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Appendix A SAR Plots





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 12:41:06 PM
 End Time : 01-Mar-2005 12:50:41 PM
 Scanning Time : 575 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 200
 Width : 50
 Depth : 30
 Power Start : 1.156
 Power Finish : 1.096
 Power Drift (%) : -5.243

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

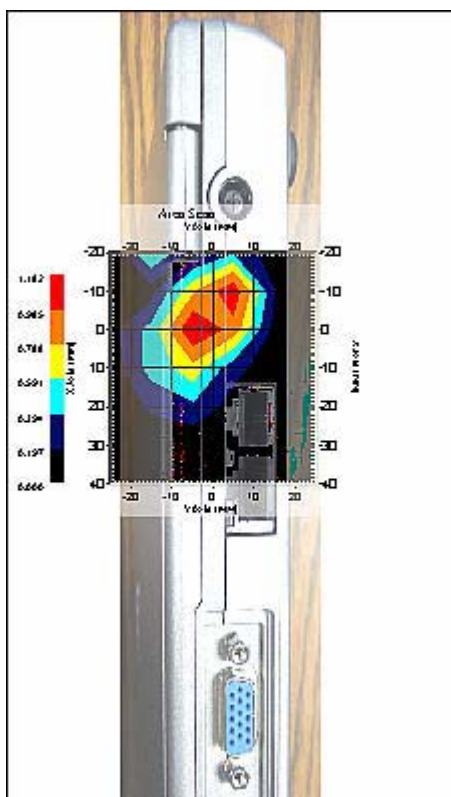


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 12:30:43 PM

Other Data

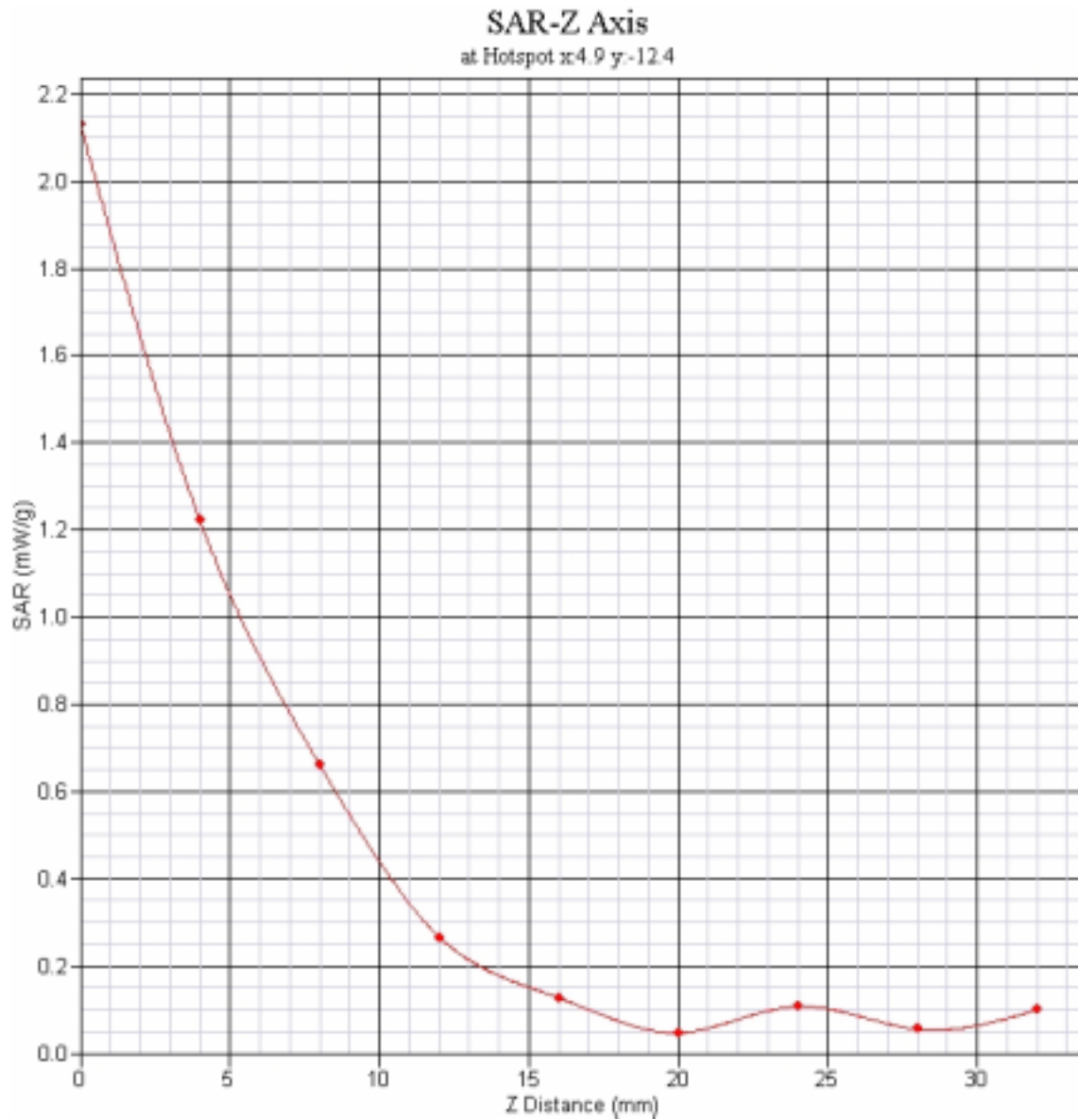
DUT Position : Touch
 Separation : 0
 Channel : Mid - 2437



1 gram SAR value : 0.990 W/kg
 Zoom Scan Peak SAR : 2.131

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	5.2	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 03:22:28 PM
 End Time : 01-Mar-2005 03:32:08 PM
 Scanning Time : 580 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 200
 Width : 50
 Depth : 30
 Power Start : 0.274
 Power Finish : 0.274
 Power Drift (%) : 0.000

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

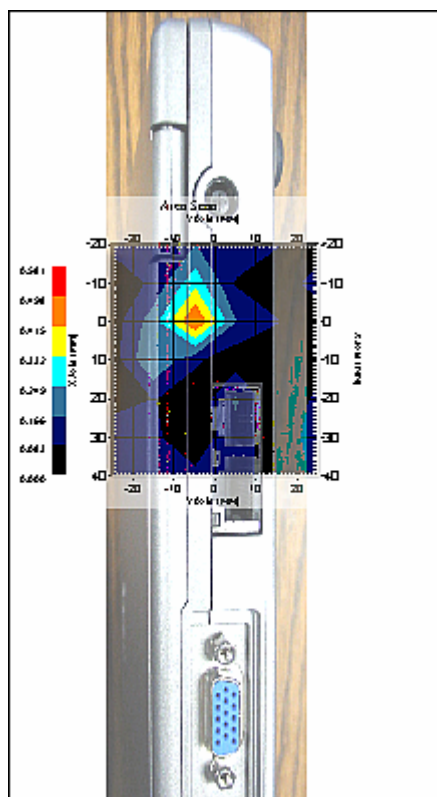


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 3:19:03 PM

Other Data

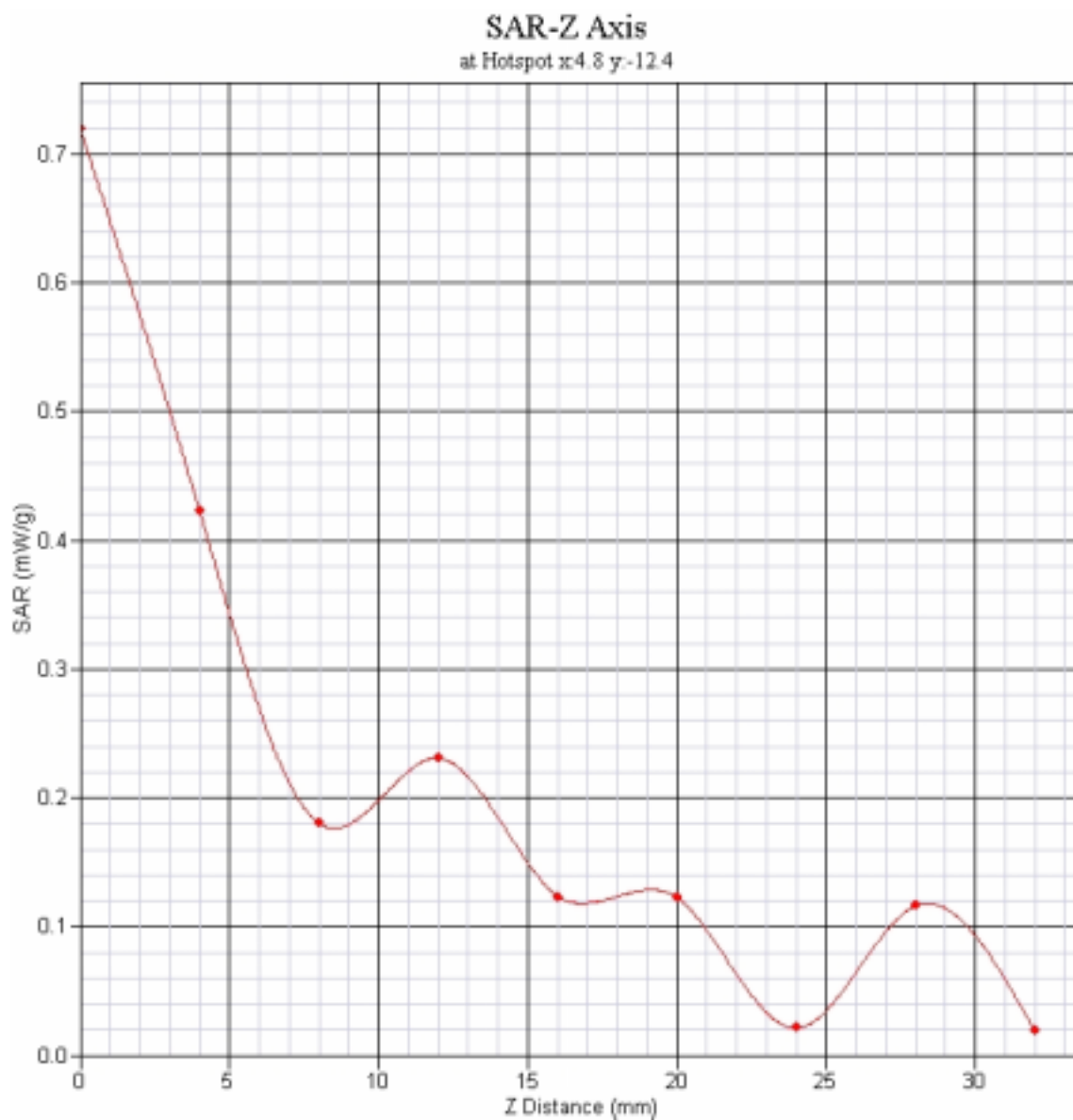
DUT Position : Touch
 Separation : 0
 Channel : Low - 2412



1 gram SAR value : 0.288 W/kg
 Zoom Scan Peak SAR : 0.720

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	53.1	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 01:20:06 PM
 End Time : 01-Mar-2005 01:30:04 PM
 Scanning Time : 598 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 200
 Width : 50
 Depth : 30
 Power Start : 0.832
 Power Finish : 0.765
 Power Drift (%) : -8.116

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

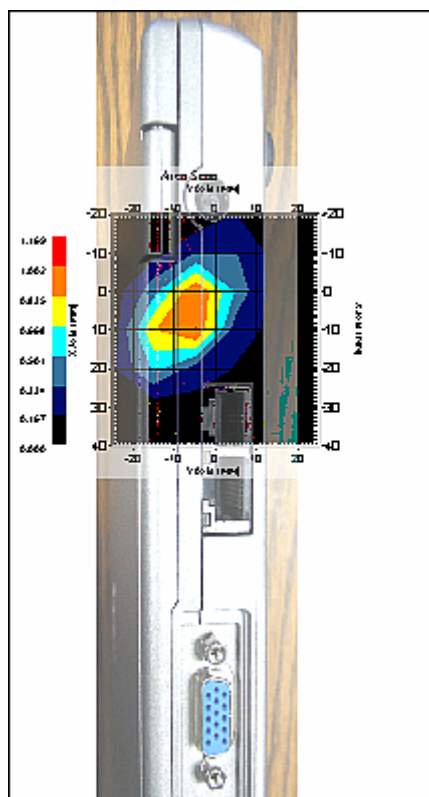


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 3:19:03 PM

Other Data

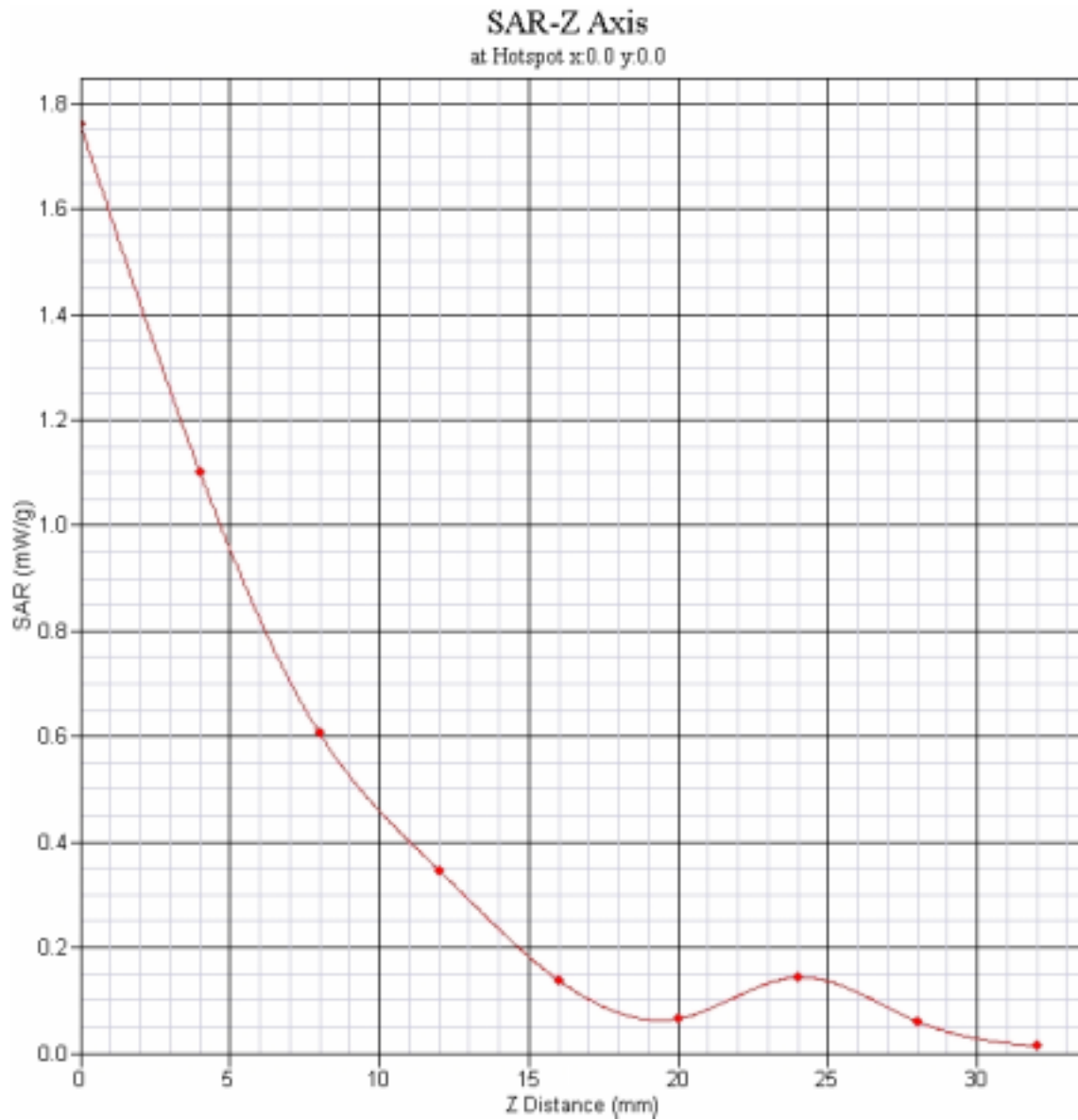
DUT Position : Touch
 Separation : 0
 Channel : Low - 2412



1 gram SAR value : 0.718 W/kg
 Zoom Scan Peak SAR : 1.761

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	8.1	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 03:50:39 PM
 End Time : 01-Mar-2005 04:00:34 PM
 Scanning Time : 595 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 200
 Width : 50
 Depth : 30
 Power Start : 0.237
 Power Finish : 0.237
 Power Drift (%) : 0.000

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor : 1
 Conversion Factor : 5
 Probe Sensitivity : 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point : 95 mV
 Offset : 1.56

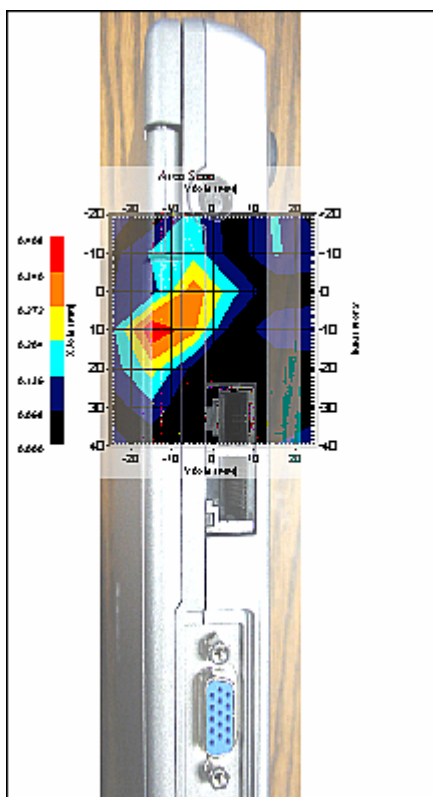


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 3:19:03 PM

Other Data

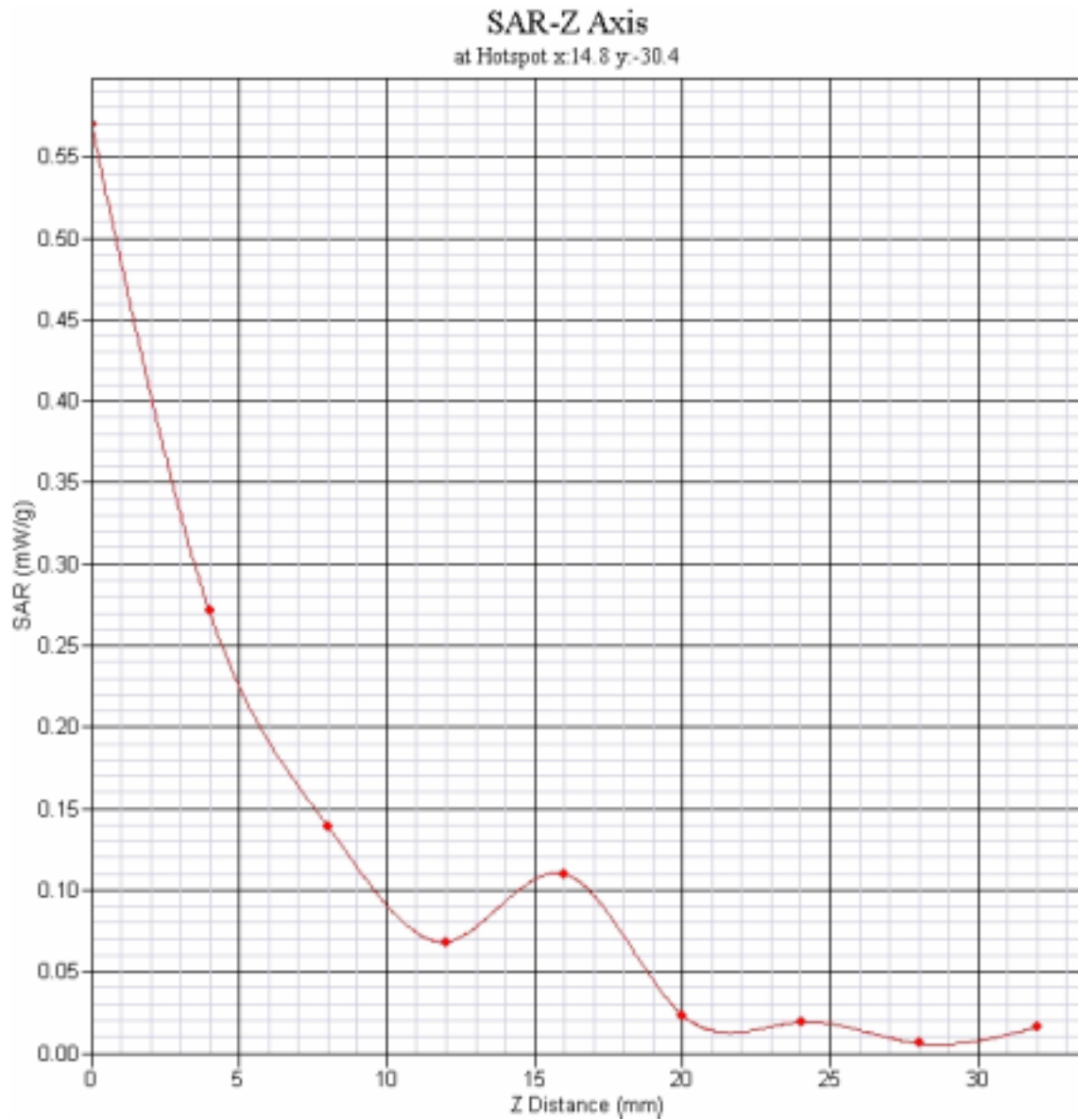
DUT Position : Touch
 Separation : 0
 Channel : Mid - 2437



1 gram SAR value : 0.286 W/kg
 Zoom Scan Peak SAR : 0.570

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	137.0	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 03:05:55 PM
 End Time : 01-Mar-2005 03:15:31 PM
 Scanning Time : 576 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 200
 Width : 50
 Depth : 30
 Power Start : 0.408
 Power Finish : 0.407
 Power Drift (%) : -0.567

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

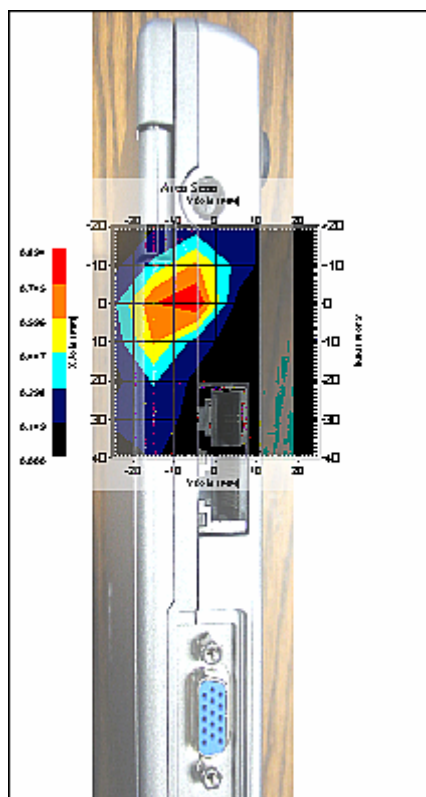


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 12:30:43 PM

Other Data

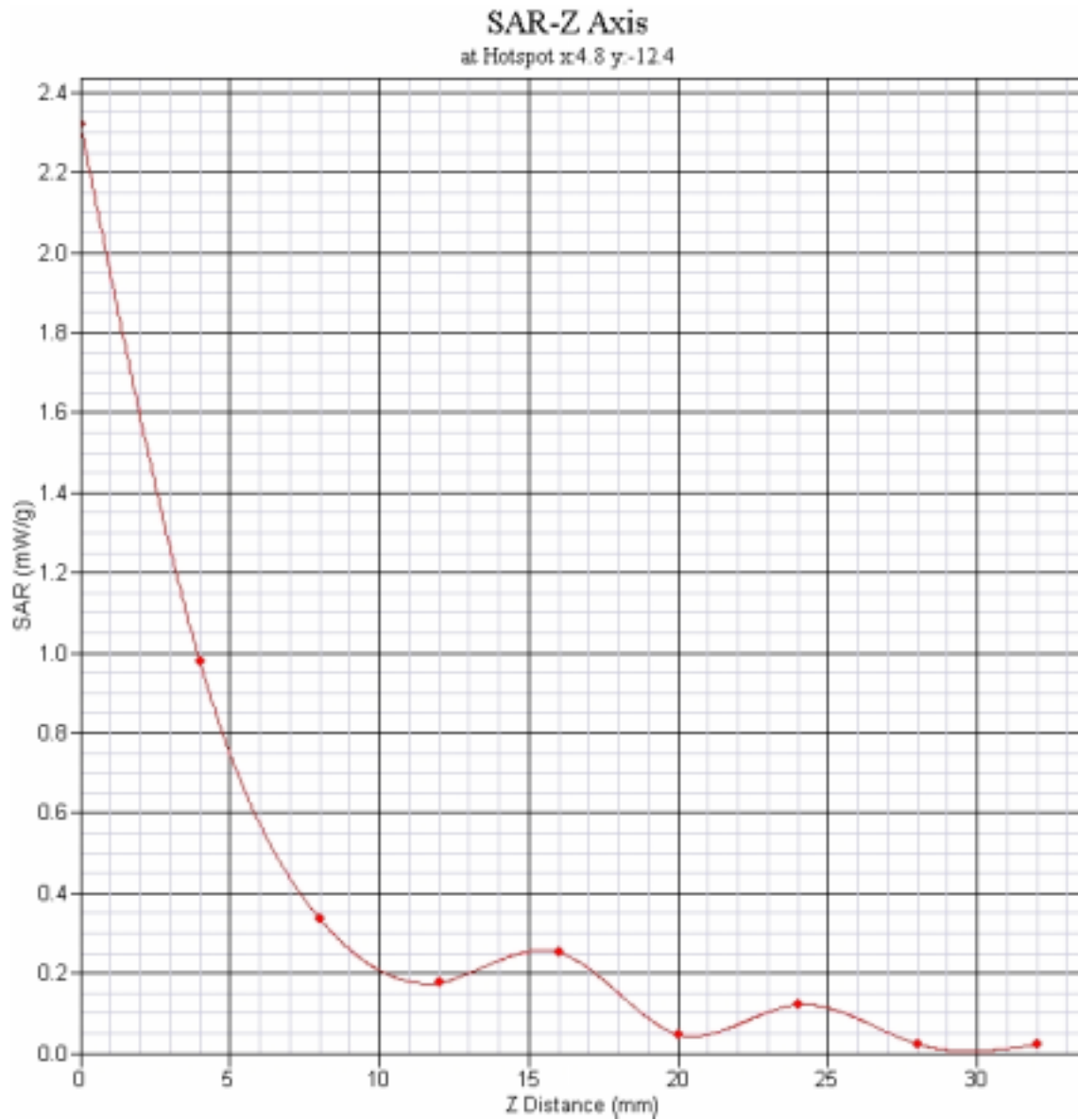
DUT Position : Touch
 Separation : 0
 Channel : High - 2462



1 gram SAR value : 0.776 W/kg
 Zoom Scan Peak SAR : 2.321

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	25.8	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 04:03:09 PM
 End Time : 01-Mar-2005 04:12:48 PM
 Scanning Time : 579 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 200
 Width : 50
 Depth : 30
 Power Start : 0.166
 Power Finish : 0.166
 Power Drift (%) : 0.000

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

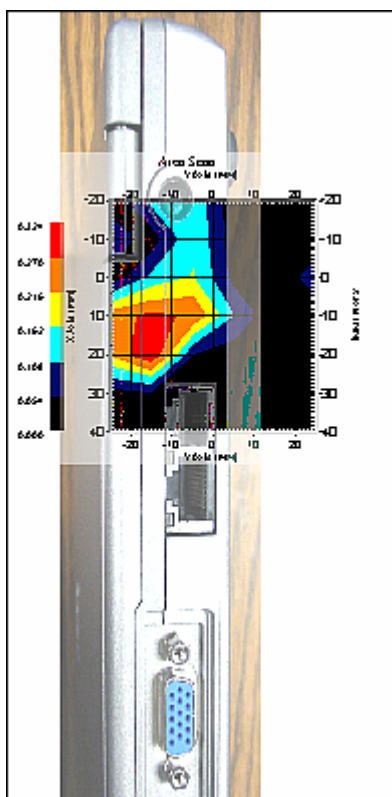


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 3:19:03 PM

Other Data

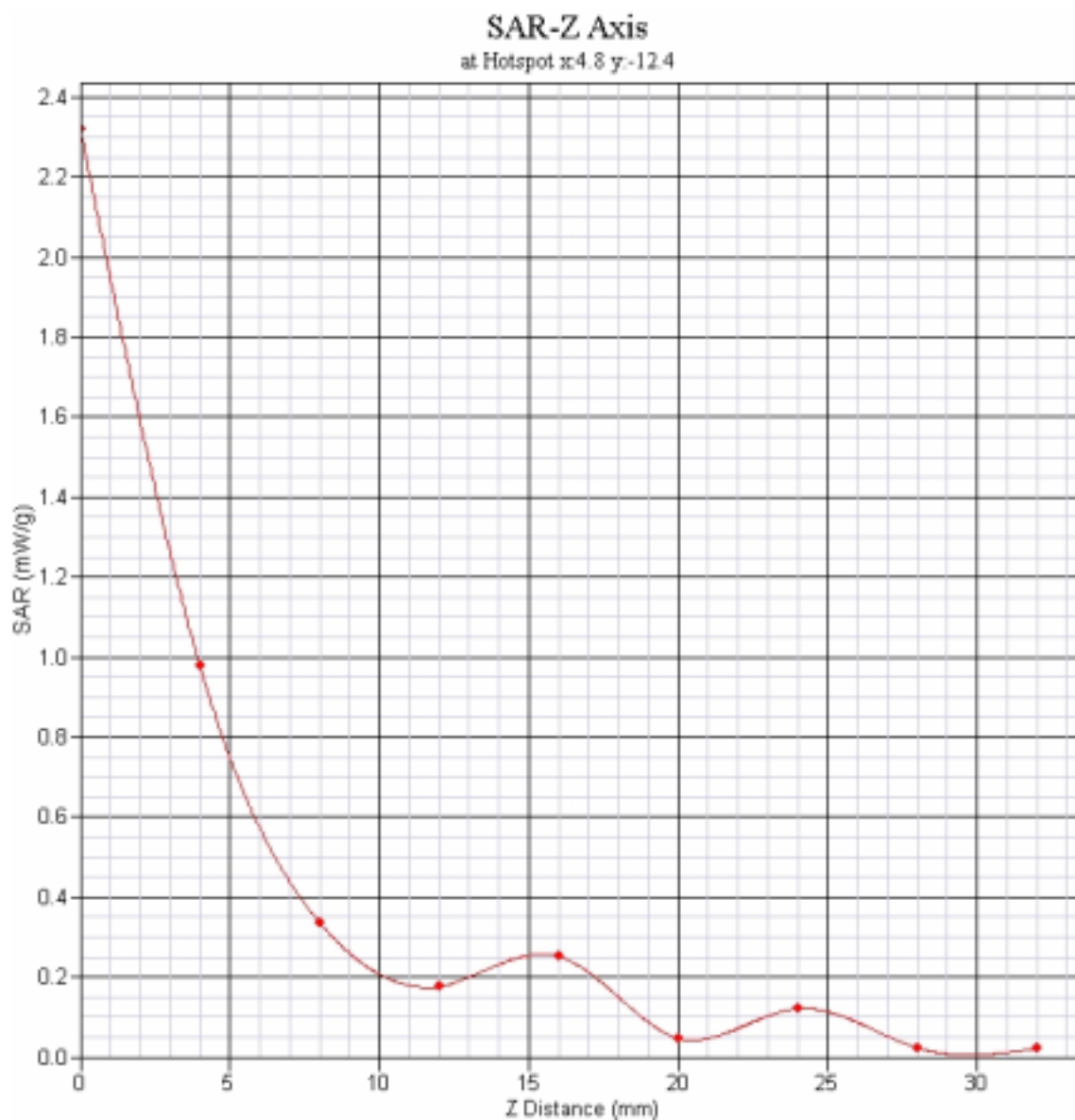
DUT Position : Touch
 Separation : 0
 Channel : High - 2462



1 gram SAR value : 0.173 W/kg
 Zoom Scan Peak SAR : 0.540

Exposure Assessment Measurement Uncertainty

Source of Uncertainty	Tolerance Value	Probability Distribution	Divisor	c_1 (1-g)	c_1 (10-g)	Standard Uncertainty (1-g)	Standard Uncertainty (10-g)
Measurement System							
Probe Calibration	3.5	normal	1	1	1	3.5	3.5
Axial Isotropy	3.7	rectangular	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{3}cp$	$\sqrt{3}cp$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	25.8	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 11:36:03 AM
 End Time : 01-Mar-2005 11:45:50 AM
 Scanning Time : 587 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 150
 Width : 100
 Depth : 30
 Power Start : 0.100
 Power Finish : 0.106
 Power Drift (%) : 6.000

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

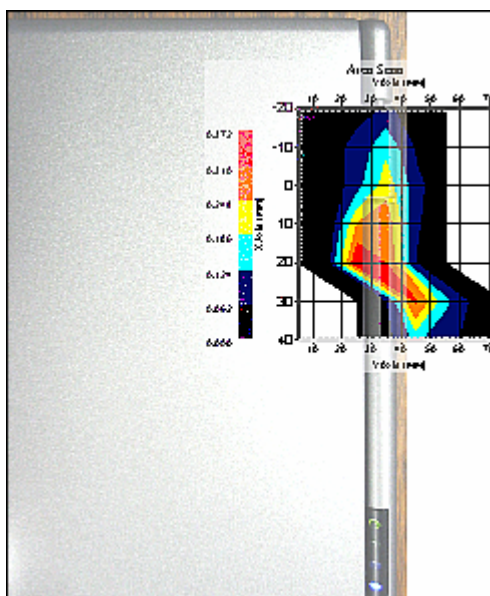


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 11:35:59 AM

Other Data

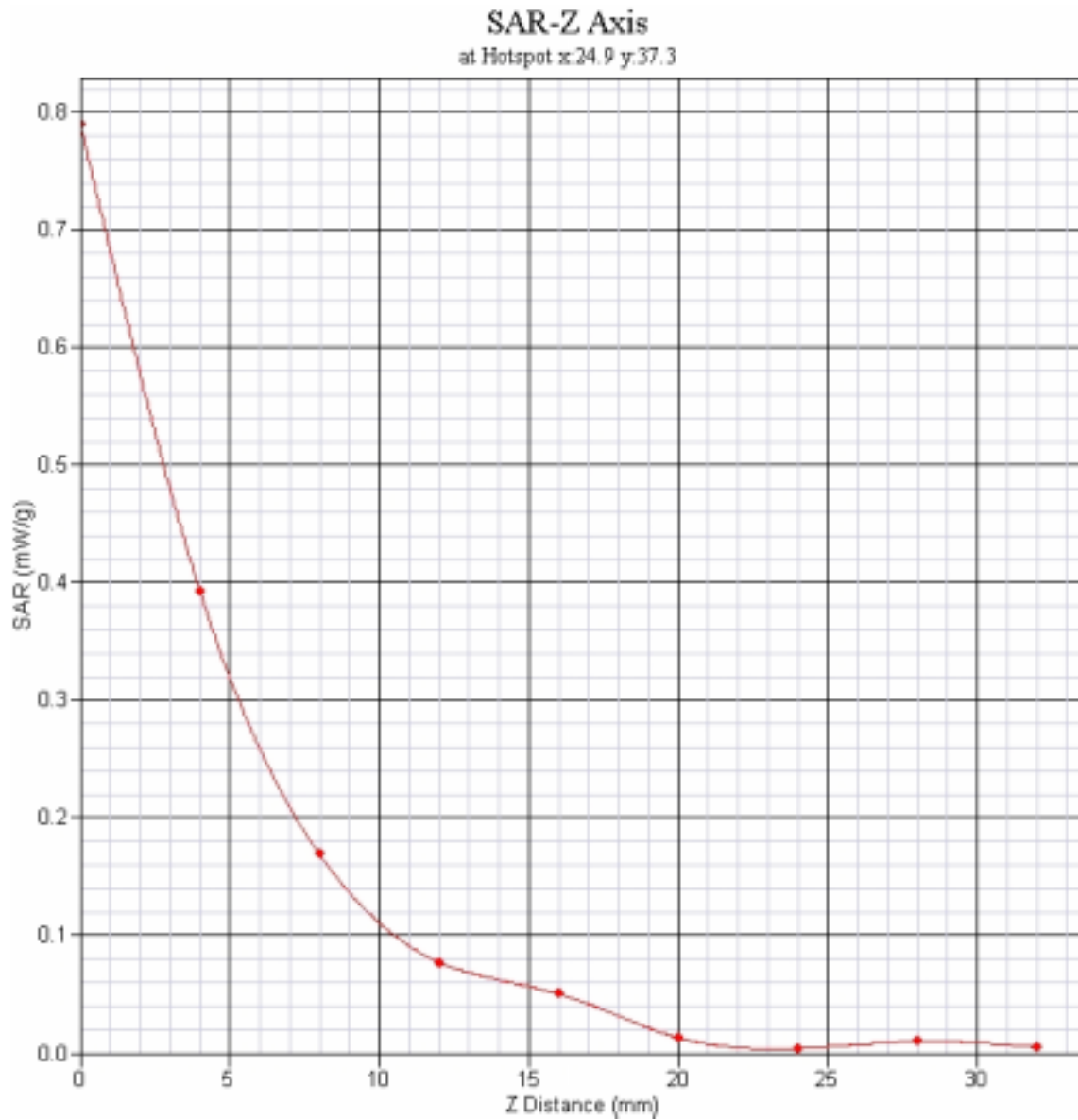
DUT Position : Touch
 Separation : 0
 Channel : Mid - 2437



1 gram SAR value : 0.325 W/kg
 Zoom Scan Peak SAR : 0.790

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	94.1	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	3.7	rectangular	$\sqrt{3}$	0.6	0.5	1.3	1.1
Combined Uncertainty		RSS				9.2	9.0
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.4	18.1





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SAR Test Report

Operator : 123
 Validation Date : 01-Mar-2005
 Measurement Date : 01-Mar-2005
 Starting Time : 01-Mar-2005 12:05:00 PM
 End Time : 01-Mar-2005 12:14:34 PM
 Scanning Time : 574 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 150
 Width : 100
 Depth : 30
 Power Start : 0.100
 Power Finish : 0.091
 Power Drift (%) : -9.000

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

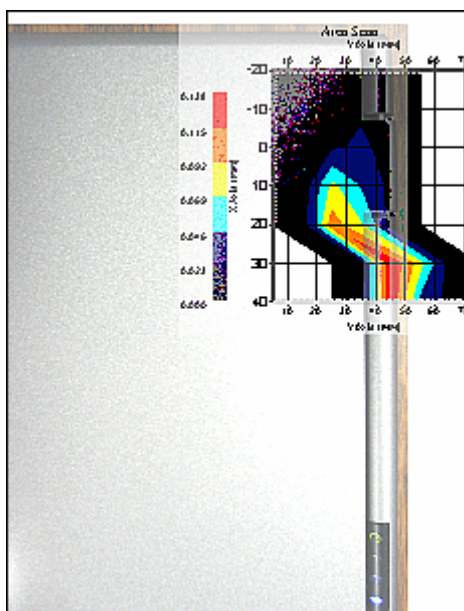


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 11:35:59 AM

Other Data

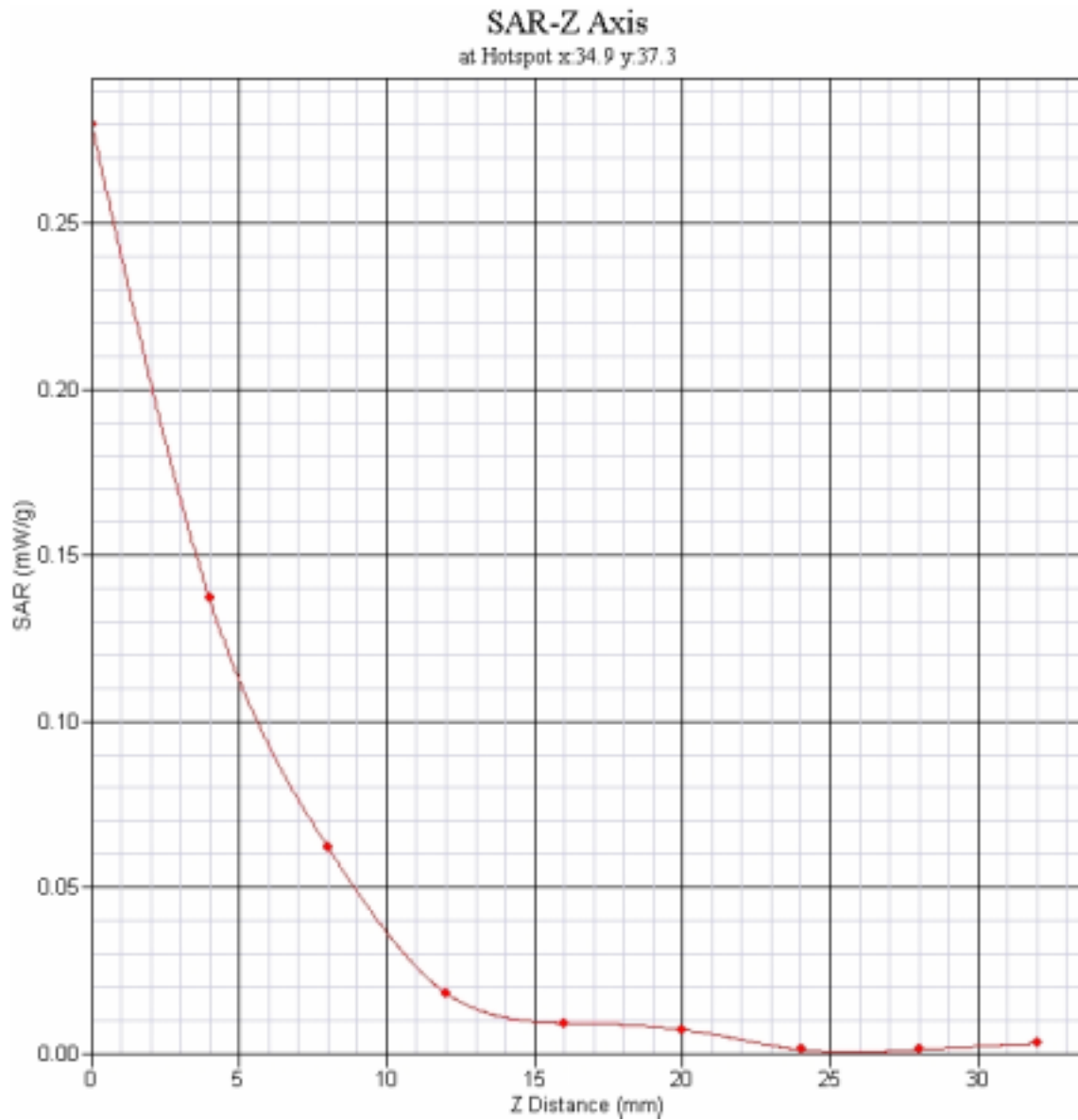
DUT Position : Touch
 Separation : 0
 Channel : Low - 2412



1 gram SAR value : 0.111 W/kg
 Zoom Scan Peak SAR : 0.280

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	90.0	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	3.7	rectangular	$\sqrt{3}$	0.6	0.5	1.3	1.1
Combined Uncertainty		RSS				9.2	9.0
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.4	18.1





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SAR Test Report

Operator : 123
 Validation Date : 02-Mar-2005
 Measurement Date : 02-Mar-2005
 Starting Time : 02-Mar-2005 10:31:11 AM
 End Time : 02-Mar-2005 10:41:43 AM
 Scanning Time : 632 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 180
 Width : 100
 Depth : 30
 Power Start : 0.100
 Power Finish : 0.104
 Power Drift (%) : 4.000

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

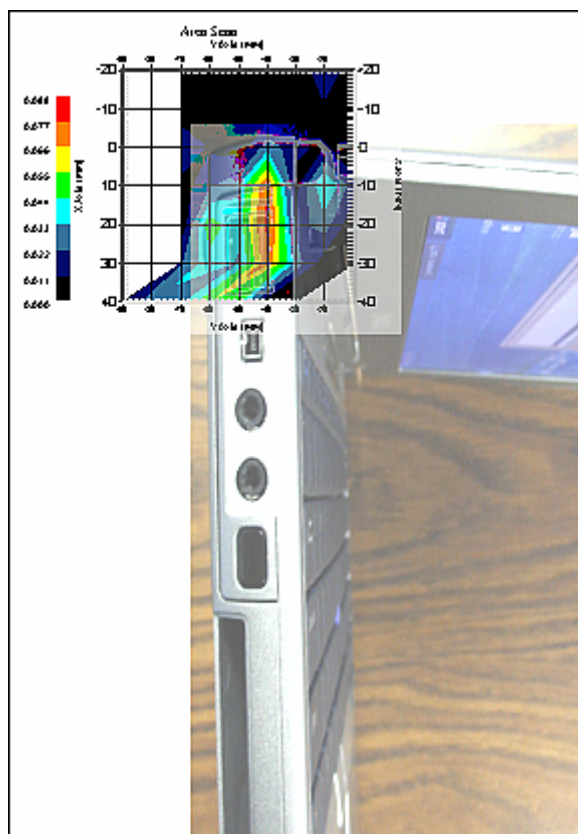


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 3:19:03 PM

Other Data

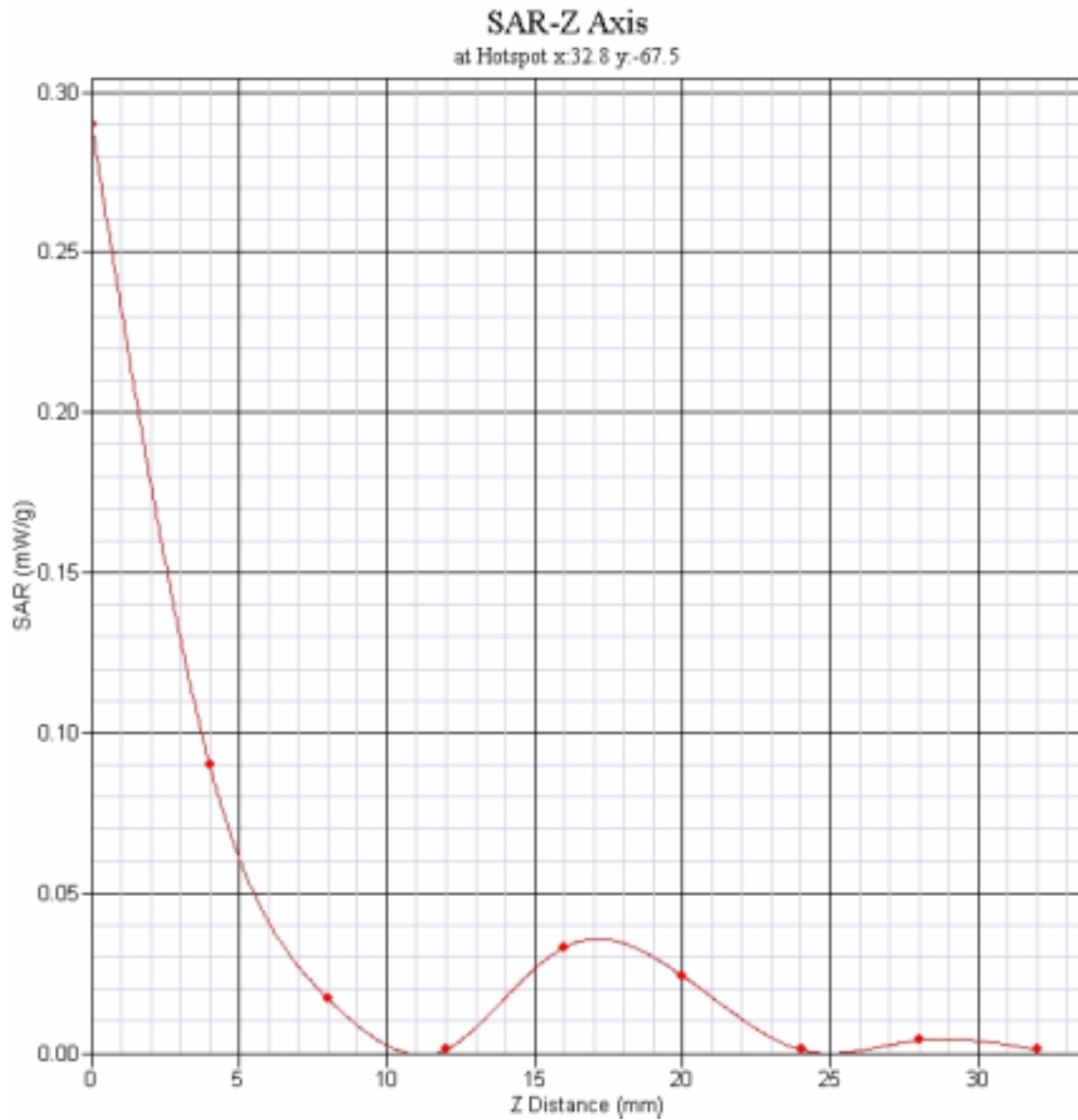
DUT Position : Touch
 Separation : 0
 Channel : Mid - 2437



1 gram SAR value : 0.073 W/kg
 Zoom Scan Peak SAR : 0.290

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	96.2	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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SAR Test Report

Operator : 123
 Validation Date : 02-Mar-2005
 Measurement Date : 02-Mar-2005
 Starting Time : 02-Mar-2005 10:05:36 AM
 End Time : 02-Mar-2005 10:15:12 AM
 Scanning Time : 576 secs

Product Data
 Device Name : Dell Pebble WNC
 Serial No. : 8142Y010093260105DM000
 Type : Other
 Model : Dell Pebble
 Frequency : 2450.00 MHz
 Max. Transmit Pwr : 0.045 W
 Drift Time : 0 min(s)
 Length : 180
 Width : 100
 Depth : 30
 Power Start : 0.100
 Power Finish : 0.090
 Power Drift (%) : -10.000

Phantom Data
 Name : APREL-Uni
 Type : Uni-Phantom
 Size : 280 x 280 x 200
 Serial No. : User Define
 Location : Center
 Description : Uni

Tissue Data
 Type : BODY
 Serial No. : 2450
 Frequency : 2450 MHz
 Calibration Date : 01-Mar-2005
 Temperature : 22 °C
 Ambient Temp. : 23 °C
 Humidity : 50 RH%
 Epsilon : 54.99 F/m
 Sigma : 1.98 S/m
 Density : 1000 kg/cu. m

Probe Data
 Name : APREL Probe 212
 Model : E020
 Type : E-Field Triangle
 Serial No. : 212
 Calibration Date : 27-Dec-2004
 Frequency : 2450 MHz
 Duty Cycle Factor: 1
 Conversion Factor: 5
 Probe Sensitivity: 1.20 1.20 1.20 $\mu\text{V}/(\text{V}/\text{sq. m})$
 Compression Point: 95 mV
 Offset : 1.56

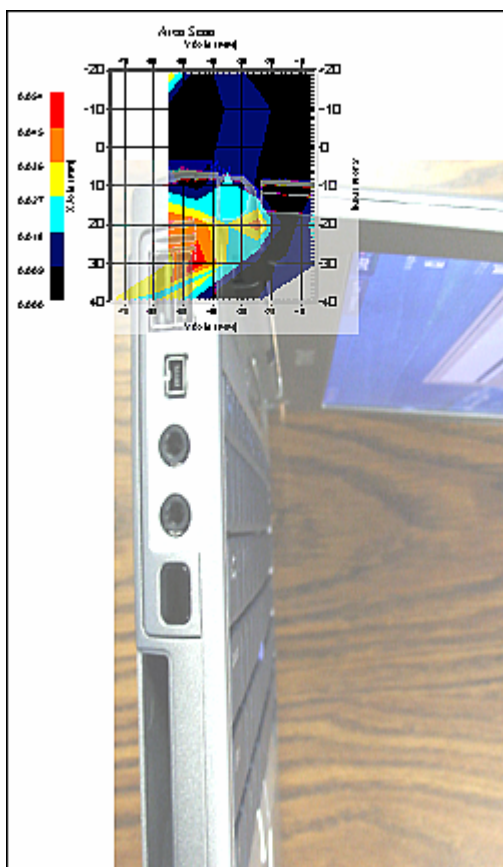


Measurement Data

Crest Factor : 1
 Scan Type : Complete
 Set-up Date : 01-Mar-2005
 Set-up Time : 3:19:03 PM

Other Data

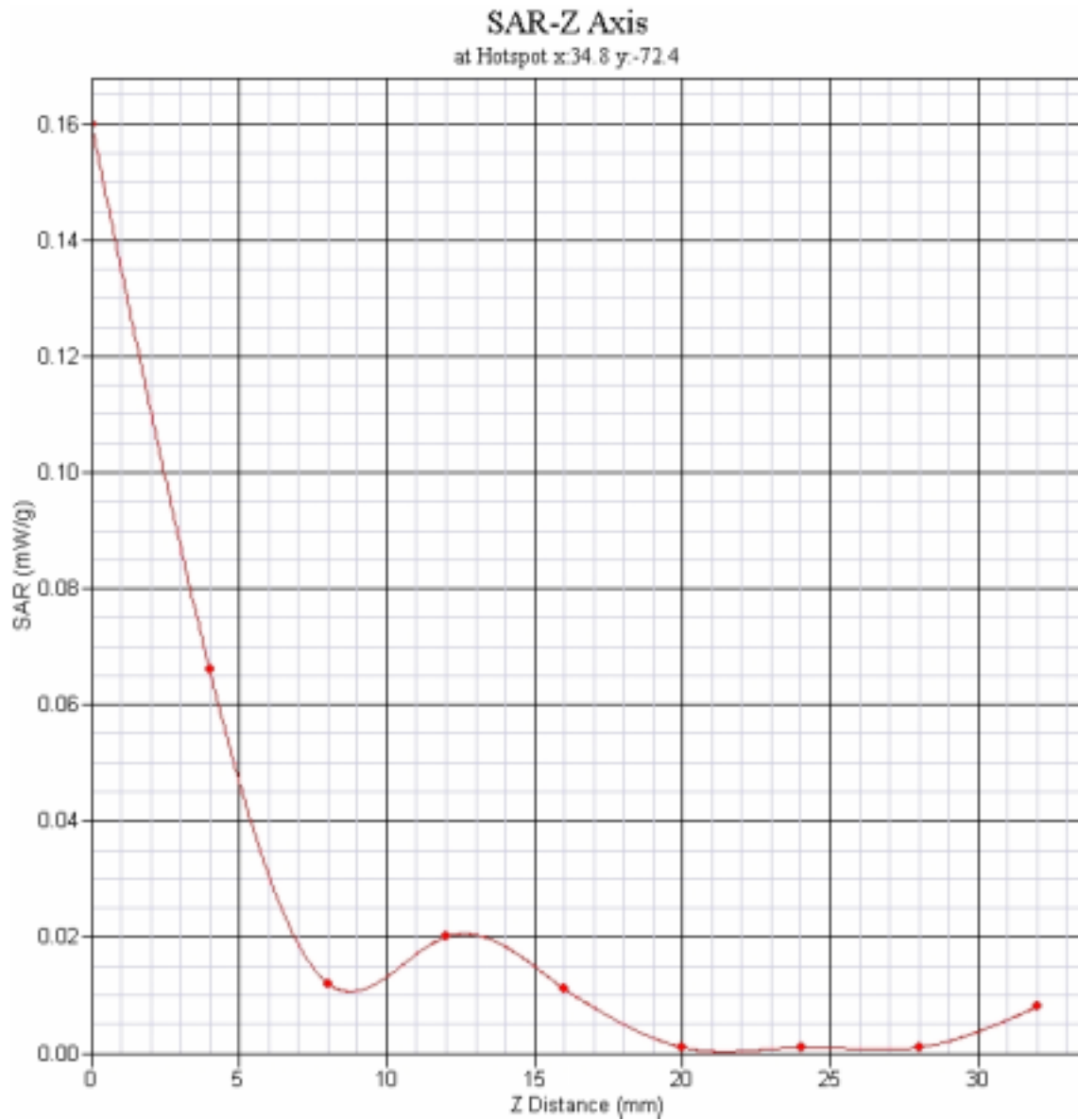
DUT Position : Touch
 Separation : 0
 Channel : Low - 2412



1 gram SAR value : 0.052 W/kg
 Zoom Scan Peak SAR : 0.160

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	$\sqrt{3}$	$(1-cp)^{1/2}$	$(1-cp)^{1/2}$	1.5	1.5
Hemispherical Isotropy	10.9	rectangular	$\sqrt{3}$	$\sqrt{cp}$	$\sqrt{cp}$	4.4	4.4
Boundary Effect	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	rectangular	$\sqrt{3}$	1	1	2.7	2.7
Detection Limit	1.0	rectangular	$\sqrt{3}$	1	1	0.6	0.6
Readout Electronics	1.0	normal	1	1	1	1.0	1.0
Response Time	0.8	rectangular	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	1.7	rectangular	$\sqrt{3}$	1	1	1.0	1.0
RF Ambient Condition	3.0	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner Mech.	0.4	rectangular	$\sqrt{3}$	1	1	0.2	0.2
Restriction							
Probe Positioning with respect to Phantom Shell	2.9	rectangular	$\sqrt{3}$	1	1	1.7	1.7
Extrapolation and Integration	3.7	rectangular	$\sqrt{3}$	1	1	2.1	2.1
Test Sample Positioning	4.0	normal	1	1	1	4.0	4.0
Device Holder Uncertainty	2.0	normal	1	1	1	2.0	2.0
Drift of Output Power	90.0	rectangular	$\sqrt{3}$	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty(shape & thickness tolerance)	3.4	rectangular	$\sqrt{3}$	1	1	2.0	2.0
Liquid Conductivity(target)	5.0	rectangular	$\sqrt{3}$	0.7	0.5	2.0	1.4
Liquid Conductivity(meas.)	0.2	rectangular	$\sqrt{3}$	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	$\sqrt{3}$	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.5	rectangular	$\sqrt{3}$	0.6	0.5	1.9	1.6
Combined Uncertainty		RSS				9.3	9.1
Combined Uncertainty (coverage factor=2)		Normal (k=2)				18.6	18.2





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Appendix B Probe Calibration Certificate





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NCL CALIBRATION LABORATORIES

Calibration File No.: CP-469

Client.: APREL

C E R T I F I C A T E O F 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

Manufacturer: APREL Laboratories

Model No.: E-020

Serial No.: 212

Body Calibration

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

Project No: Internal

Calibrated: 27th December 2004
Released on: 27th December 2004

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-020 212.

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

Conditions

Probe 212 was a new probe 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

Calibration Results Summary



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Probe Type:	E-Field Probe E-020
Serial Number:	212
Frequency:	2450 MHz
Sensor Offset:	1.56 mm
Sensor Length:	2.5 mm
Tip Enclosure:	Ertalyte*
Tip Diameter:	5 mm
Tip Length:	60 mm
Total Length:	290 mm

*Resistive to recommended tissue recipes per IEEE-1528

Sensitivity in Air

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

Sensitivity in Body Tissue





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Frequency: 2450 MHz**Epsilon:** 50.6 (+/-5%) **Sigma:** 1.98 S/m (+/-10%)**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:

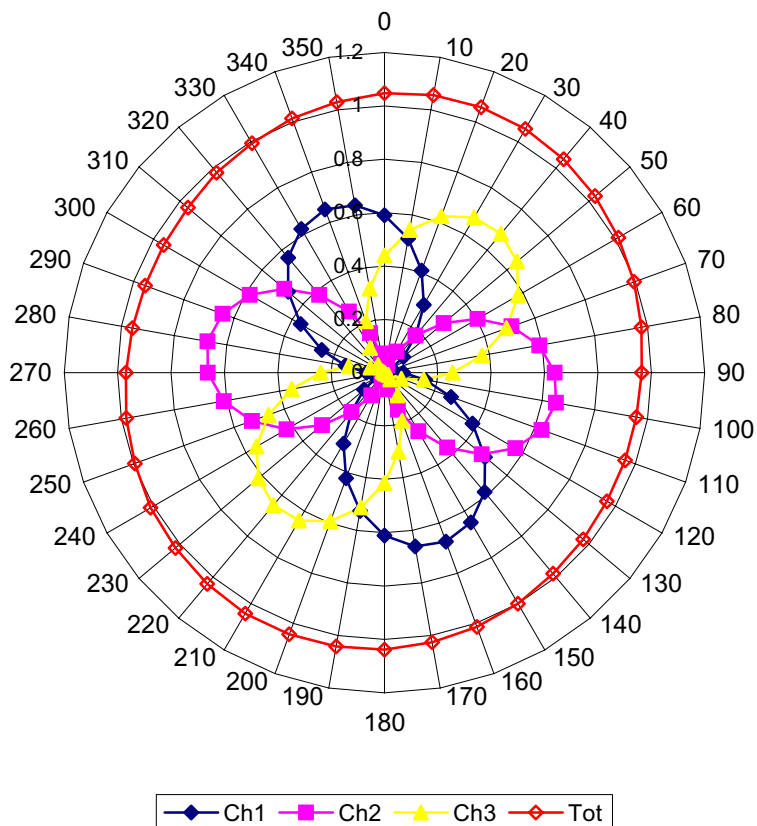
Uncertainty resulting from the boundary effect is less than 2% for the distance between the tip of the probe and the tissue boundary, when less than 2.4mm.

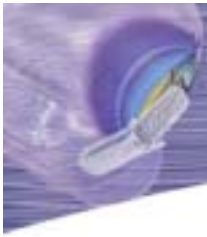
Spatial Resolution:

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.

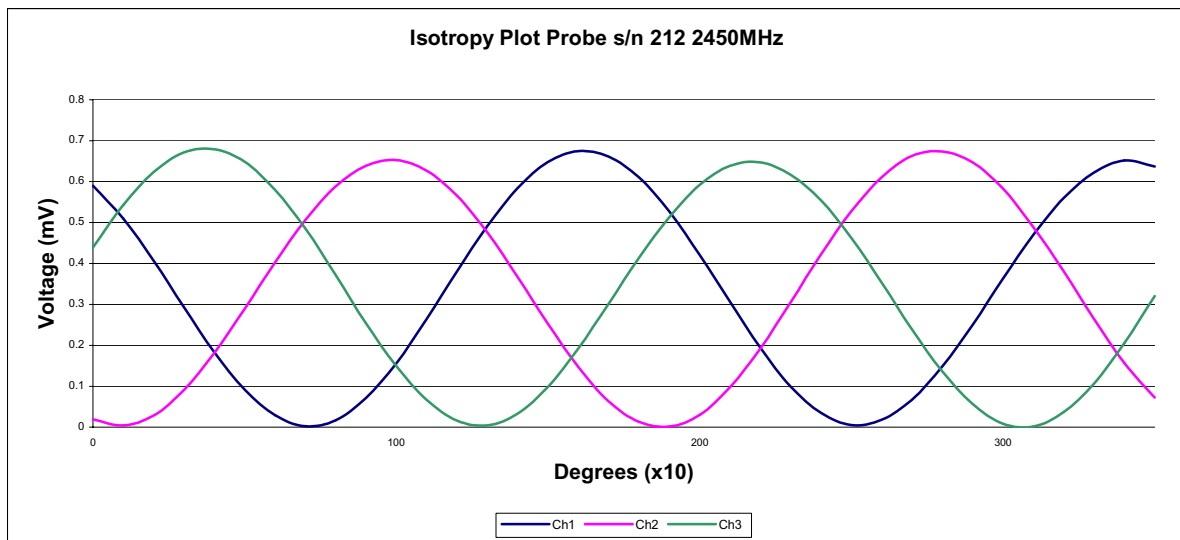
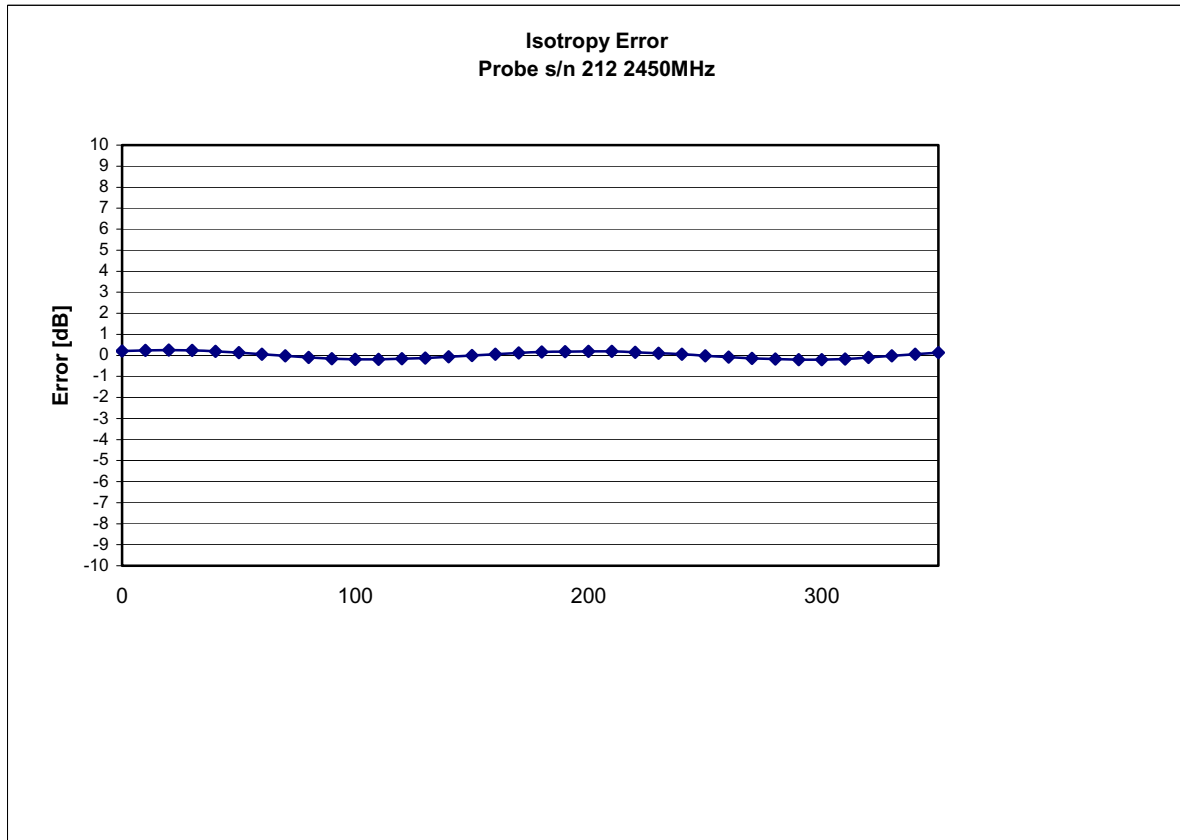
Receiving Pattern 2450 MHz (Air)

Receiving Pattern Probe s/n 212 24500MHz





Isotropy Error 2450 MHz (Air)

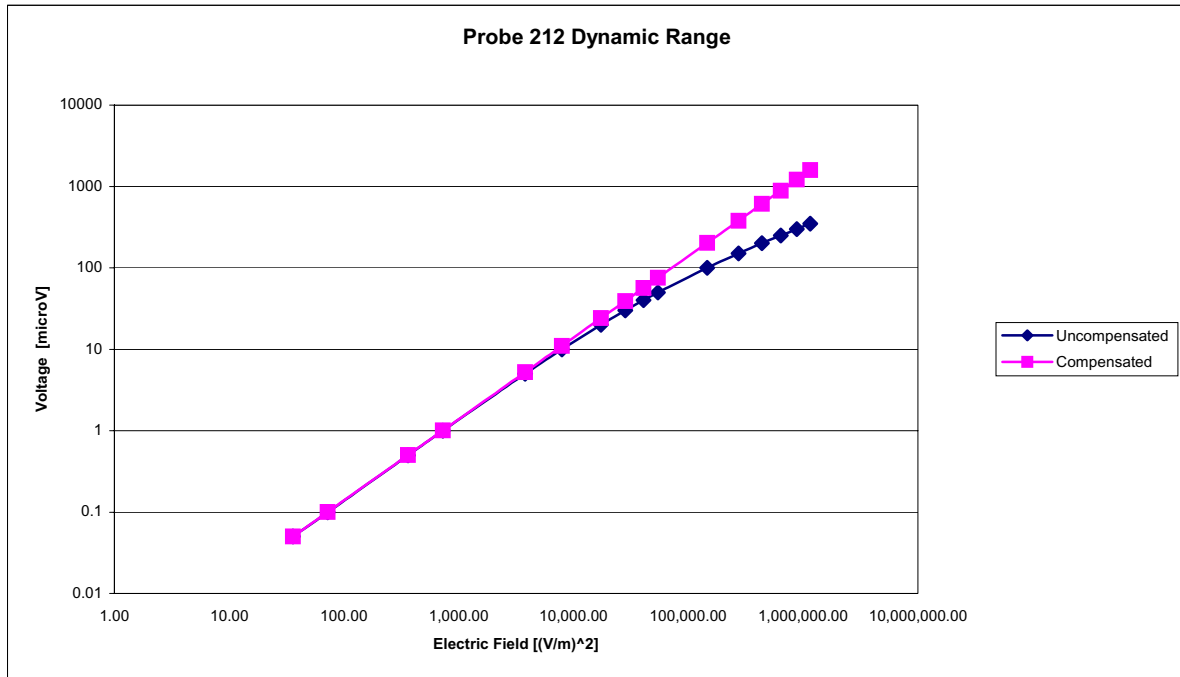


Isotropy:

0.10 dB

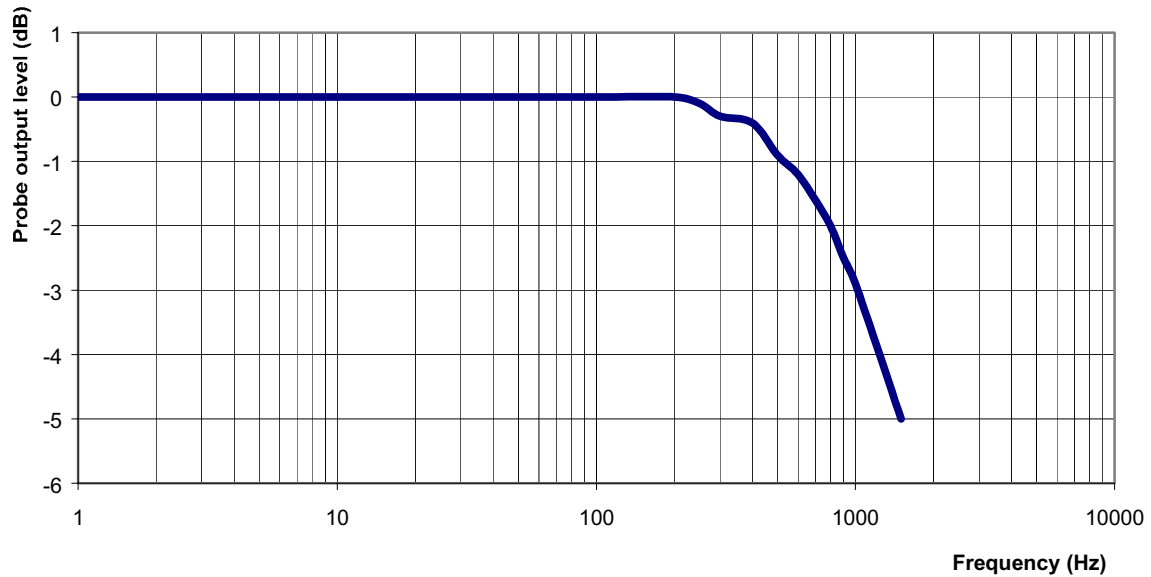


Dynamic Range



Video Bandwidth

Probe Frequency Characteristics



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

Conversion Factor Uncertainty Assessment

Frequency: 2450MHz

Epsilon: 50.6 (+/-5%)

Sigma: 1.98 S/m (+/-10%)

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 MT.

Boundary Effect:

For a distance of 2.4mm the evaluated uncertainty (increase in the probe sensitivity) is less than 2%.



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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 2004.





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Appendix C Dipole Calibration Certificate





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NCL CALIBRATION LABORATORIES

Calibration File No: DC-0265
Project Number: Internal

CERTIFICATE OF CALIBRATION

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

APREL Validation Dipole

Manufacturer: APREL Laboratories
Part number: D-2450-S-1
Frequency: 2.45 GHz
Serial No: ALCD-10

Customer: APREL

Calibrated: 14 November 2003
Released on: 15 November 2003

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



Calibration Results Summary

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

Mechanical Dimensions

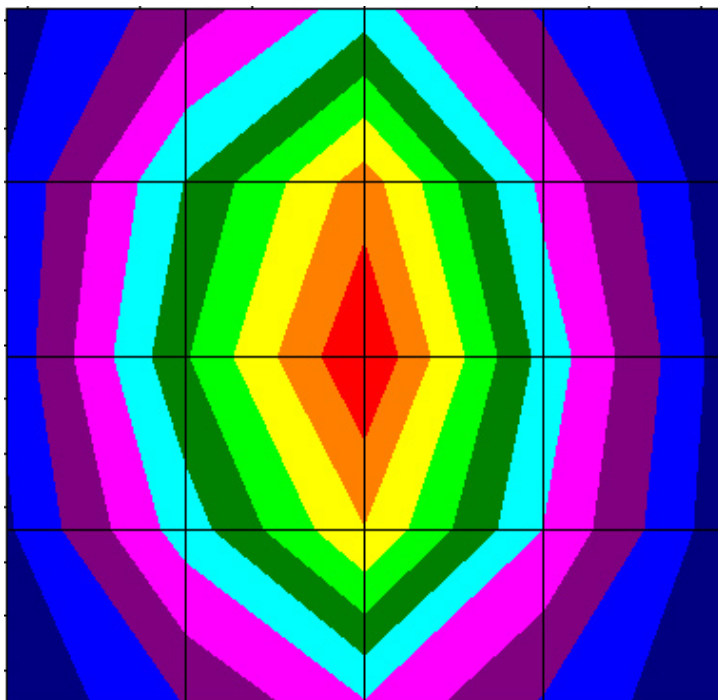
Length: 51.7 mm
Height: 30.8 mm

Electrical Specification

SWR: 1.181U
Return Loss: -21.4 dB
Impedance: 46.175

System Validation Results

Frequency	1 Gram	10 Gram	Peak
2.45 GHz	52.45	22.91	102.91



Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018. The results contained within this report are for Validation Dipole ALCD-10 at 2.45 GHz. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the IEEE mechanical specification. 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 ALIDX-500, along with the APREL Reference E-010 130 MHz to 26 GHz E-Field Probe Serial Number 163.

References

SSI-TP-018 Dipole Calibration Procedure
 SSI-TP-016 Tissue Calibration Procedure
 IEEE 1528 *DRAFT* "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 ALCD-10 was a new Dipole taken from stock prior to calibration.

Ambient Temperature of the Laboratory:	24 °C +/- 0.5°C
Temperature of the Tissue:	20 °C +/- 0.5°C

Dipole Calibration Results

Mechanical Verification

IEEE Length	IEEE Height	Measured Length	Measured Height
51.5 mm	30.4 mm	51.7 mm	30.8 mm

Tissue Validation

Head Tissue 2450 MHz	Measured
Dielectric constant, κ	39.2
Conductivity, ω [S/m]	1.82
Tissue Conversion Factor,	4.61

Electrical Calibration

Test	Result	IEEE Value
S11 R/L	-21.4	-21 dB
SWR	1.181U	-
Impedance	46.175 T	

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

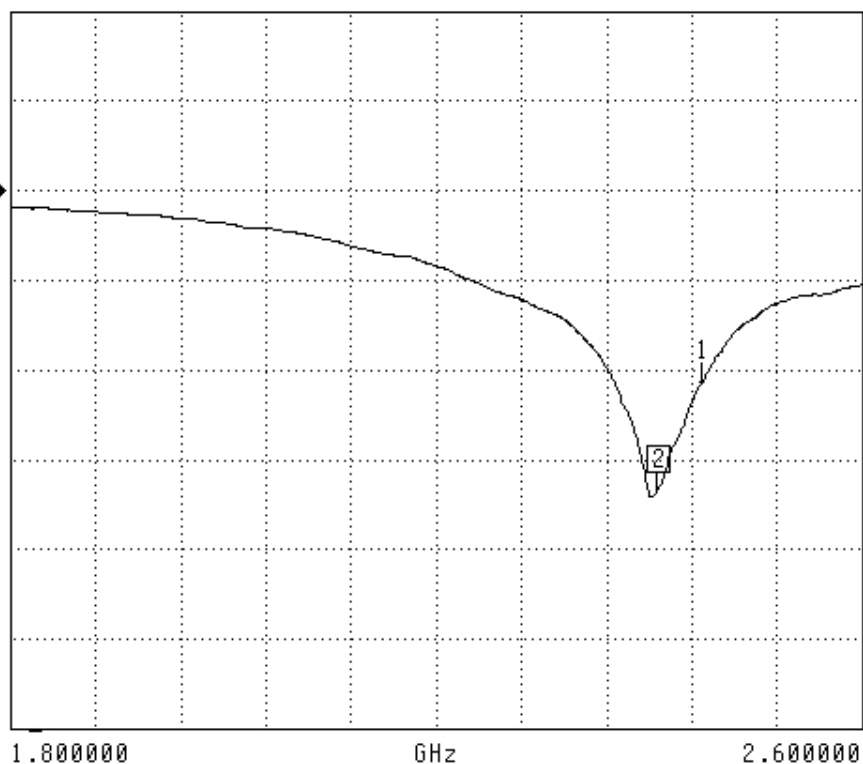
S11 Parameter Return Loss

S11 FORWARD REFLECTION

LOG MAGNITUDE

REF=0.000 dB

10.000 dB/DIV



CH 1 - S11
REFERENCE PLANE
5.1160 mm

MARKER 2
2.408000 GHz
-33.566 dB

MARKER TO MAX
▶ MARKER TO MIN
1 2.450000 GHz
-21.377 dB

MARKER READOUT
FUNCTIONS

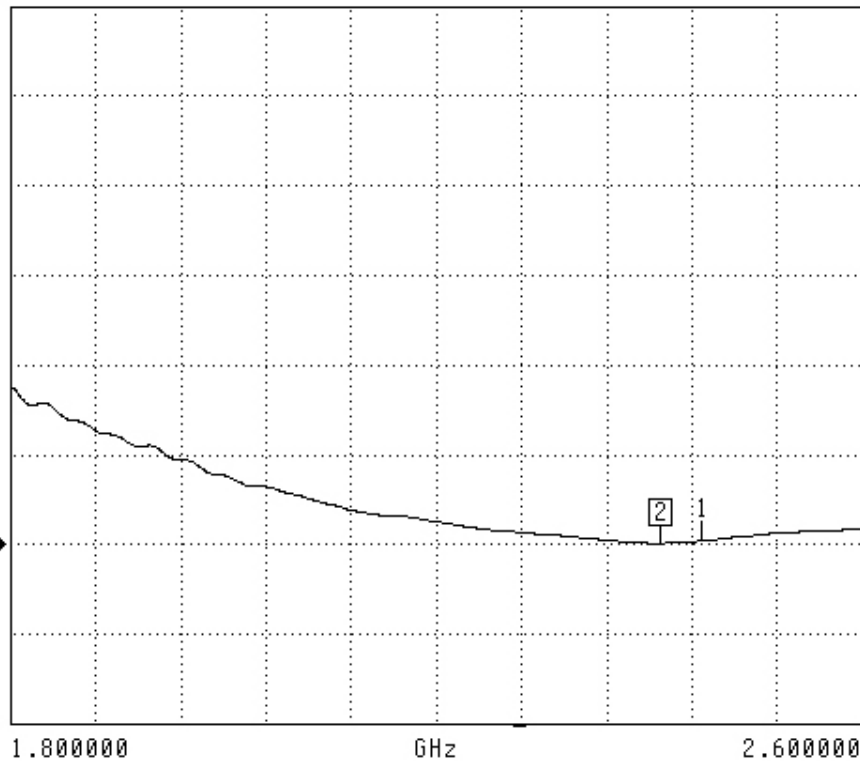
SWR

S11 FORWARD REFLECTION

SWR

REF=1.000 U

5.000 U/DIV



CH 1 - S11
REFERENCE PLANE
5.1160 mm

MARKER 2
2.411000 GHz
1.049 U

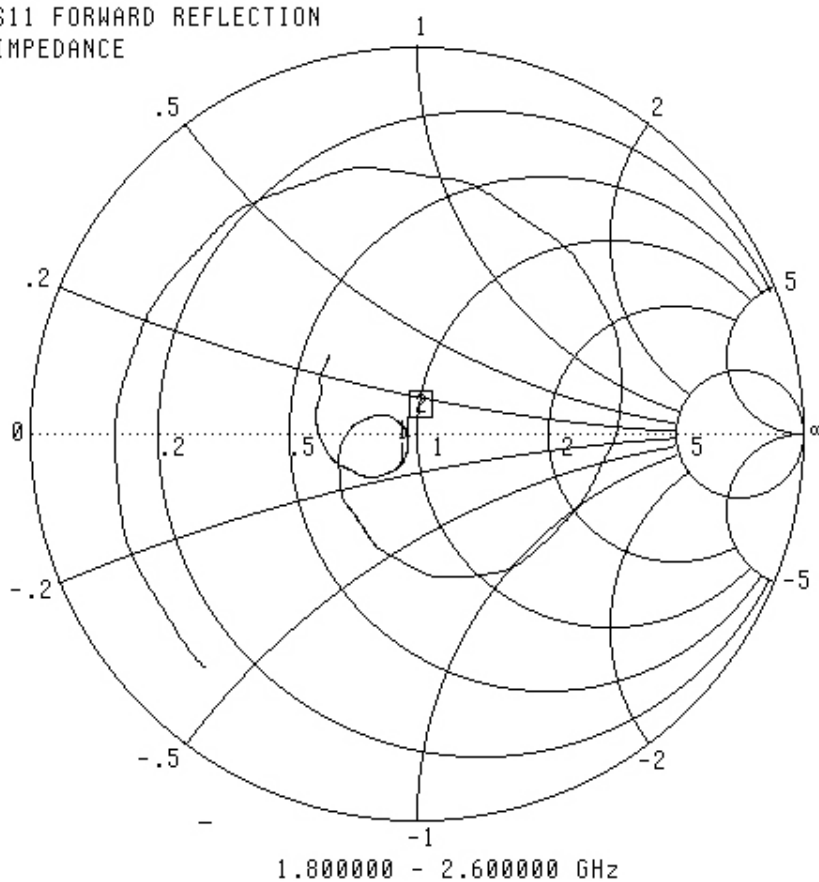
MARKER TO MAX
▶ MARKER TO MIN

1 2.450000 GHz
1.181 U

MARKER READOUT
FUNCTIONS

Smith Chart Dipole Impedance

S11 FORWARD REFLECTION
IMPEDANCE



CH 1 - S11
REFERENCE PLANE
5.1160 mm

MARKER 2
2.411000 GHz
48.080 Ω
-1.171 jΩ

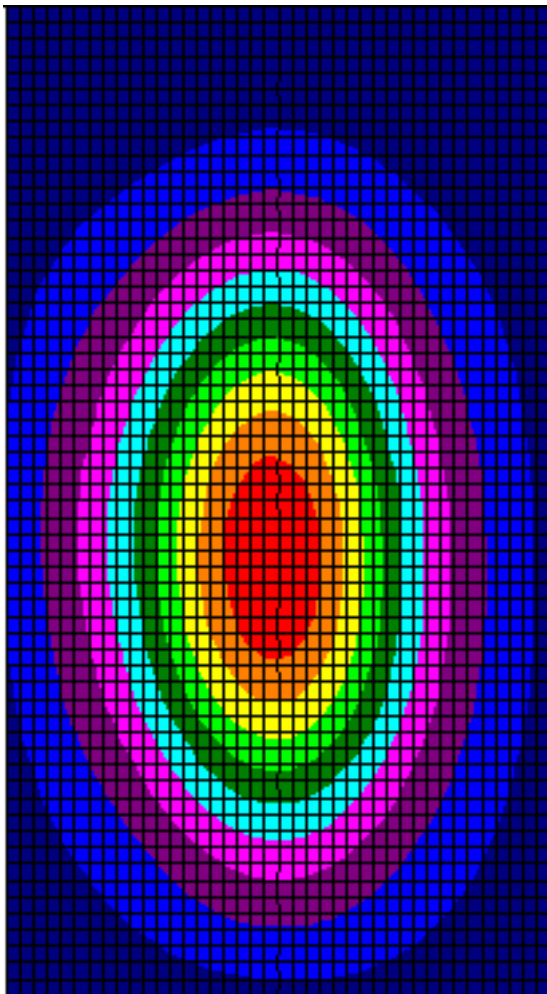
MARKER TO MAX
▶ MARKER TO MIN
1 2.450000 GHz
46.175 Ω
-7.199 jΩ

MARKER READOUT
FUNCTIONS

System Validation Results Using the Electrically Calibrated Dipole

Frequency	1 Gram	10 Gram	Peak Above Feed Point
2.45 GHz	52.45	22.91	102.91

The following Graphic Plot is the splined measurement result for the course scan.





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Test Equipment

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