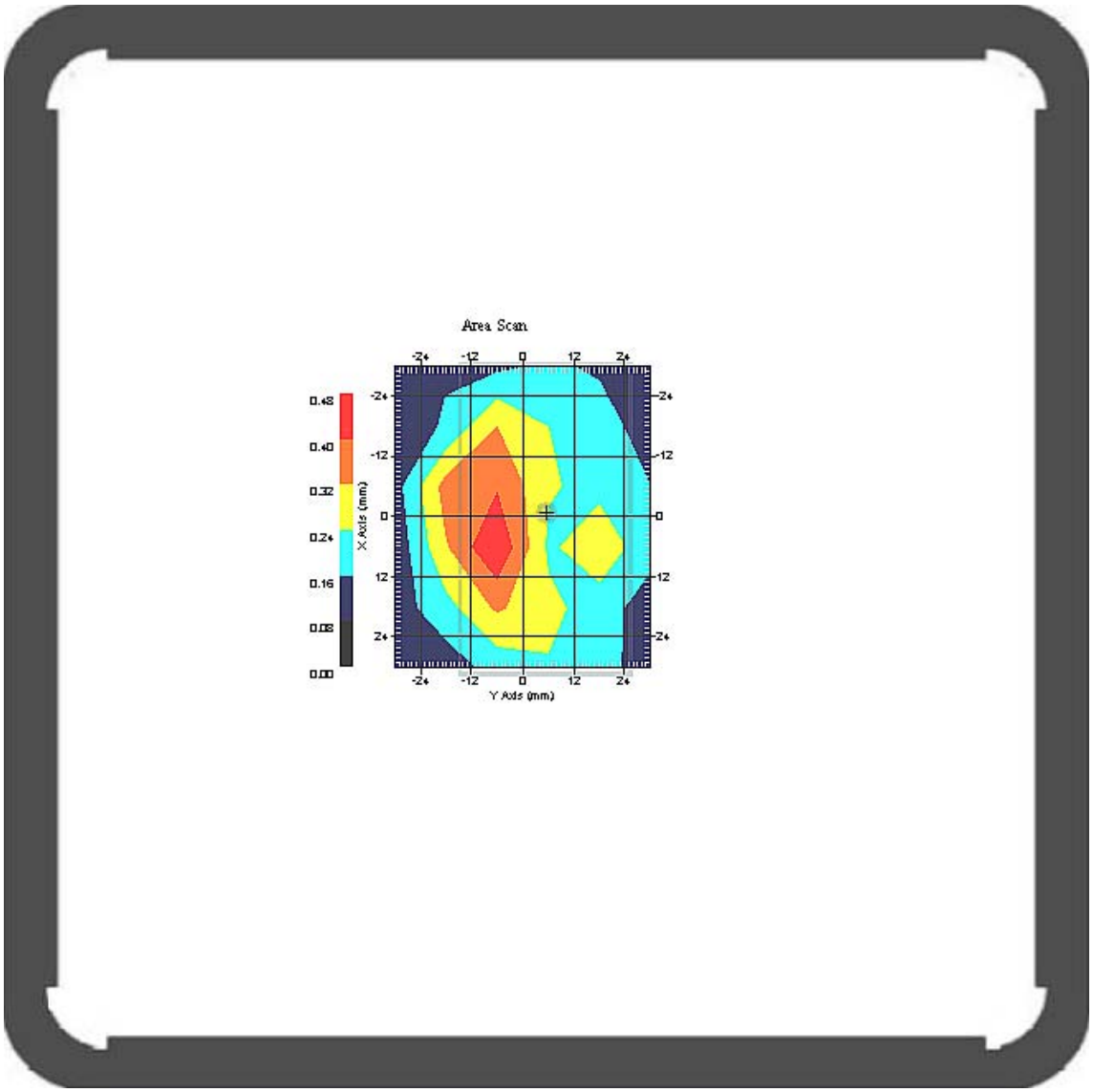


1 gram SAR value : 0.456 W/kg
10 gram SAR value : 0.282 W/kg
Area Scan Peak SAR : 0.520 W/kg
Zoom Scan Peak SAR : 0.963 W/kg

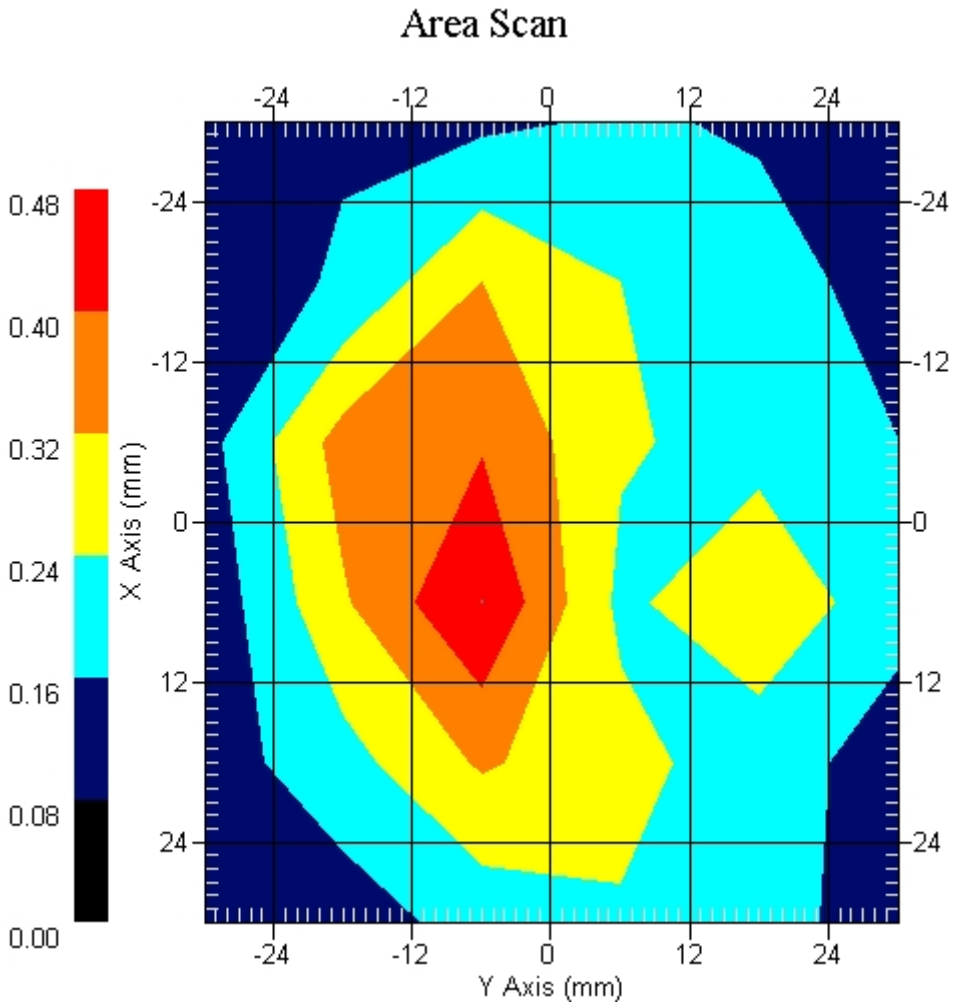

Area Scan
0.522
0.435
0.348
0.261
0.174
0.087
0.000
X Axis (mm)
Y Axis (mm)
-24
-12
0
12
24

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.119 W/kg
Power Drift-Finish: 0.121 W/kg
Power Drift (%) : 1.680

DUT Position : Touch EUT Front
Channel : 810

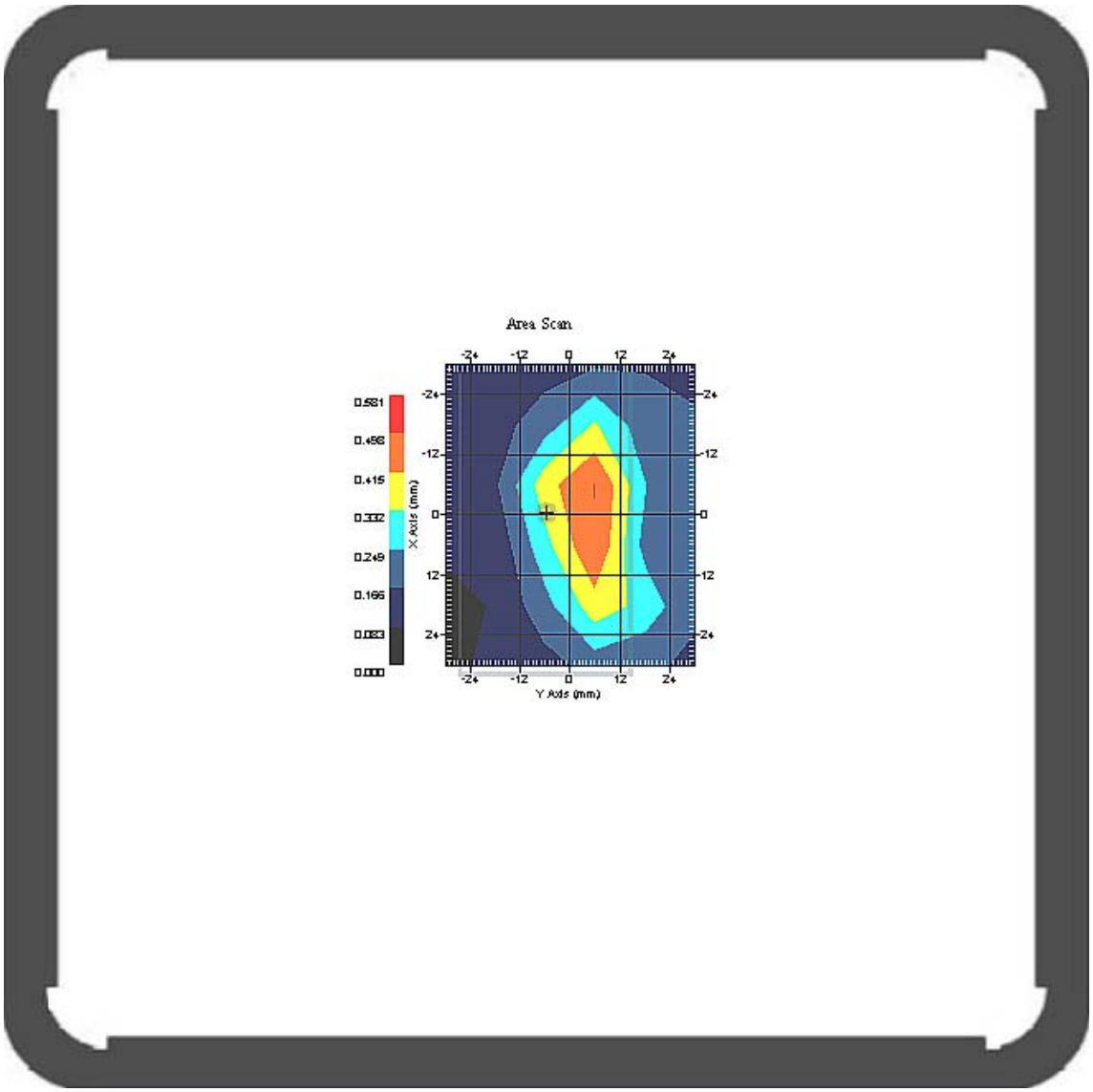


1 gram SAR value : 0.415 W/kg
10 gram SAR value : 0.235 W/kg
Area Scan Peak SAR : 0.480 W/kg
Zoom Scan Peak SAR : 0.811 W/kg

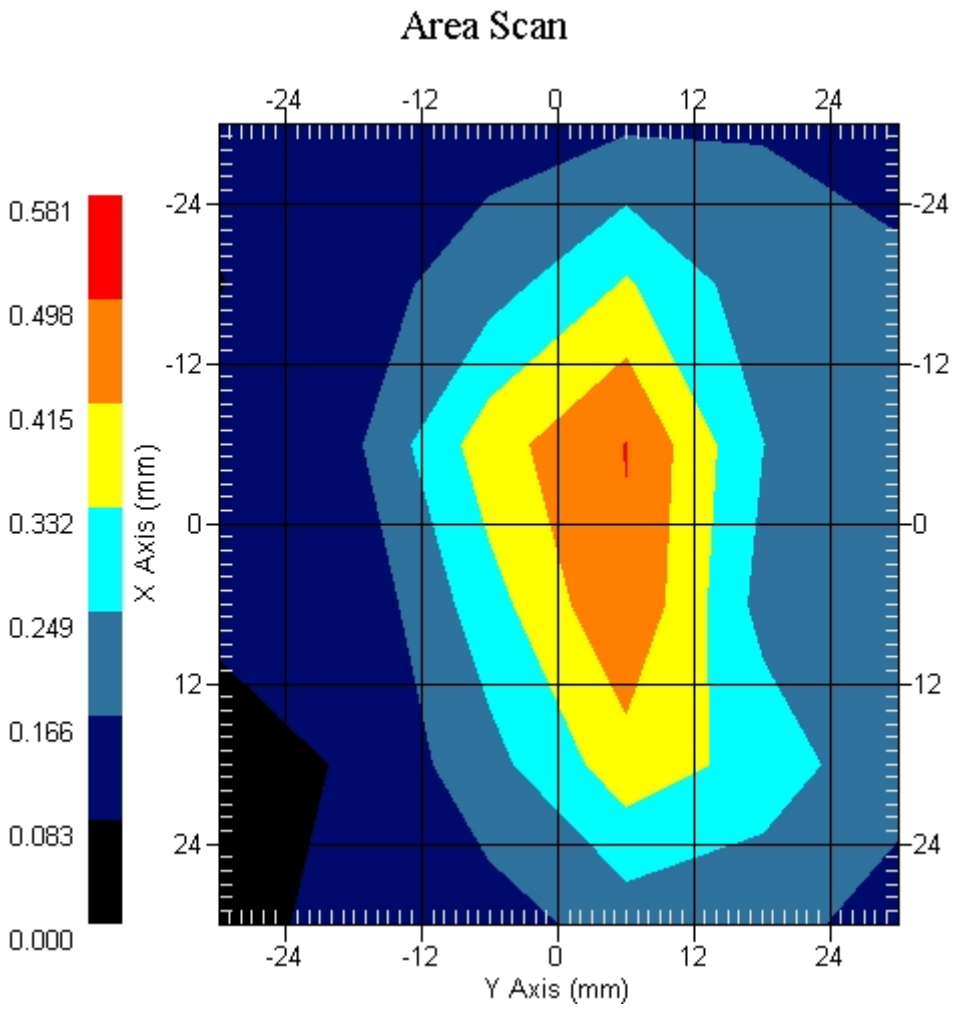

Area Scan
-24
-12
0
12
24
0.48
0.40
0.32
0.24
0.16
0.08
0.00
X Axis (mm)
Y Axis (mm)

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.20 °C
Ambient Temp. : 20.80 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.122 W/kg
Power Drift-Finish: 0.119 W/kg
Power Drift (%) : -2.459

DUT Position : Touch EUT Back
Channel : 661



1 gram SAR value : 0.403 W/kg
10 gram SAR value : 0.268 W/kg
Area Scan Peak SAR : 0.500 W/kg
Zoom Scan Peak SAR : 0.935 W/kg


Area Scan
0.581
0.498
0.415
0.332
0.249
0.166
0.083
0.000
X Axis (mm)
-24
-12
0
12
24
Y Axis (mm)

ALSAS-10U VER 2.3.6 APREL Laboratories

SAR Test Report-PCS 1900 GPRS (Distance 0cm)

Report Date : 26-Sep-2008
Measurement Date : 26-Sep-2008

Product Data
Device Name : COMPASS
Type : Other
Model : GT7XX (X: 00~99)
Frequency : 1900.00 MHz
Max. Transmit Pwr : 1 W
Drift Time : 0 min(s)
Length : 74.5 mm
Width : 42.3 mm
Depth : 27.6 mm
Antenna Type : Internal

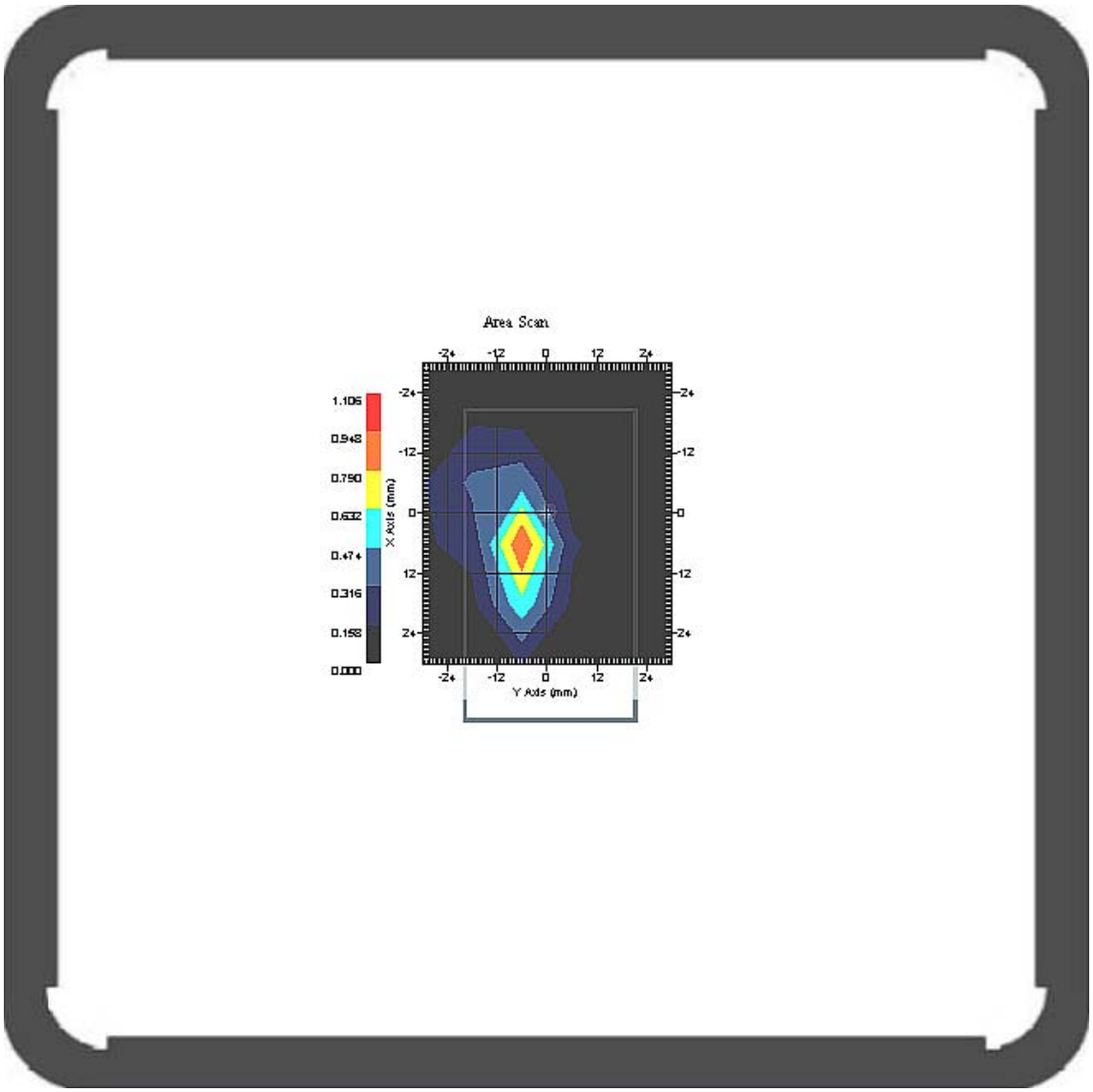
Phantom Data
Type : Uni-Phantom
Size (mm) : 280 x 280 x 200
Location : Center

Tissue Data
Type : BODY
Serial No. : 324-B
Frequency : 1900.00 MHz
Last Calib. Date : 26-Sep-2007
Temperature : 20.00 °C
Ambient Temp. : 20.70 °C
Humidity : 48.00 RH%
Epsilon : 54.21 F/m
Sigma : 1.55 S/m
Density : 1000.00 kg/cu. m

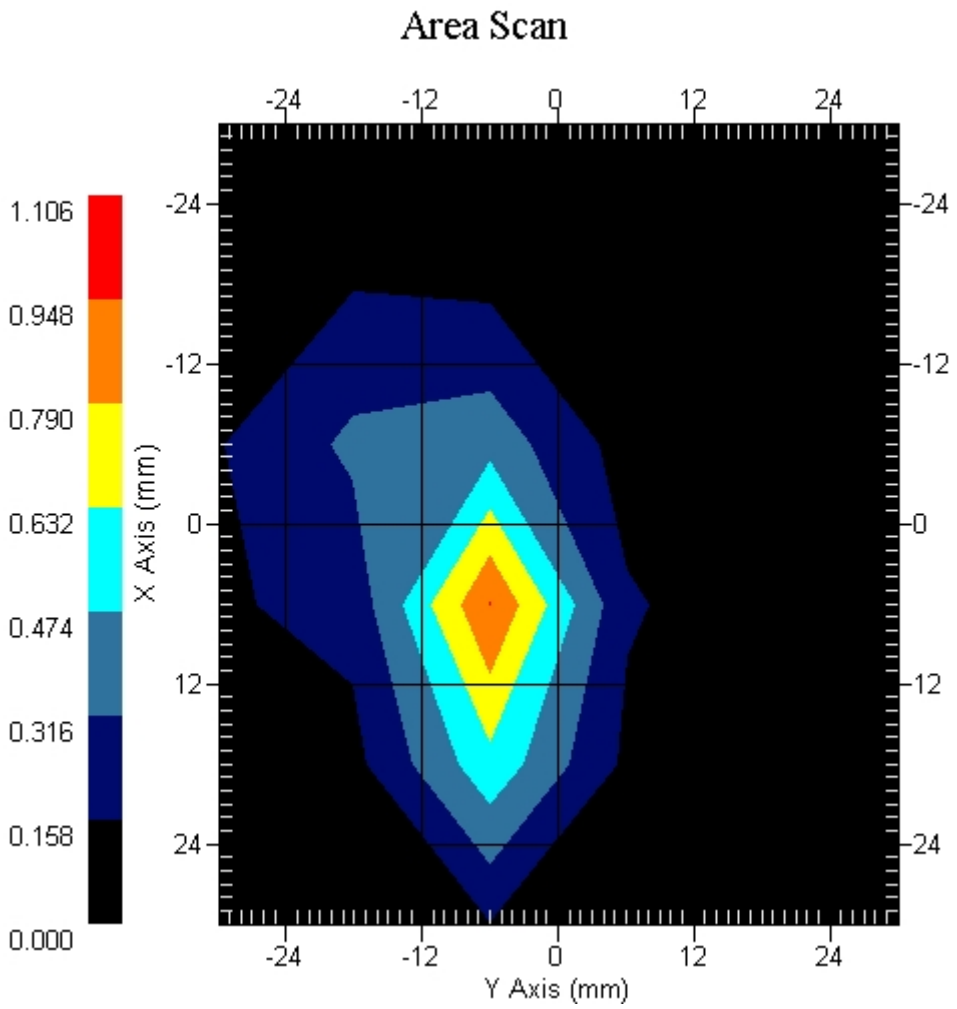
Probe Data
Name : Probe 265
Model : E020
Type : E-Field Triangle
Serial No. : 265
Last Calib. Date : 09-May-2008
Frequency : 1900.00 MHz
Duty Cycle Factor: 4
Conversion Factor: 5.1
Probe Sensitivity: 1.20 1.20 1.20 $\mu V/(V/m)^2$
Compression Point: 95.00 mV
Offset : 1.56 mm

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.405 W/kg
Power Drift-Finish: 0.394 W/kg
Power Drift (%) : -2.716

DUT Position : Touch EUT Front
Channel : 512

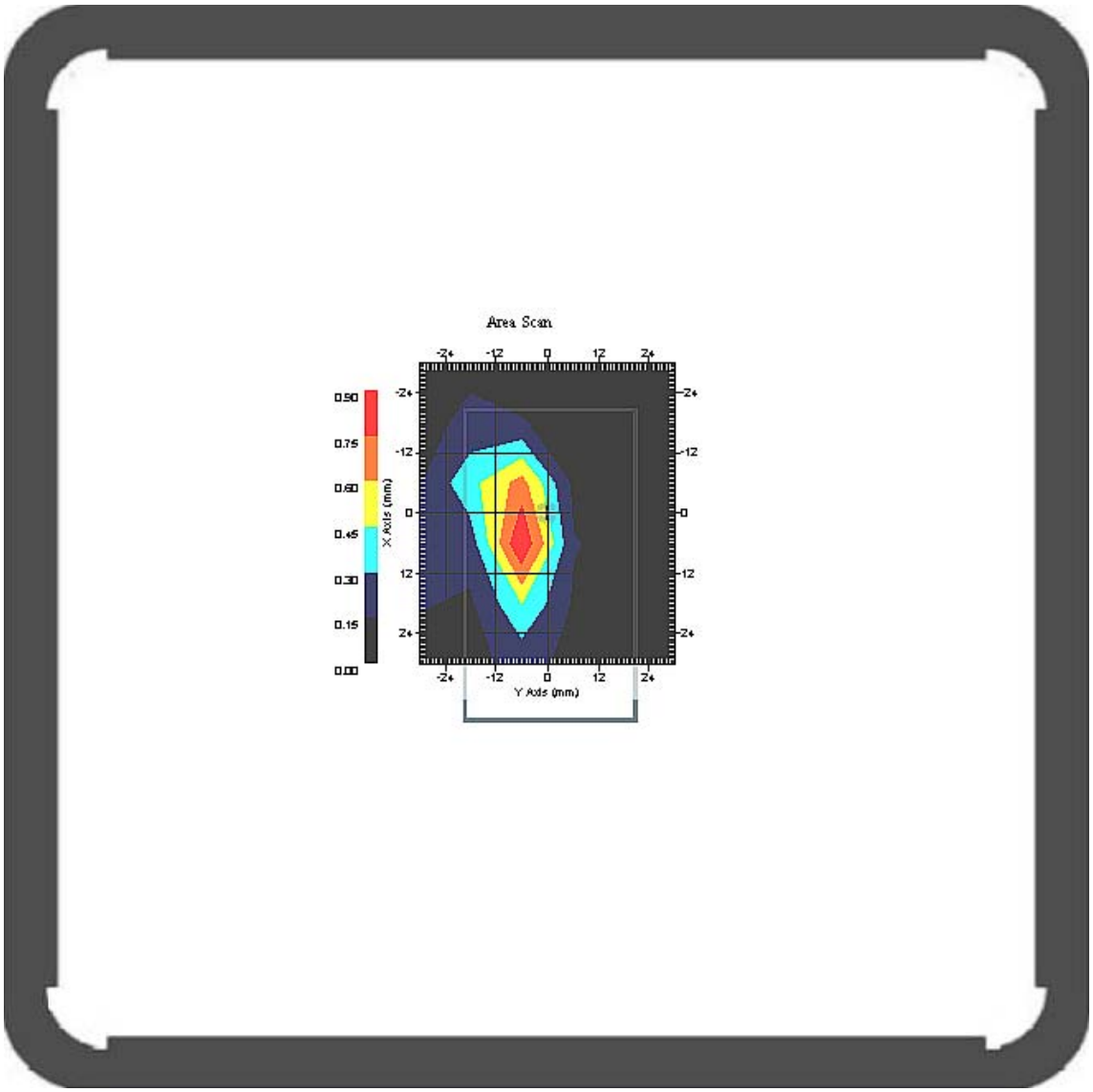


1 gram SAR value : 0.649 W/kg
10 gram SAR value : 0.397 W/kg
Area Scan Peak SAR : 0.950 W/kg
Zoom Scan Peak SAR : 1.501 W/kg

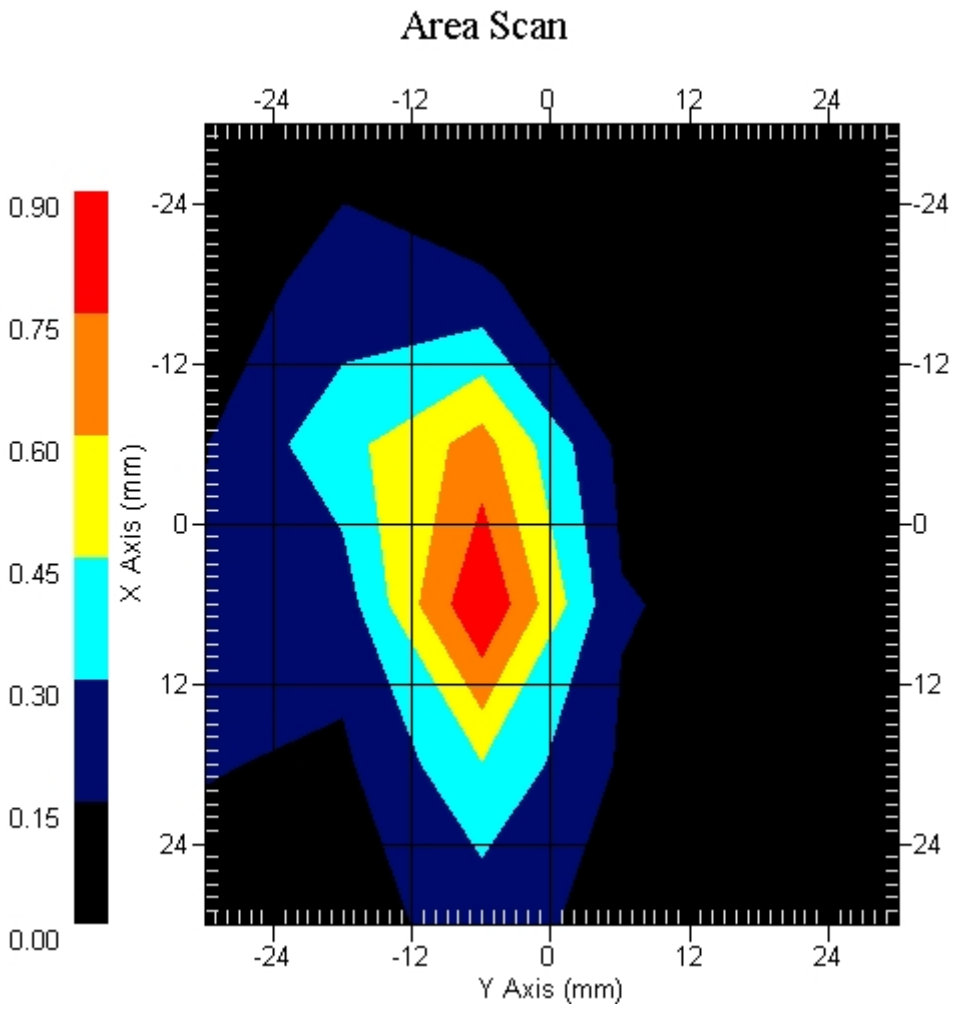

Area Scan
-24
-12
0
12
24
1.106
0.948
0.790
0.632
0.474
0.316
0.158
0.000
X Axis (mm)
Y Axis (mm)

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.462 W/kg
Power Drift-Finish: 0.454 W/kg
Power Drift (%) : -1.731

DUT Position : Touch EUT Front
Channel : 661

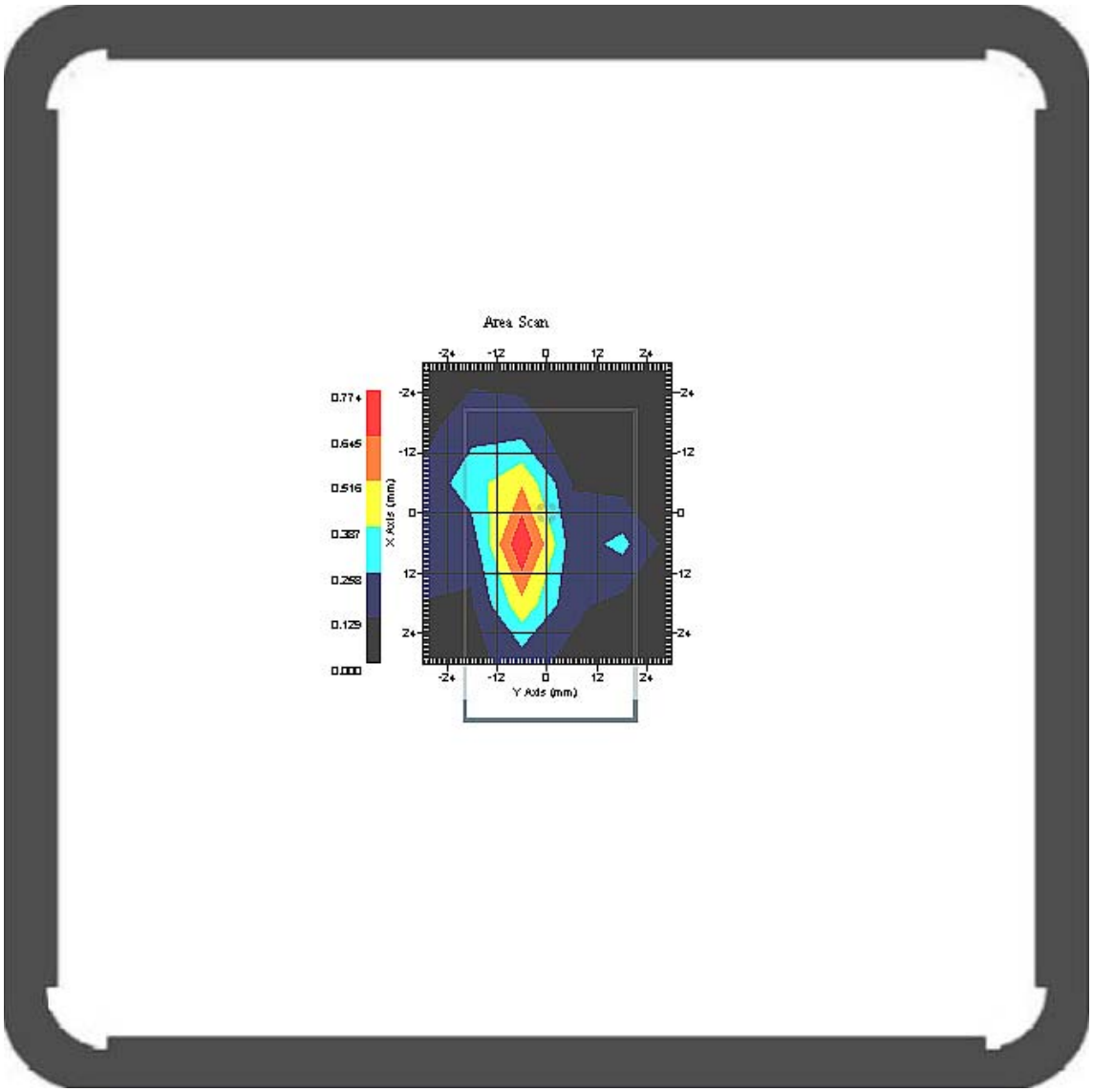


1 gram SAR value : 0.589 W/kg
10 gram SAR value : 0.372 W/kg
Area Scan Peak SAR : 0.900 W/kg
Zoom Scan Peak SAR : 1.425 W/kg

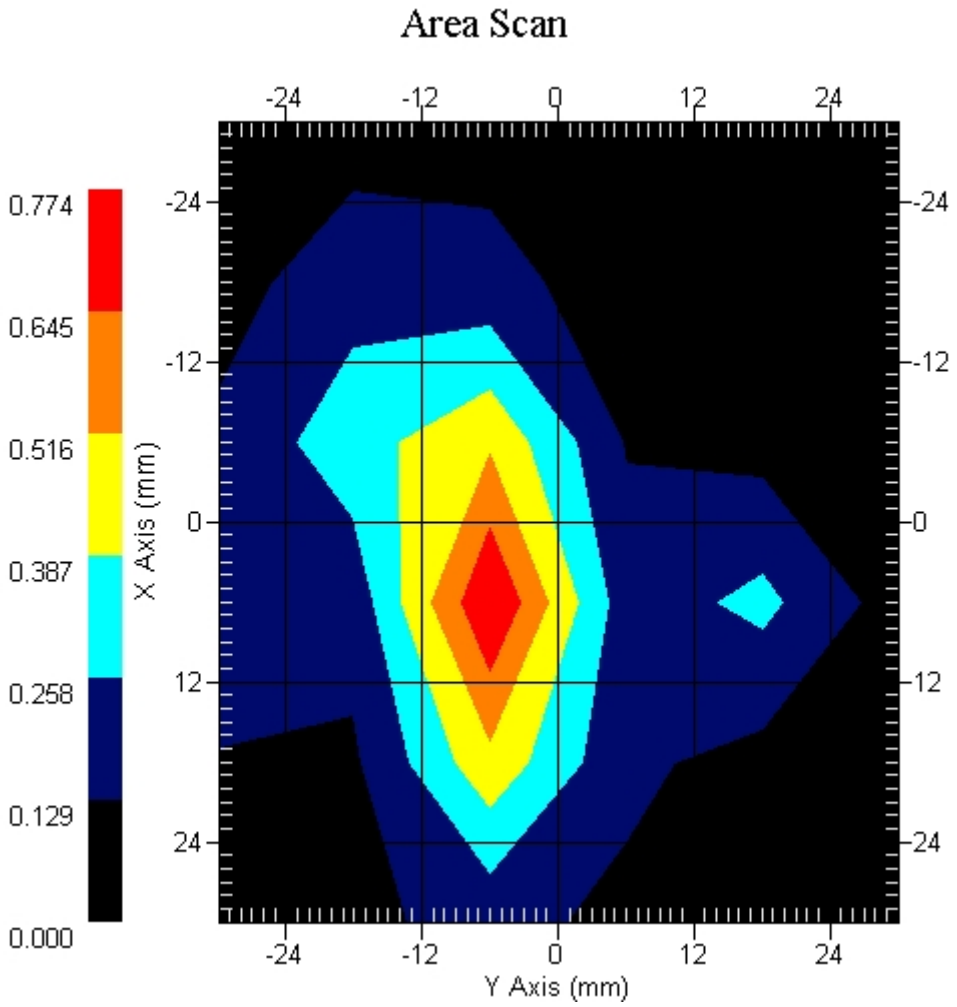

Area Scan
-24
-12
0
12
24
0.90
0.75
0.60
0.45
0.30
0.15
0.00
X Axis (mm)
Y Axis (mm)

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.476 W/kg
Power Drift-Finish: 0.497 W/kg
Power Drift (%) : 4.300

DUT Position : Touch EUT Front
Channel : 810

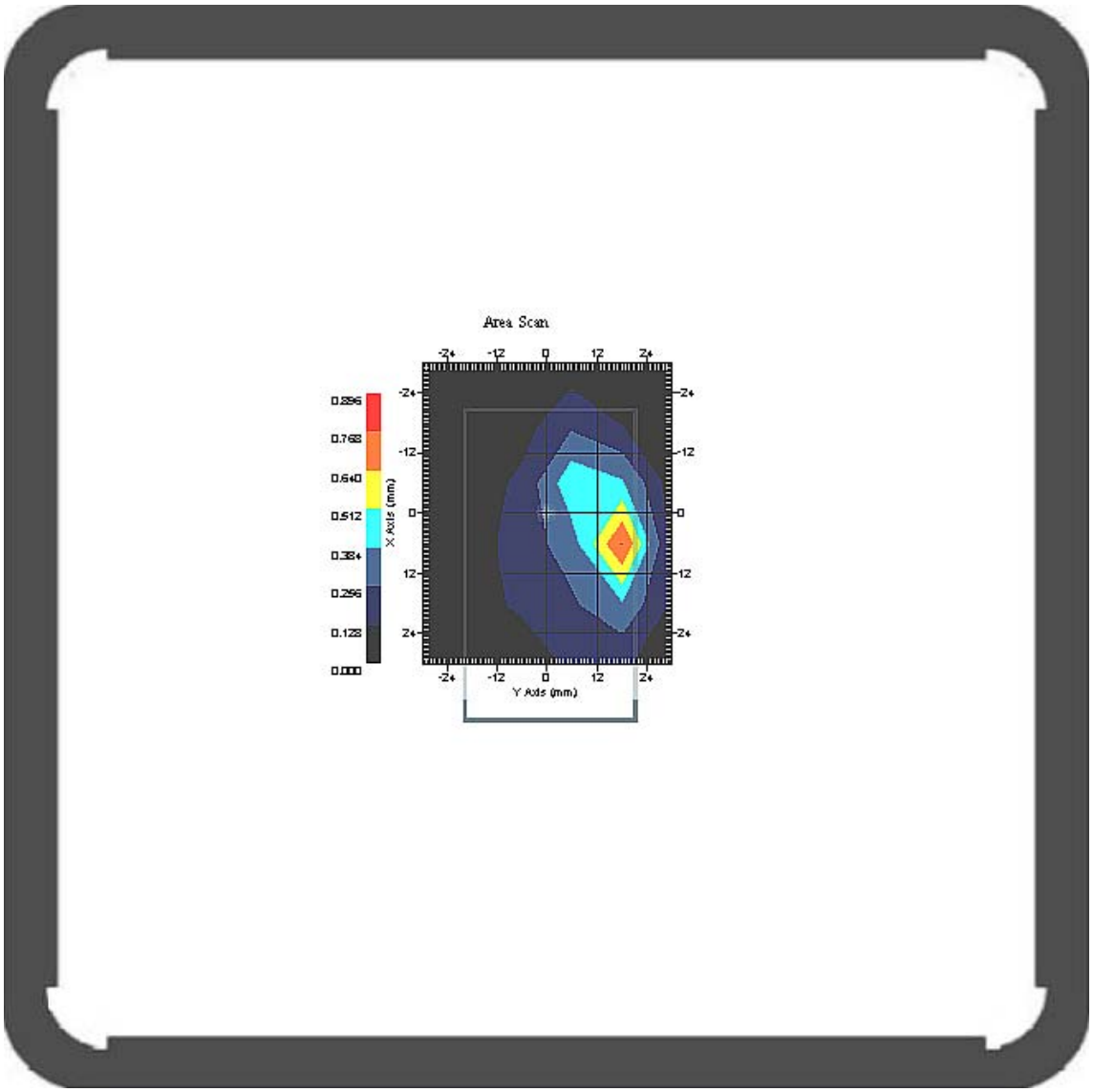


1 gram SAR value : 0.536 W/kg
10 gram SAR value : 0.329 W/kg
Area Scan Peak SAR : 0.772 W/kg
Zoom Scan Peak SAR : 1.431 W/kg

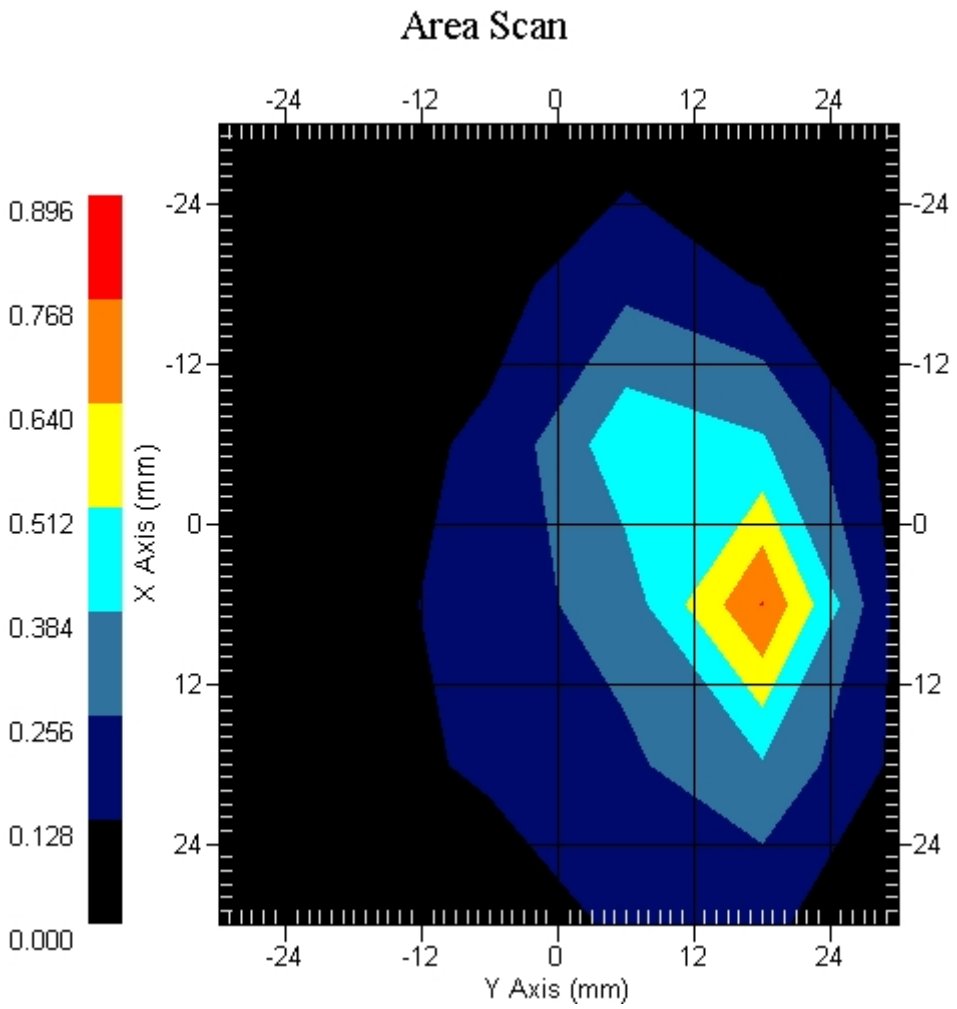

Area Scan
0.774
0.645
0.516
0.387
0.258
0.129
0.000
X Axis (mm)
Y Axis (mm)
-24
-12
0
12
24

Measurement Data
Crest Factor : 4
Tissue Temp. : 20.00 °C
Ambient Temp. : 20.70 °C
Area Scan : 6x6x1 : Measurement x=12mm, y=12mm, z=4mm
Zoom Scan : 5x5x8 : Measurement x=8mm, y=8mm, z=4mm
Power Drift-Start : 0.293 W/kg
Power Drift-Finish: 0.288 W/kg
Power Drift (%) : -1.706

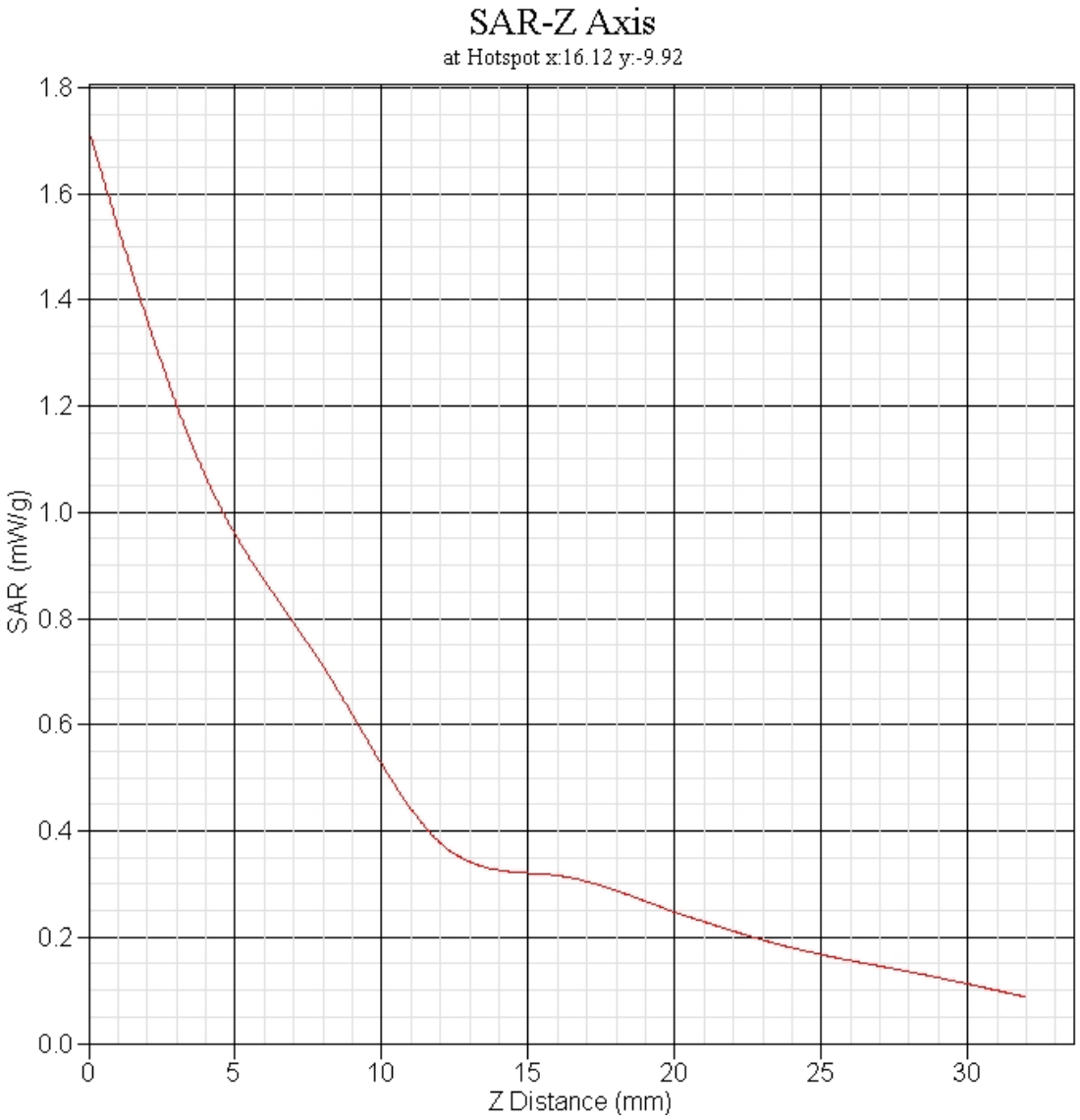
DUT Position : Touch EUT Back
Channel : 512



1 gram SAR value : 0.569 W/kg
10 gram SAR value : 0.276 W/kg
Area Scan Peak SAR : 0.740 W/kg
Zoom Scan Peak SAR : 1.358 W/kg


Area Scan
-24
-12
0
12
24
0.896
0.768
0.640
0.512
0.384
0.256
0.128
0.000
X Axis (mm)
Y Axis (mm)

PCS 1900 EUT Right-Cheek Z-Axis plot
Channel: 810

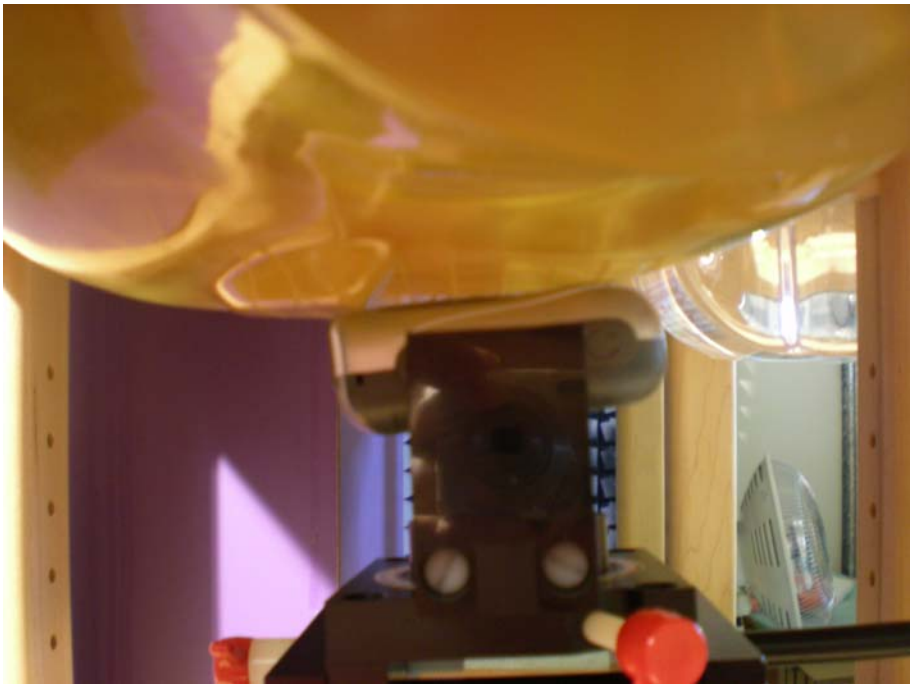


Appendix C. Test Setup Photographs & EUT Photographs

Test Setup Photographs

Right Head (EUT Cheek)

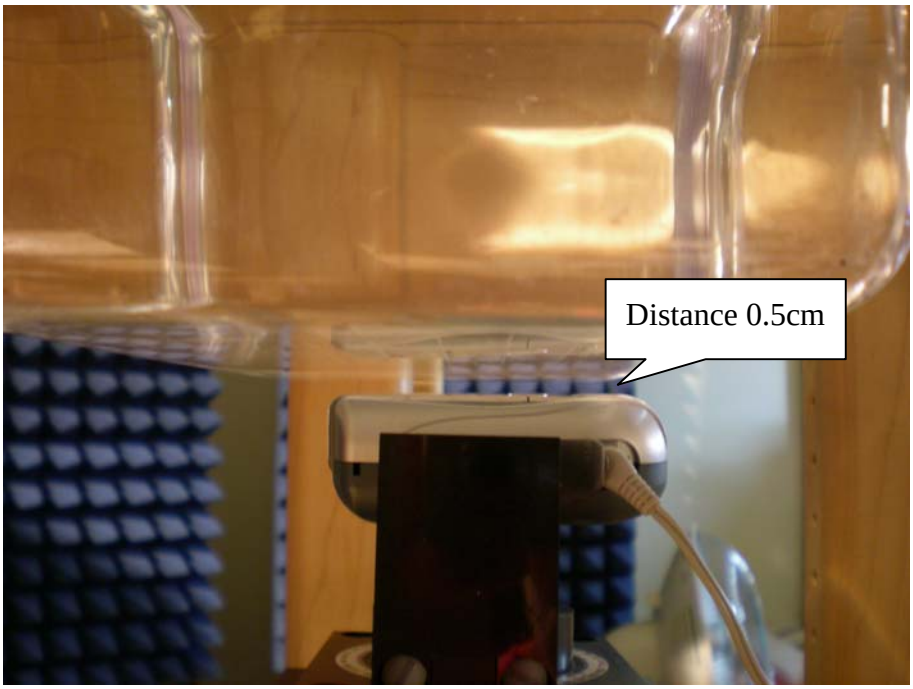
Left Head (EUT Cheek)



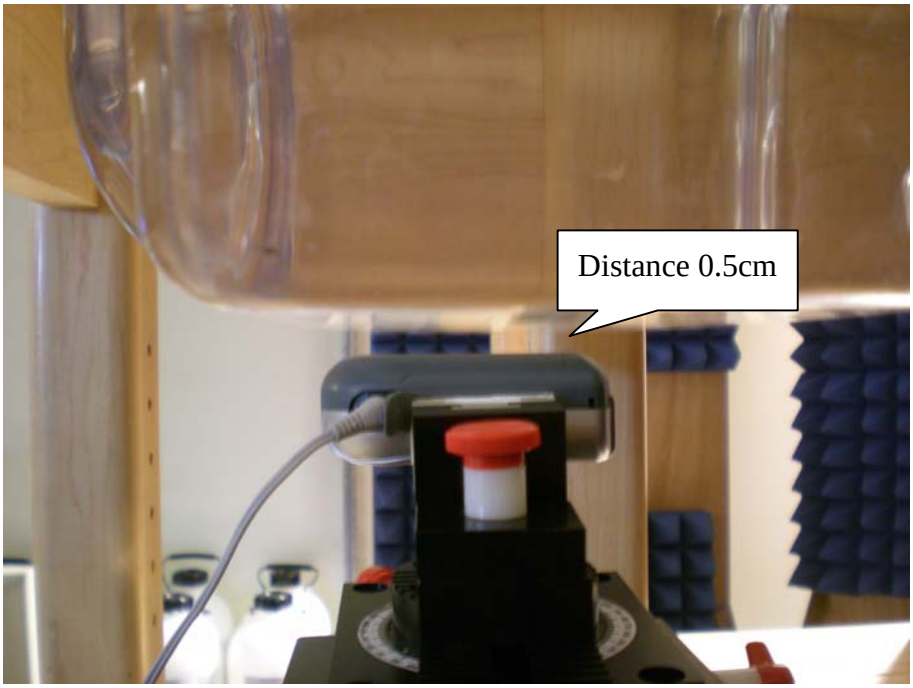
Right Head (EUT Tilted)

Left Head (EUT Tilted)

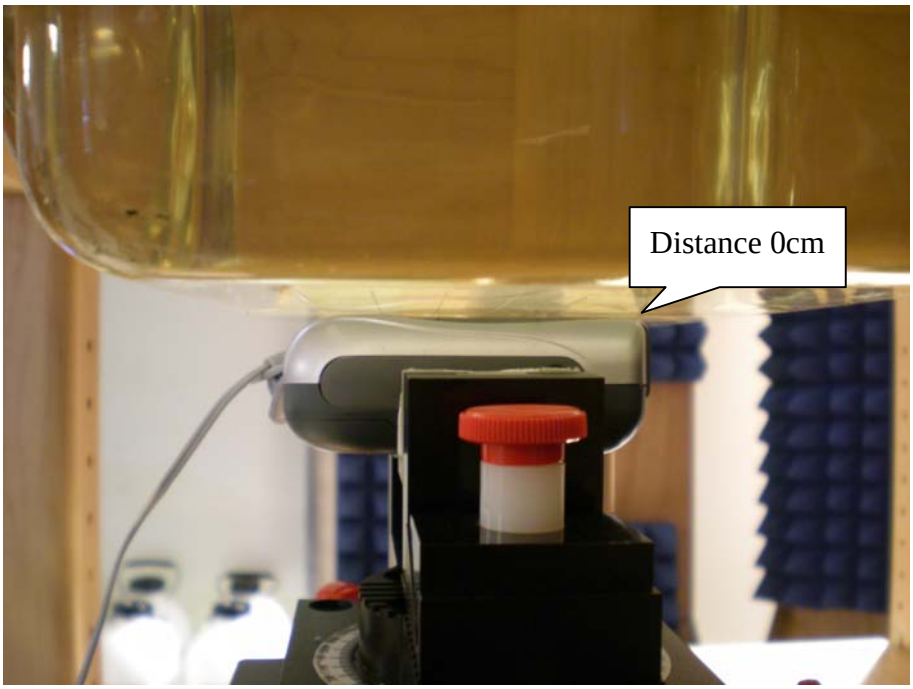
Front



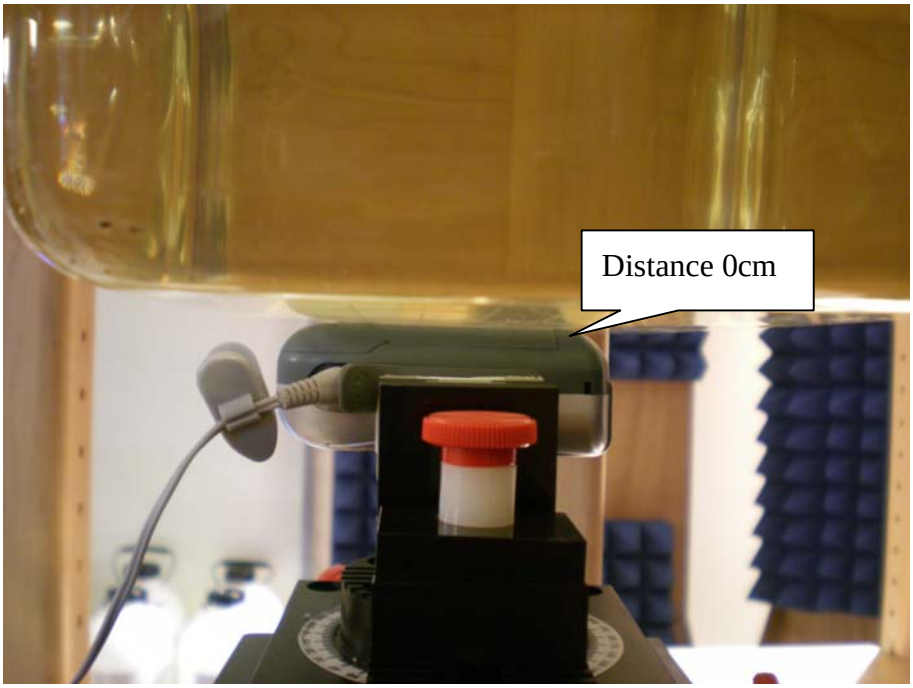
Back



Front



Back



Note: The positions used in the measurements were according to IEEE 1528-2003.

Test EUT Photographs

QuieTek

Appendix D. Probe Calibration Data

Miniature Isotropic RF Probe
M/N: ALS-E-020
S/N: 265

835 MHz Head Calibration
835 MHz Body Calibration

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-871

Client: QUIETEK

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

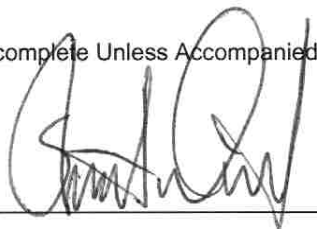
Manufacturer: APREL Laboratories
Model No.: ALS-E-020
Serial No.: 265

HEAD Calibration

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: QTKB-ALS-E20-CAL-5335

Calibrated: 9th May 2008
Released on: 9th May 2008

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 E-020 265.

References

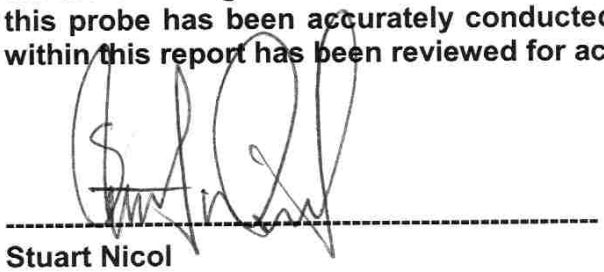
SSI/DRB-TP-D01-032-E020-V2 E-Field Probe Calibration Procedure
IEEE 1528 “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Experimental Techniques”
SSI-TP-011 Tissue Calibration Procedure
IEC 62209 “Human exposure to radio frequency fields from hand-held and Head-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 265 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-020
Serial Number:	265
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 Head Tissue

Frequency: 835 MHz

Epsilon: 41.5 (+/-5%) **Sigma:** 0.90 S/m (+/-5%)

ConvF

Channel X: 6.2

Channel Y: 6.2

Channel Z: 6.2

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

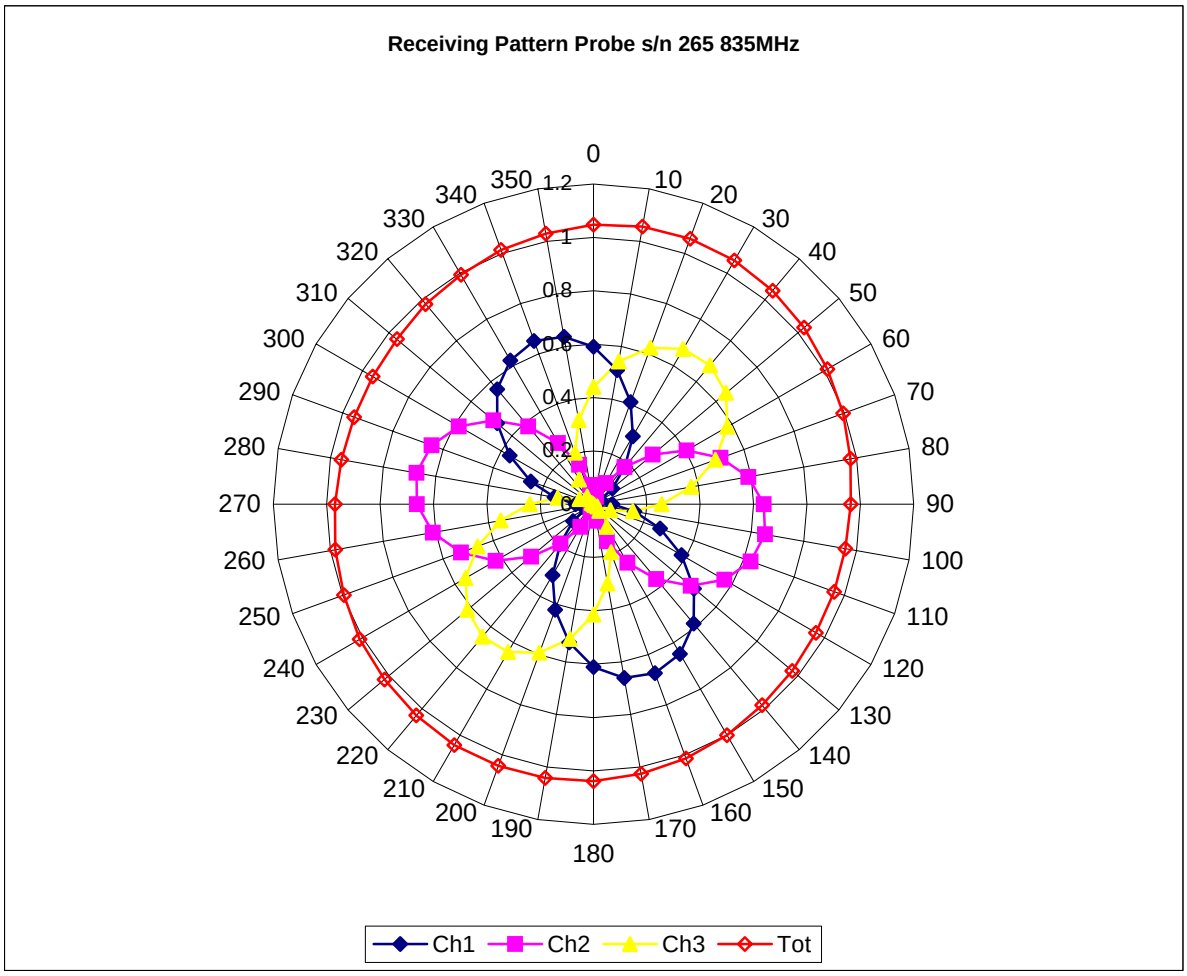
Boundary Effect:

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.

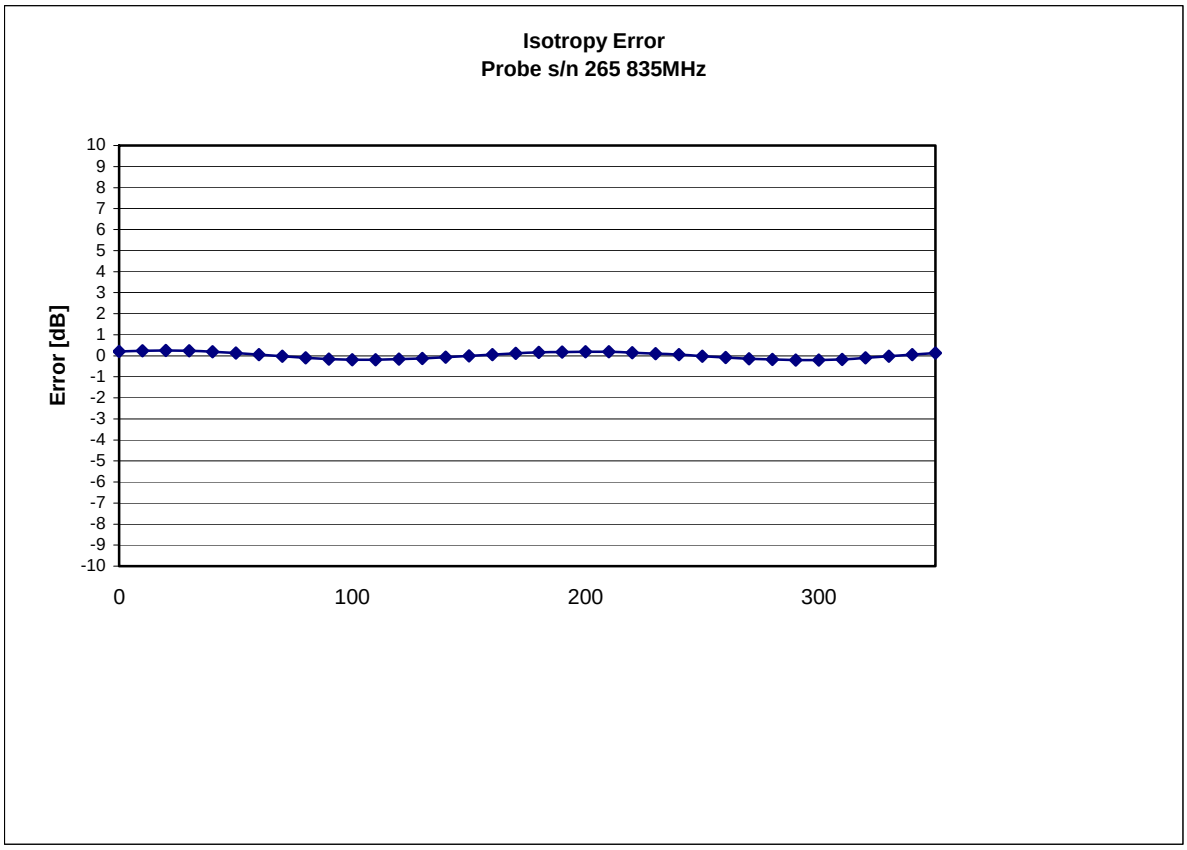
Spatial Resolution:

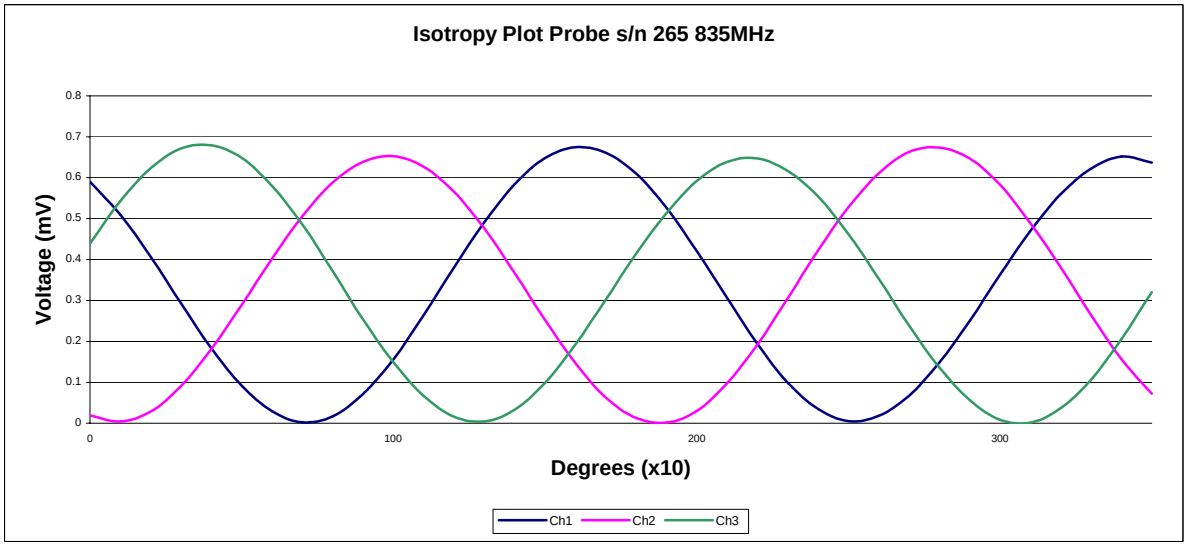
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 835 MHz (Air)



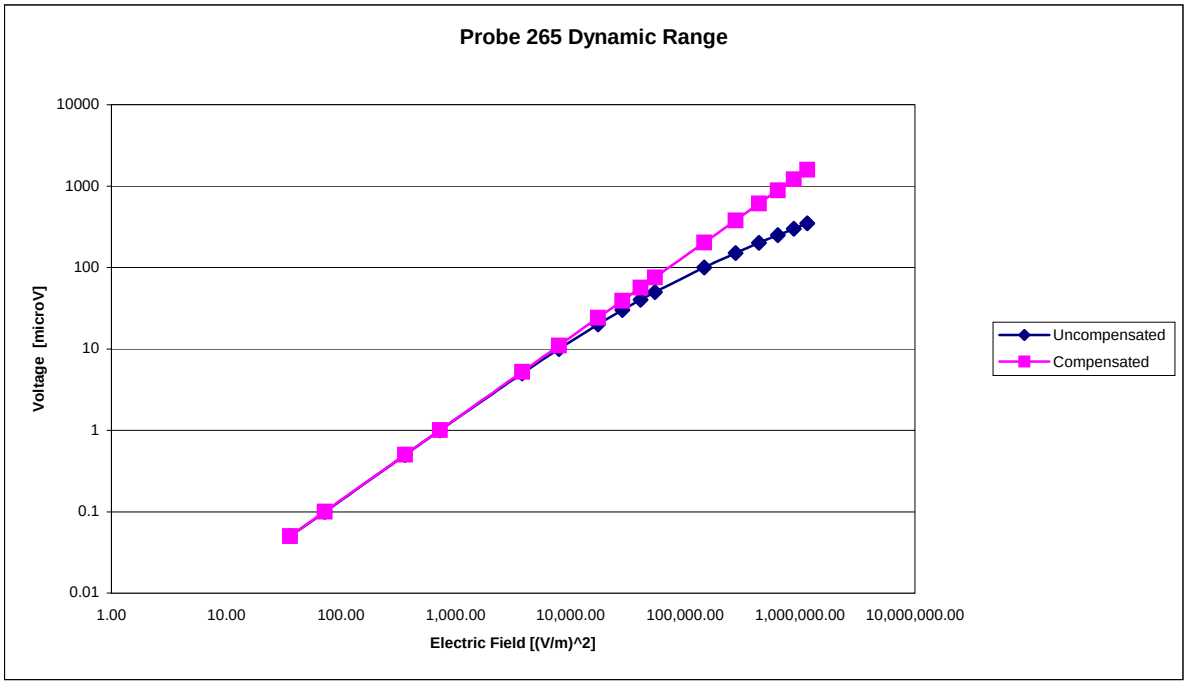
Isotropy Error 835 MHz (Air)



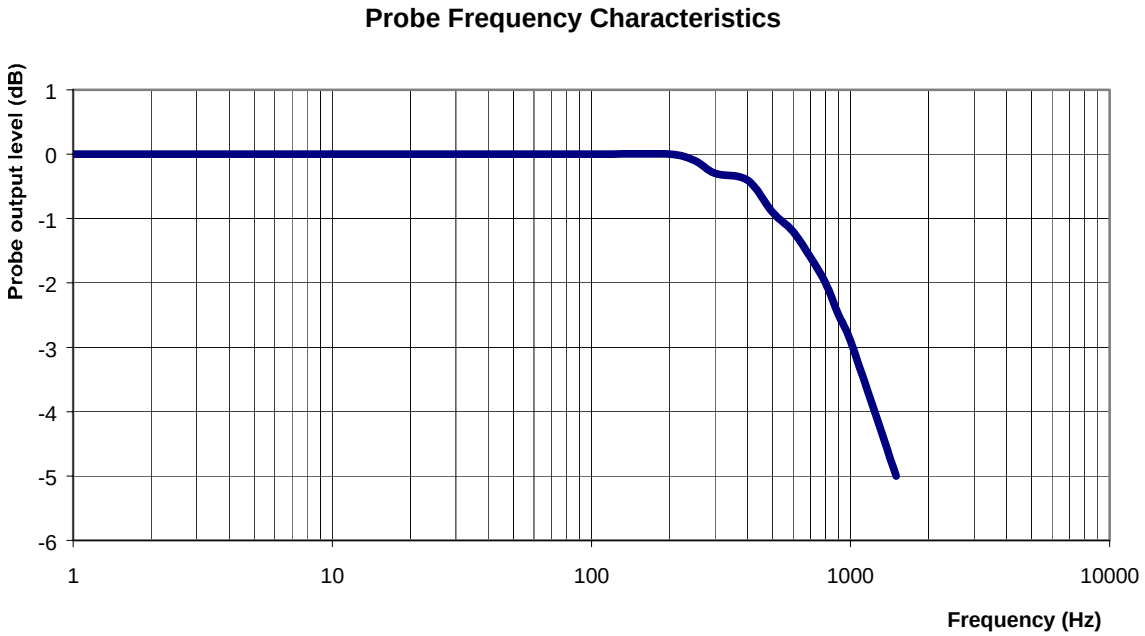


Isotropicity Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



Video Bandwidth at 500 Hz 1 dB
Video Bandwidth at 1000 Hz 3 dB

Conversion Factor Uncertainty Assessment

Frequency:		835MHz	
Epsilon:	41.5 (+/-5%)	**Sigma:**	0.90 S/m (+/-5%)
ConvF			
Channel X:	6.2	7%(K=2)	
Channel Y:	6.2	7%(K=2)	
Channel Z:	6.2	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 2.4mm 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 2008.
`

NCL CALIBRATION LABORATORIES

Calibration File No.: CP-872

Client: QUIETEK

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

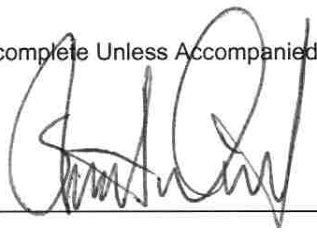
Manufacturer: APREL Laboratories
Model No.: ALS-E-020
Serial No.: 265

BODY Calibration

Calibration Procedure: SSI/DRB-TP-D01-032-E020-V2
Project No: QTKB-ALS-E20-CAL-5335

Calibrated: 9th May 2008
Released on: 9th May 2008

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

Released By: 

NCL CALIBRATION LABORATORIES

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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 E-020 265.

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 Head 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 Head-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

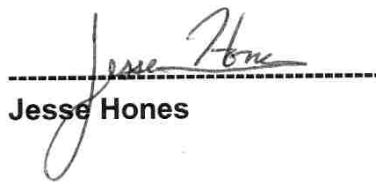
Conditions

Probe 265 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-020
Serial Number:	265
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

Frequency: 835 MHz

Epsilon: 55.2 (+/-5%) **Sigma:** 0.97 S/m (+/-5%)

ConvF

Channel X: 6.6

Channel Y: 6.6

Channel Z: 6.6

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

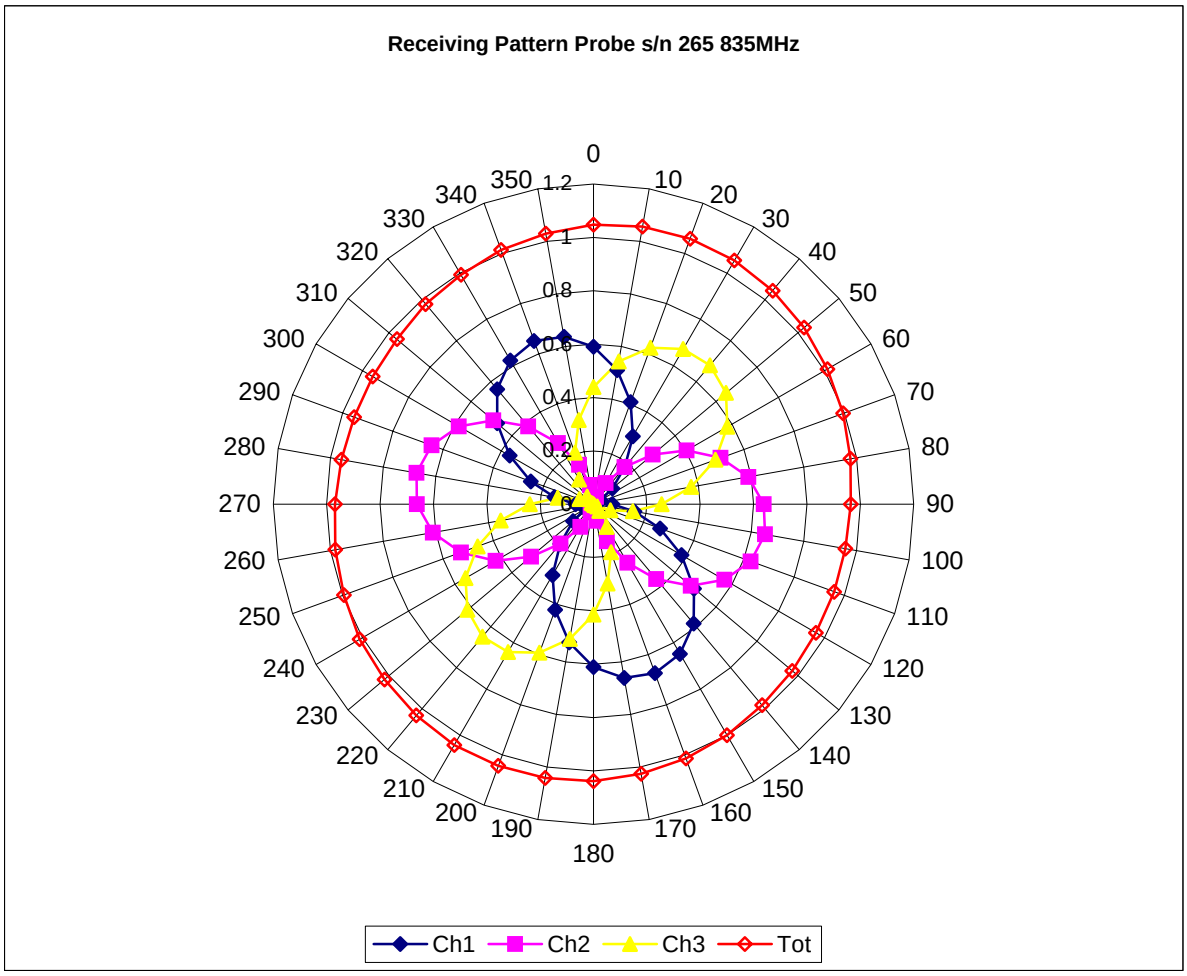
Boundary Effect:

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.

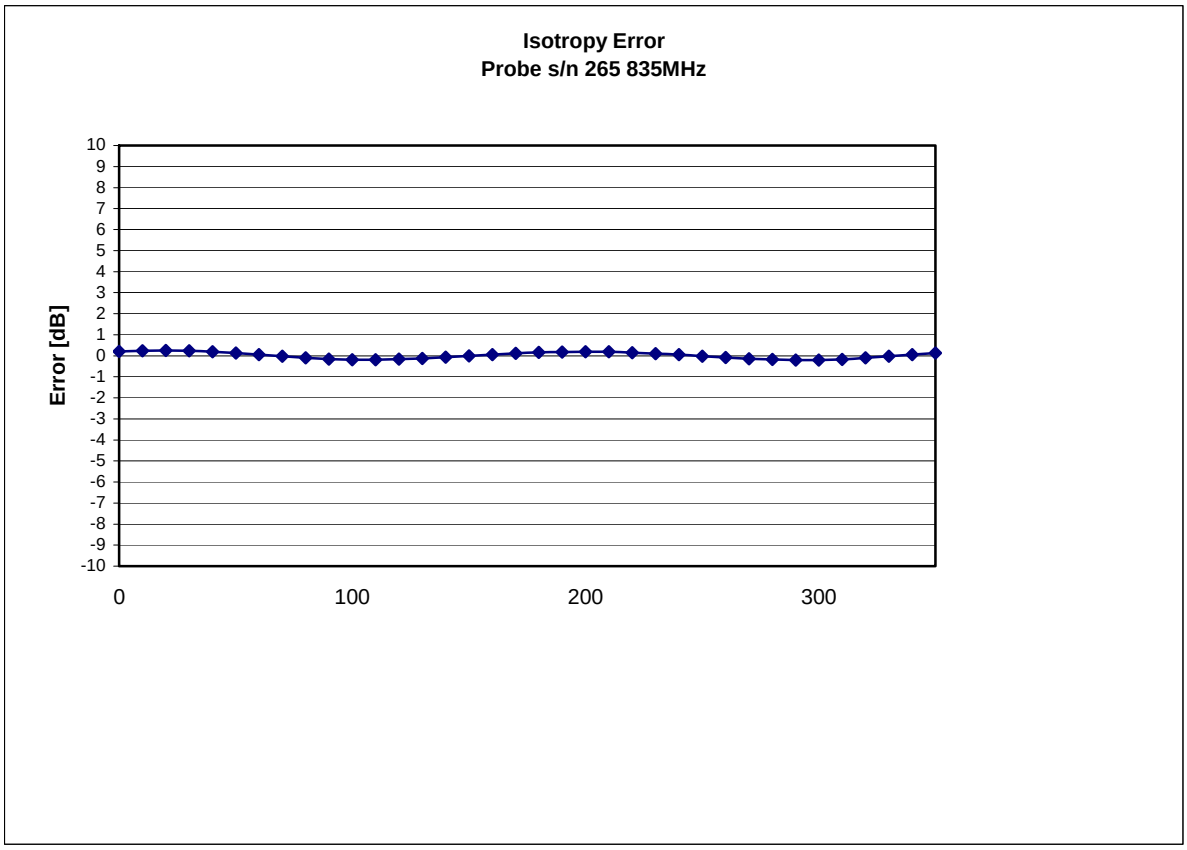
Spatial Resolution:

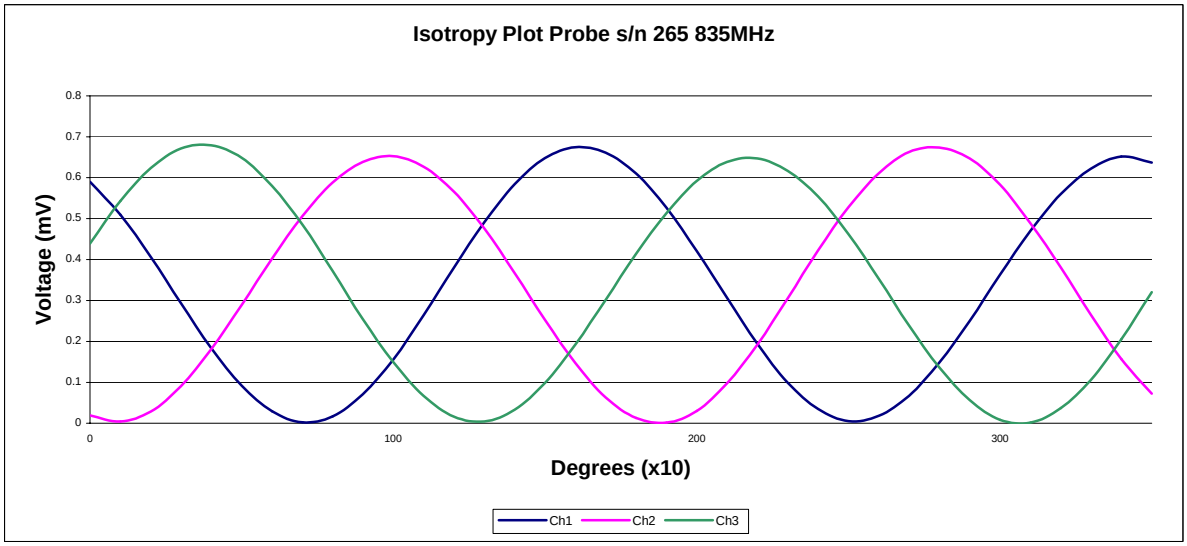
The measured probe tip diameter is 5 mm (+/- 0.01 mm) and therefore meets the requirements of SSI/DRB-TP-D01-032 for spatial resolution.

Receiving Pattern 835 MHz (Air)



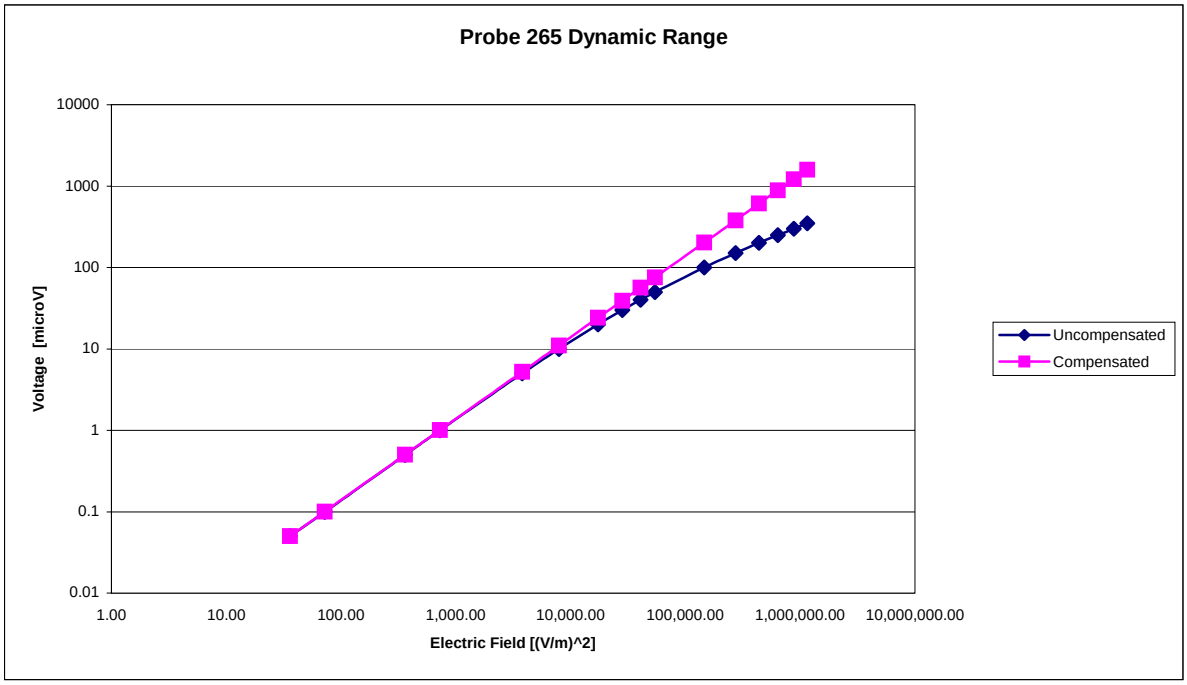
Isotropy Error 835 MHz (Air)



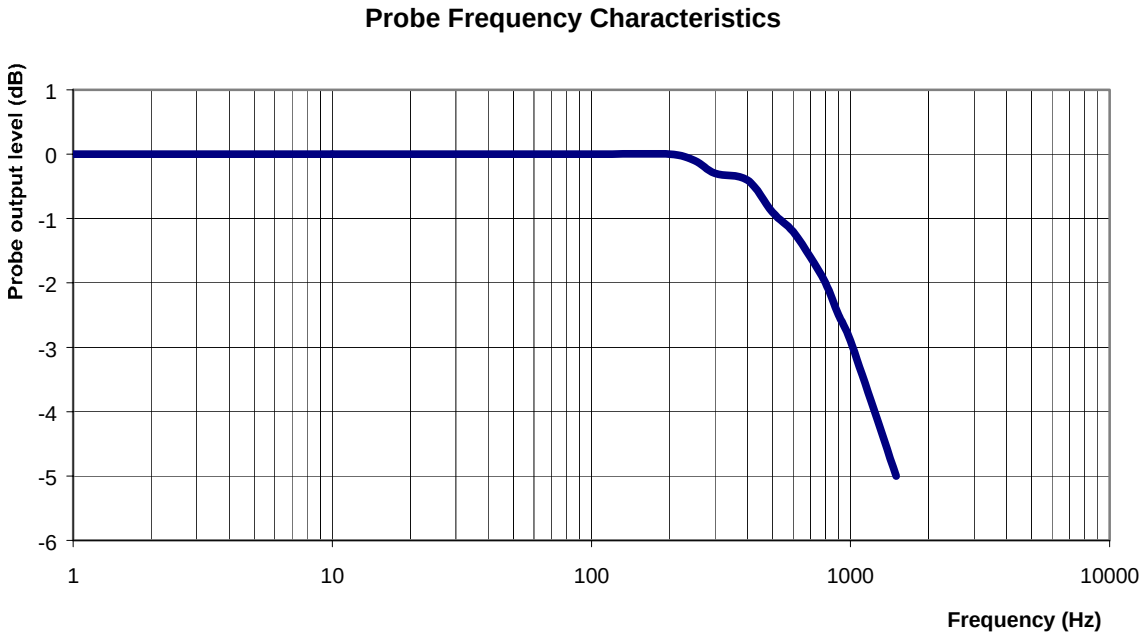


Isotropicity in Tissue: 0.10 dB

Dynamic Range



Video Bandwidth



Video Bandwidth at 500 Hz	1 dB
Video Bandwidth at 1000 Hz	3 dB

Conversion Factor Uncertainty Assessment

Frequency:		835MHz	
Epsilon:	55.2 (+/-5%)	**Sigma:**	0.97 S/m (+/-5%)
ConvF			
Channel X:	6.6	7%(K=2)	
Channel Y:	6.6	7%(K=2)	
Channel Z:	6.6	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 2.4mm 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 2008.

QuieTek

Appendix E. Dipole Calibration

Validation Dipole 835 MHz
M/N: ALS-D-835-S-2
S/N: QTK-316

Validation Dipole 1900 MHz
M/N: ALS-D-1900-S-2
S/N: QTK-318

NCL CALIBRATION LABORATORIES

Calibration File No: DC-887

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.

Quietek Validation Dipole

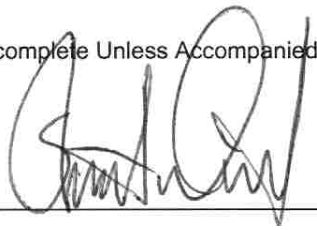
Manufacturer: APREL Laboratories
Part number: ALS-D-835-S-2
Frequency: 835 MHz
Serial No: QTK-315

Customer: Quietek

Project Number: QTKB-Dipole-CAL-5336

Calibrated: 9th May 2008
Released on: 9th May 2008

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

Calibration Results Summary

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

Mechanical Dimensions

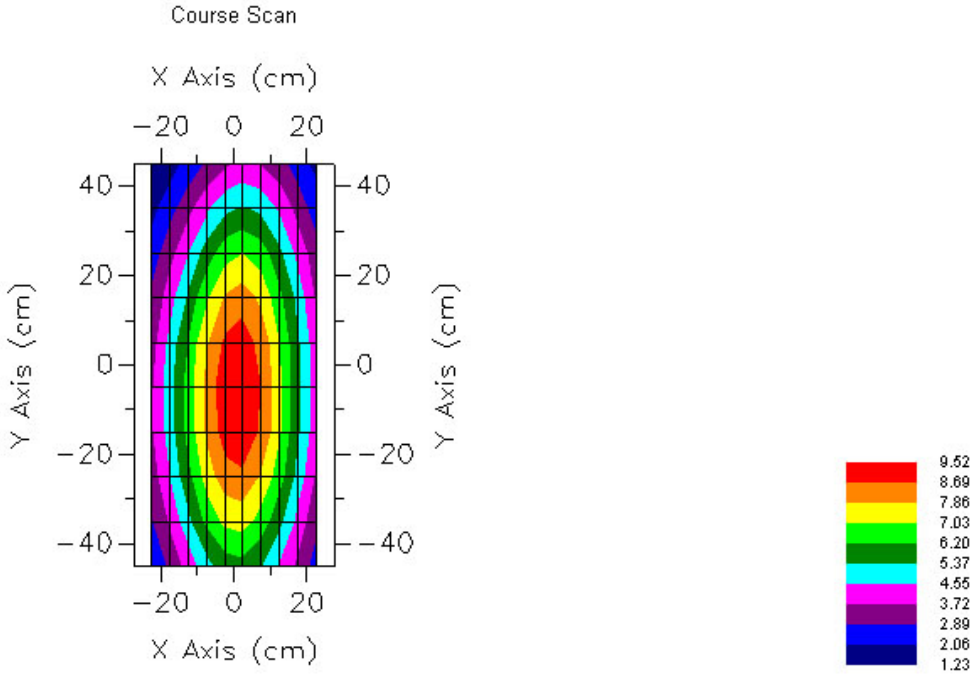
Length: 165.0 mm
Height: 90.0 mm

Electrical Specification

SWR: 1.04 U
Return Loss: -32.9 dB
Impedance: 51.1 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
835 MHz	9.33	6.42	15.0



Conditions

Dipole 315 is a recalibration.

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

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 & Part 2: Procedure to determine the specific absorption rate (SAR) for mobile wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)

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

Dipole Calibration Results

Mechanical Verification

IEEE Length	IEEE Height	Measured Length	Measured Height
161.0 mm	89.8 mm	165.0 mm	90.0 mm

Tissue Validation

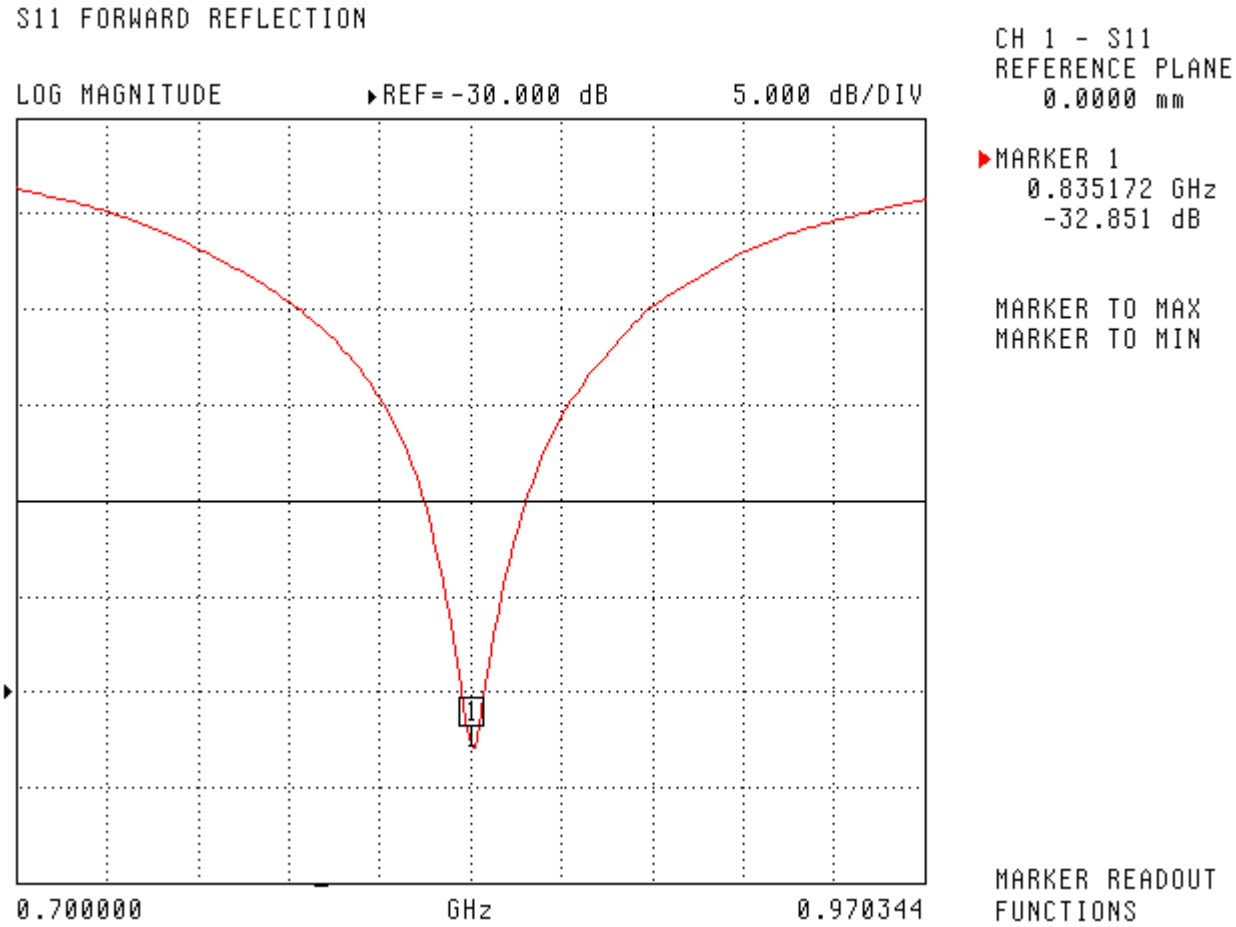
Head Tissue 835 MHz	Measured
Dielectric constant, ε_r	42.54
Conductivity, σ [S/m]	0.91

Electrical Calibration

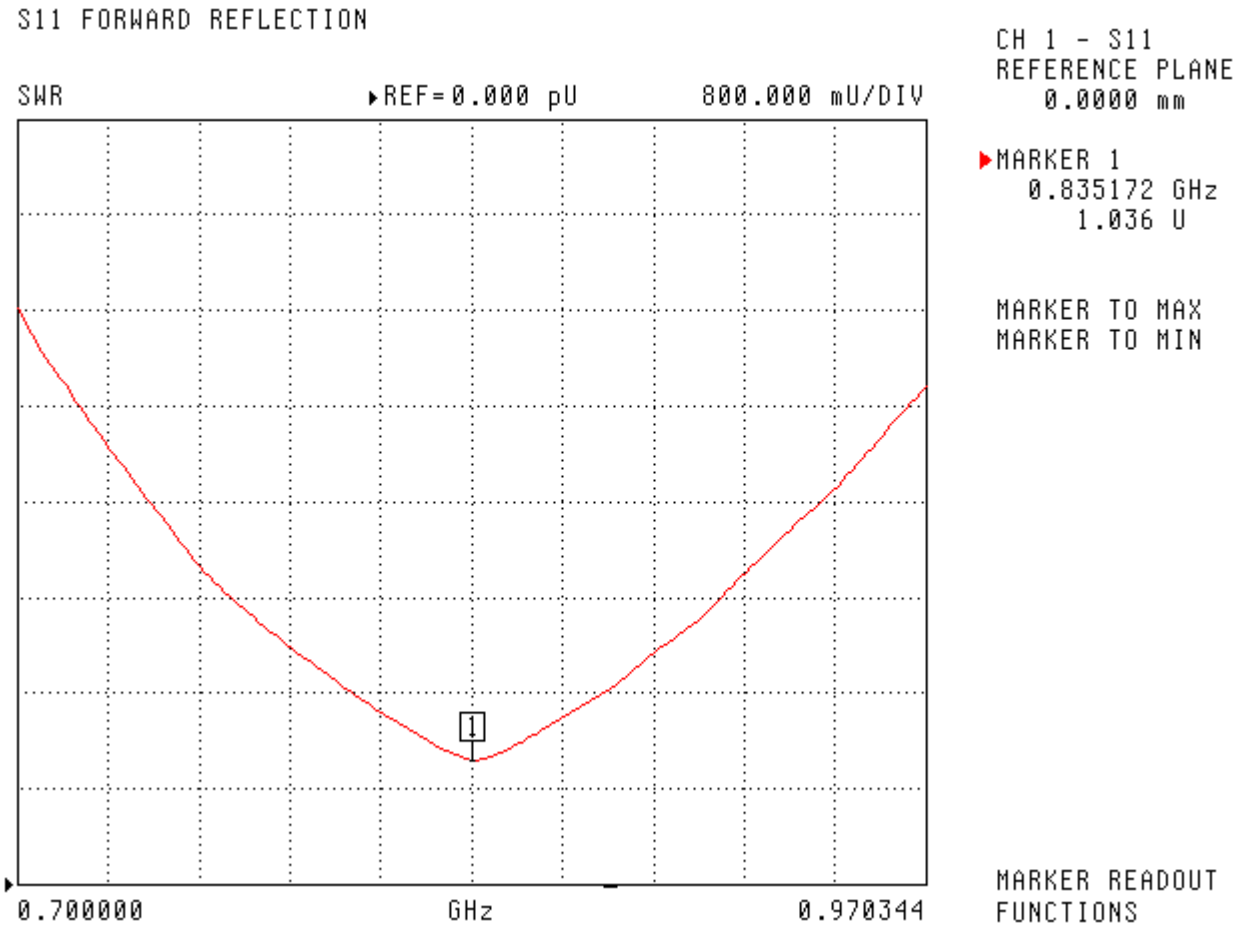
Test	Result
S11 R/L	-32.9 dB
SWR	1.04 U
Impedance	51.1 Ω

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

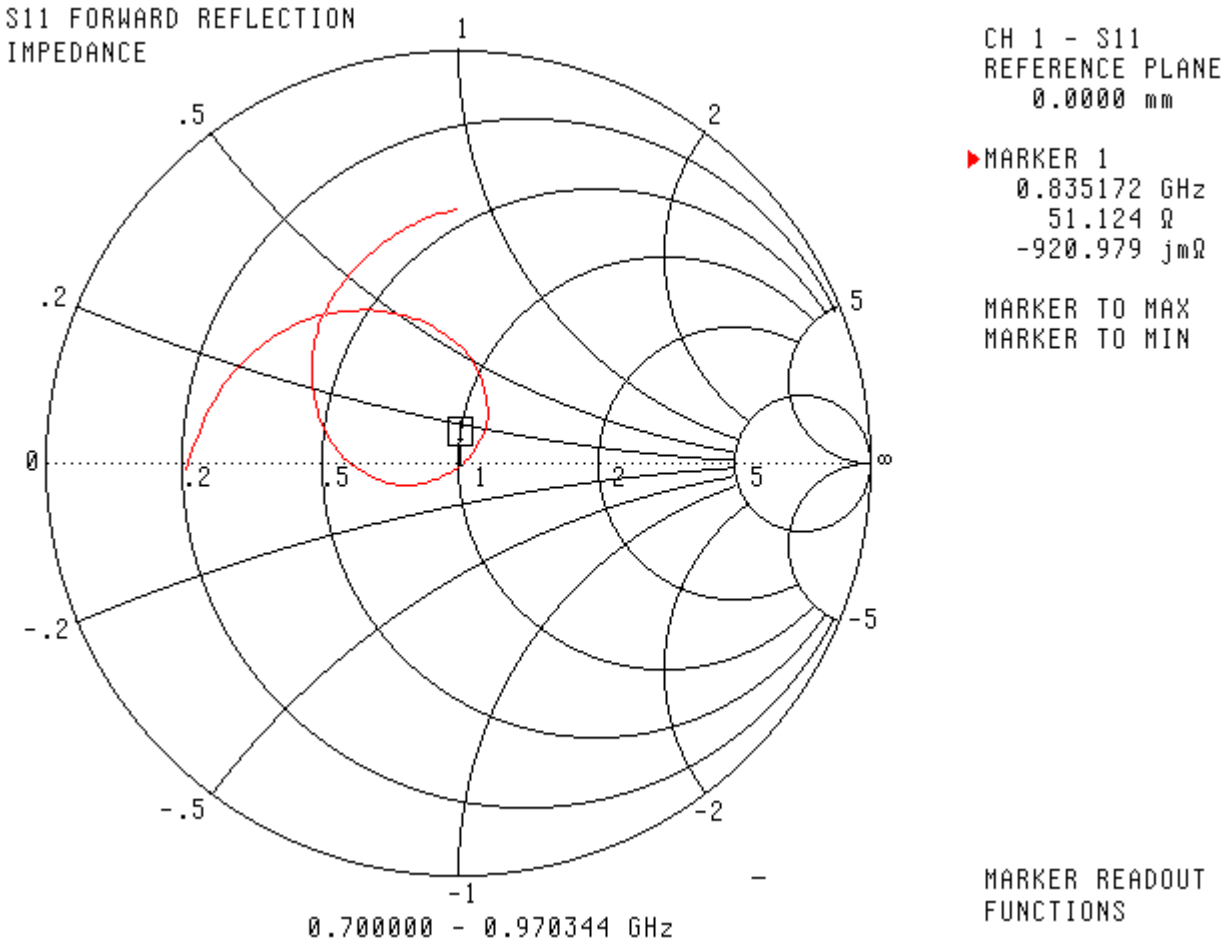
S11 Parameter Return Loss



SWR

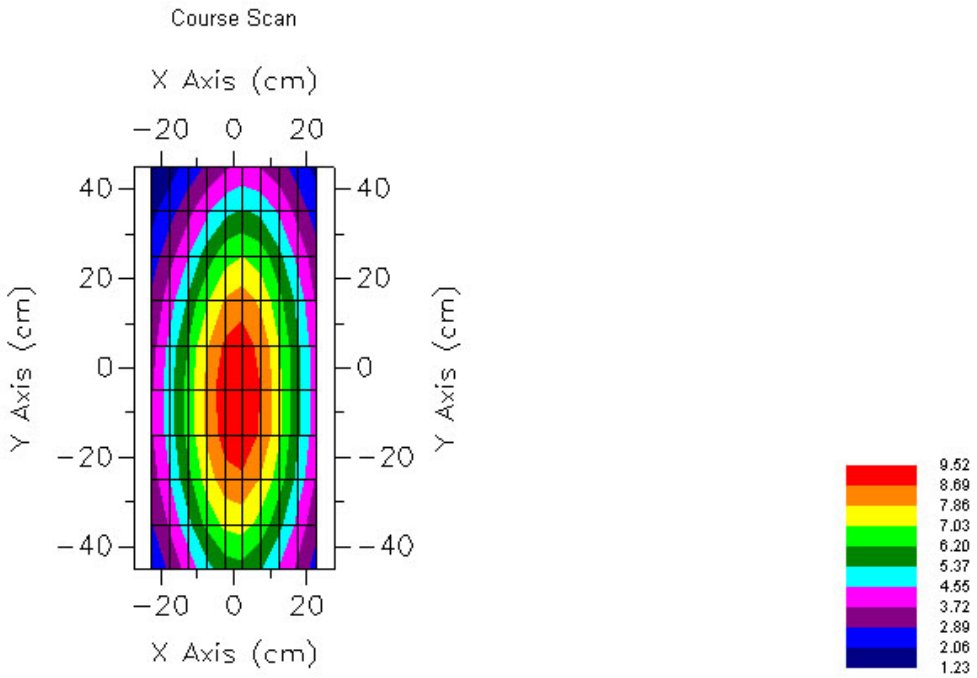


Smith Chart Dipole Impedance



System Validation Results Using the Electrically Calibrated Dipole

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
835 MHz	9.33	6.42	15.0



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 2008.

NCL CALIBRATION LABORATORIES

Calibration File No: DC-890

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.

Quietek Validation Dipole

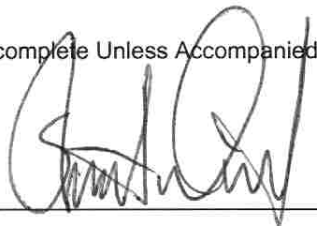
Manufacturer: APREL Laboratories
Part number: ALS-D-1900-S-2
Frequency: 1.9 GHz
Serial No: QTK-318

Customer: Quietek

Project Number: QTKB-Dipole-CAL-5336

Calibrated: 9th May 2008
Released on: 9th May 2008

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

Released By: 

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CANADA K2R 1E6

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

Calibration Results Summary

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

Mechanical Dimensions

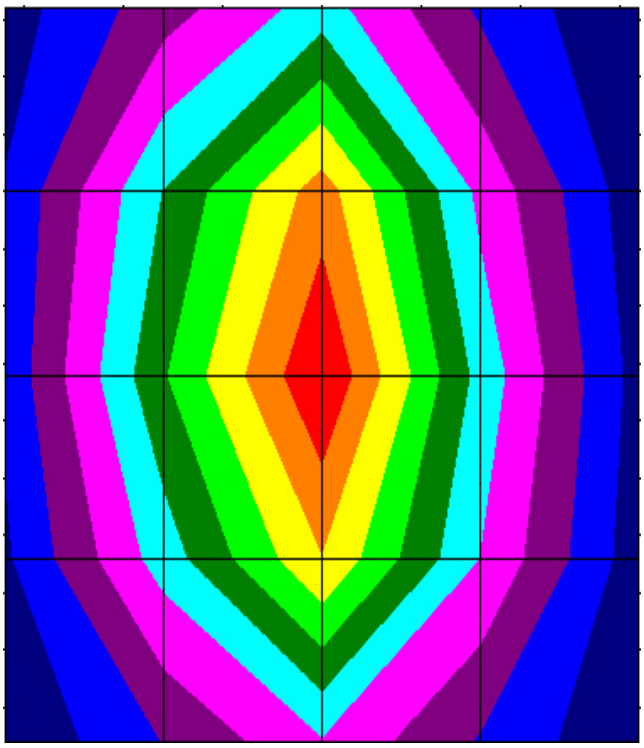
Length: 70.0 mm
Height: 39.5 mm

Electrical Specification

SWR: 1.1 U
Return Loss: -25.8 dB
Impedance: 47.8 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
1.9 GHz	36.0	20.78	67.7



Conditions

Dipole 318 is a recalibration.

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

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 & Part 2: Procedure to determine the specific absorption rate (SAR) for mobile wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)

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

20 °C +/- 0.5°C

Dipole Calibration Results

Mechanical Verification

IEEE Length	IEEE Height	Measured Length	Measured Height
68.0 mm	39.5 mm	70.0 mm	39.5 mm

Tissue Validation

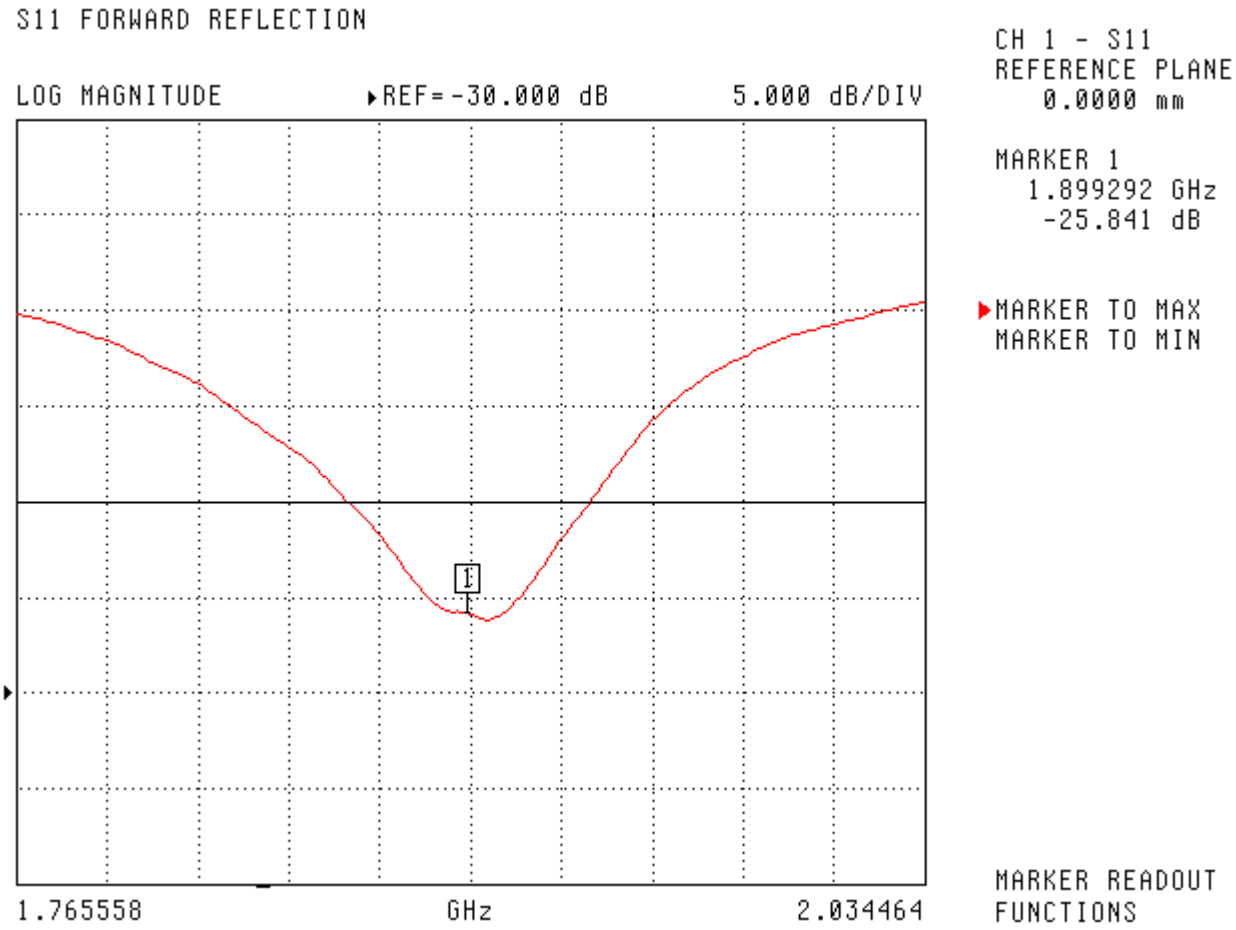
Head Tissue 1900 MHz	Measured
Dielectric constant, ε_r	39.9
Conductivity, σ [S/m]	1.42

Electrical Calibration

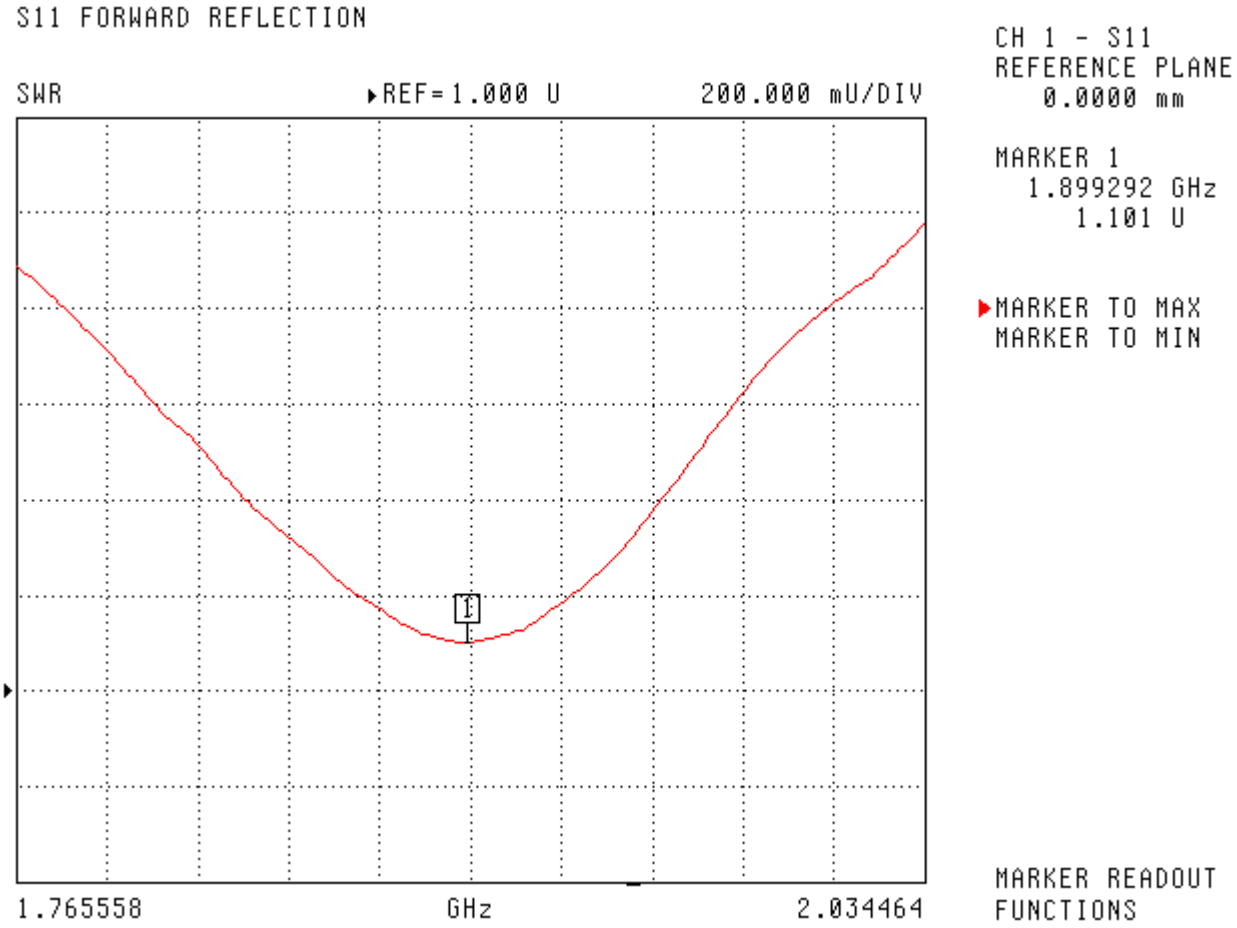
Test	Result
S11 R/L	-25.8 dB
SWR	1.1 U
Impedance	47.8 Ω

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

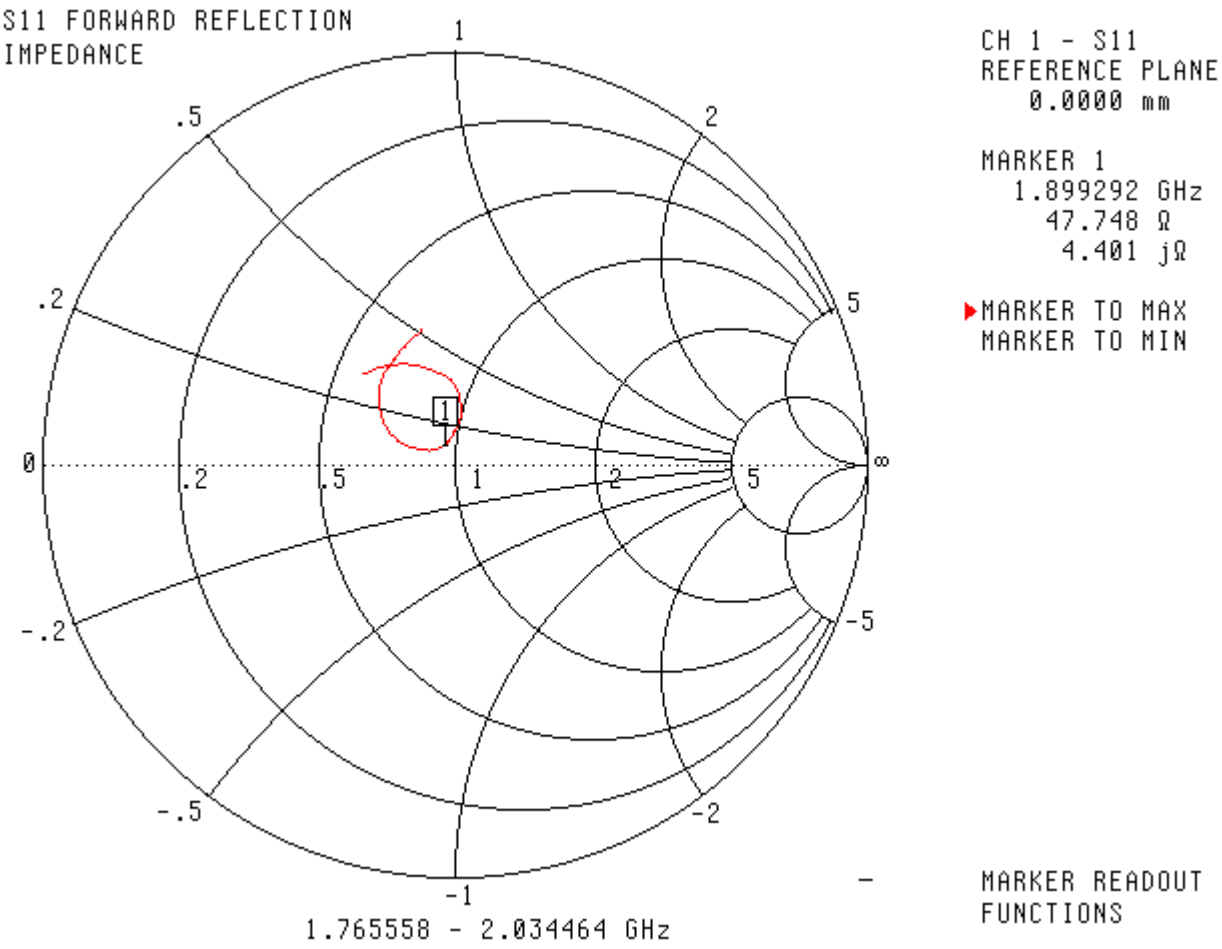
S11 Parameter Return Loss



SWR

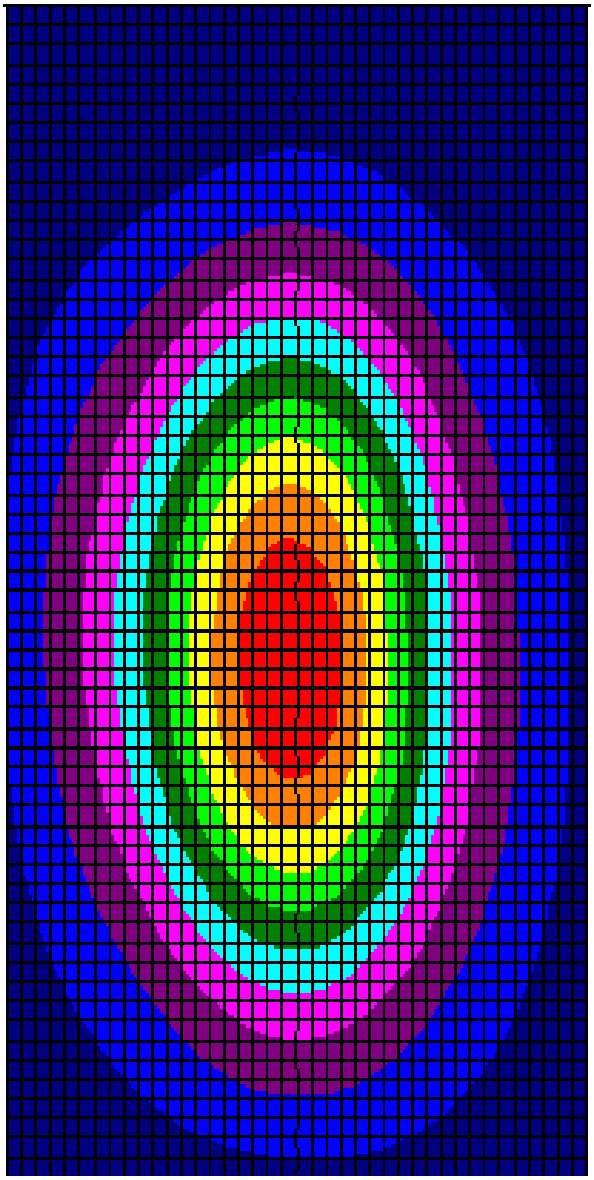


Smith Chart Dipole Impedance



System Validation Results Using the Electrically Calibrated Dipole

Frequency	1 Gram	10 Gram	Peak Above Feed Point
1.9 GHz	36.0	20.78	67.7



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 May 2008.