Appendix A
SAR Plots

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SAR Test Report

Operator : Chen
Validation Date : 19-Apr-2009
Measurement Date : 19-Apr-2009
Starting Time : 19-Apr-2009 10:56:49 AM
End Time : 19-Apr-2009 11:10:54 AM
Scanning Time : 845 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 100 mm
Width : 150 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.112
Power Drift-Finish: 0.117
Power Drift (%) : 4.464

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

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 19-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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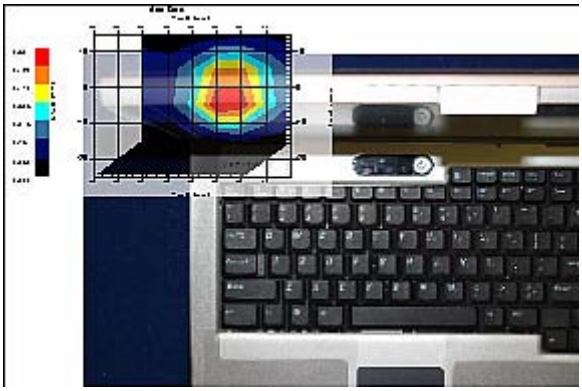
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.458 W/kg
Zoom Scan Peak SAR : 0.900

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161
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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	13.4	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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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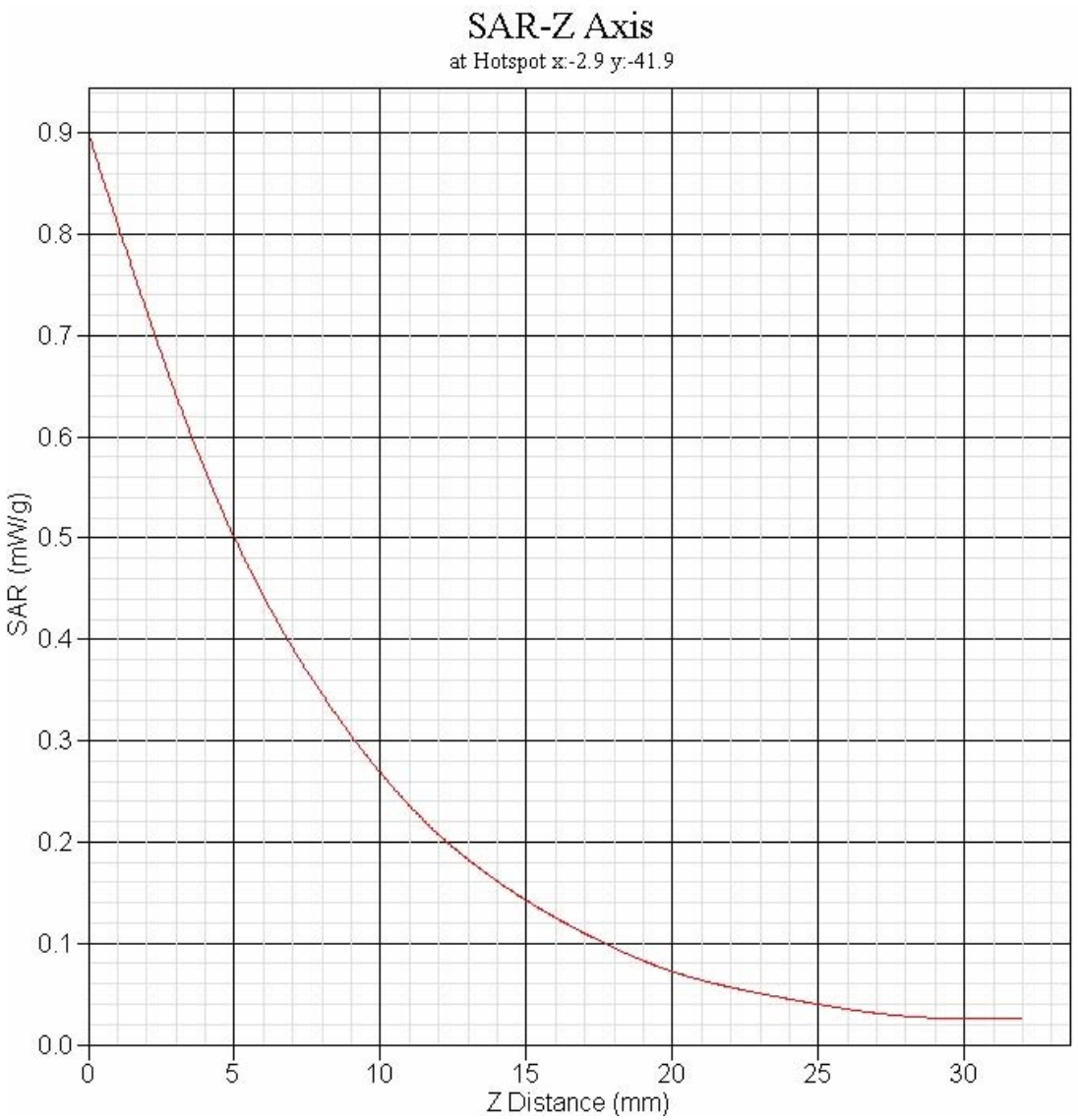

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SAR Test Report

Operator : Chen
Validation Date : 19-Apr-2009
Measurement Date : 19-Apr-2009
Starting Time : 19-Apr-2009 11:57:48 AM
End Time : 19-Apr-2009 12:11:47 PM
Scanning Time : 839 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 100 mm
Width : 150 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.100
Power Drift-Finish: 0.099
Power Drift (%) : -1.000

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

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 19-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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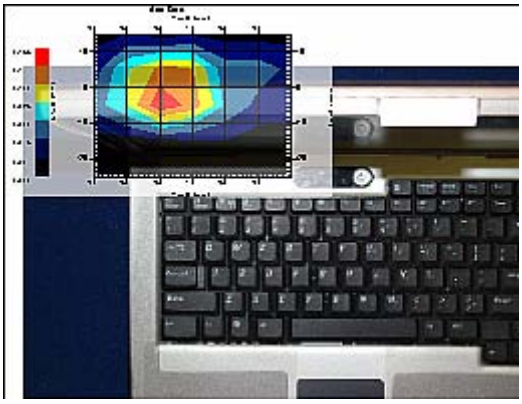
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.125 W/kg
Zoom Scan Peak SAR : 0.270

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161
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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	-57.1	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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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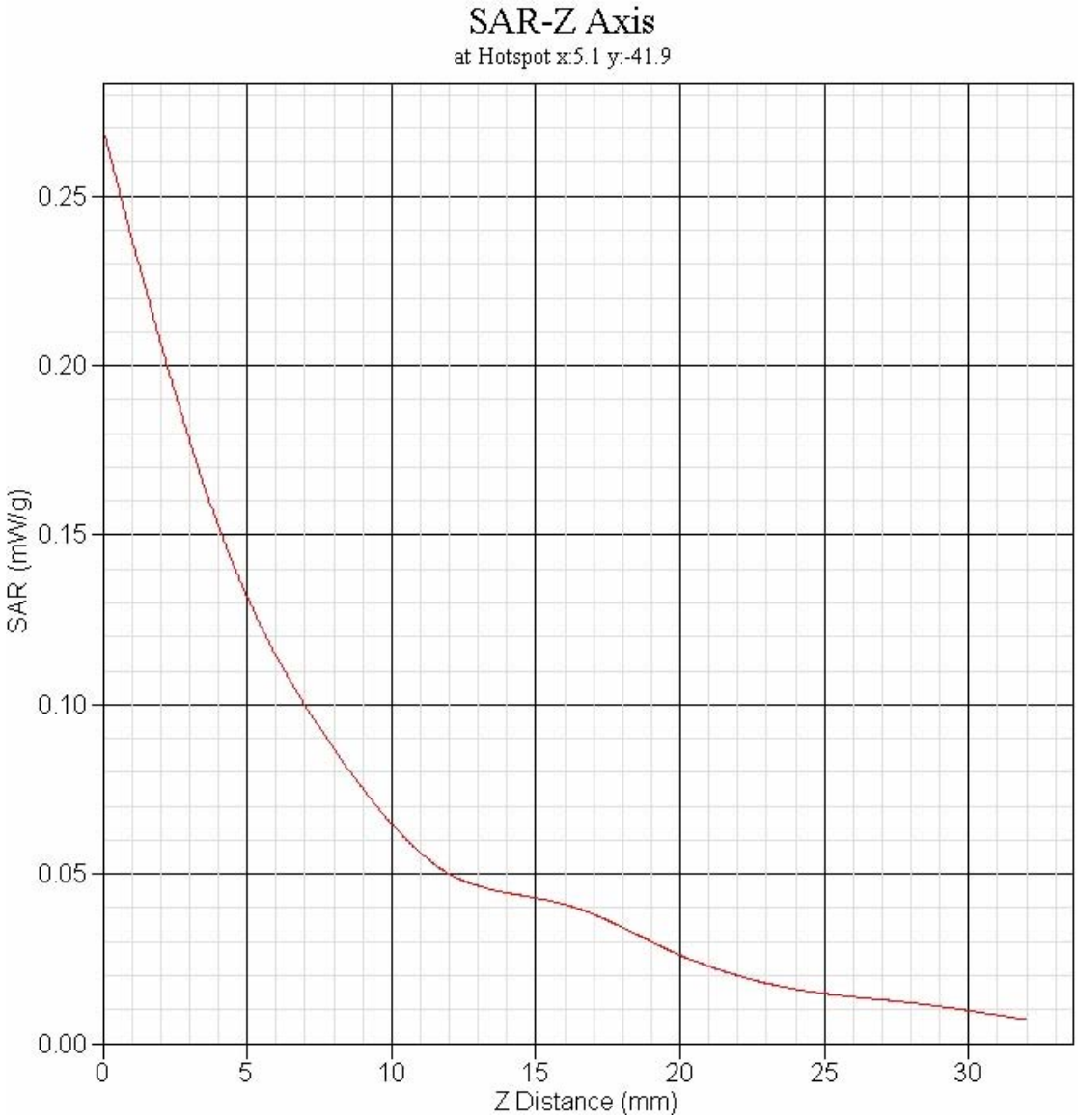

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SAR Test Report

Operator : Chen
Validation Date : 19-Apr-2009
Measurement Date : 19-Apr-2009
Starting Time : 19-Apr-2009 11:40:54 AM
End Time : 19-Apr-2009 11:54:53 AM
Scanning Time : 839 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 100 mm
Width : 150 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.122
Power Drift-Finish: 0.125
Power Drift (%) : 3.107

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

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 19-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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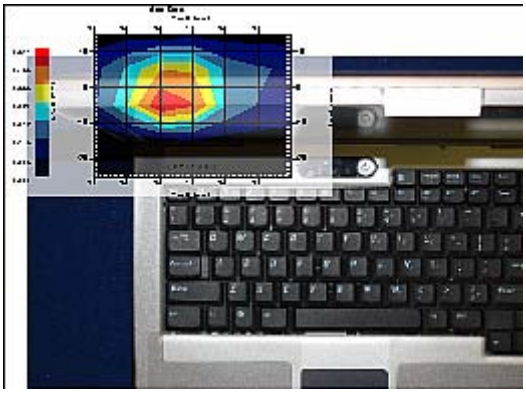
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.431 W/kg
Zoom Scan Peak SAR : 0.880

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161
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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	3.1	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
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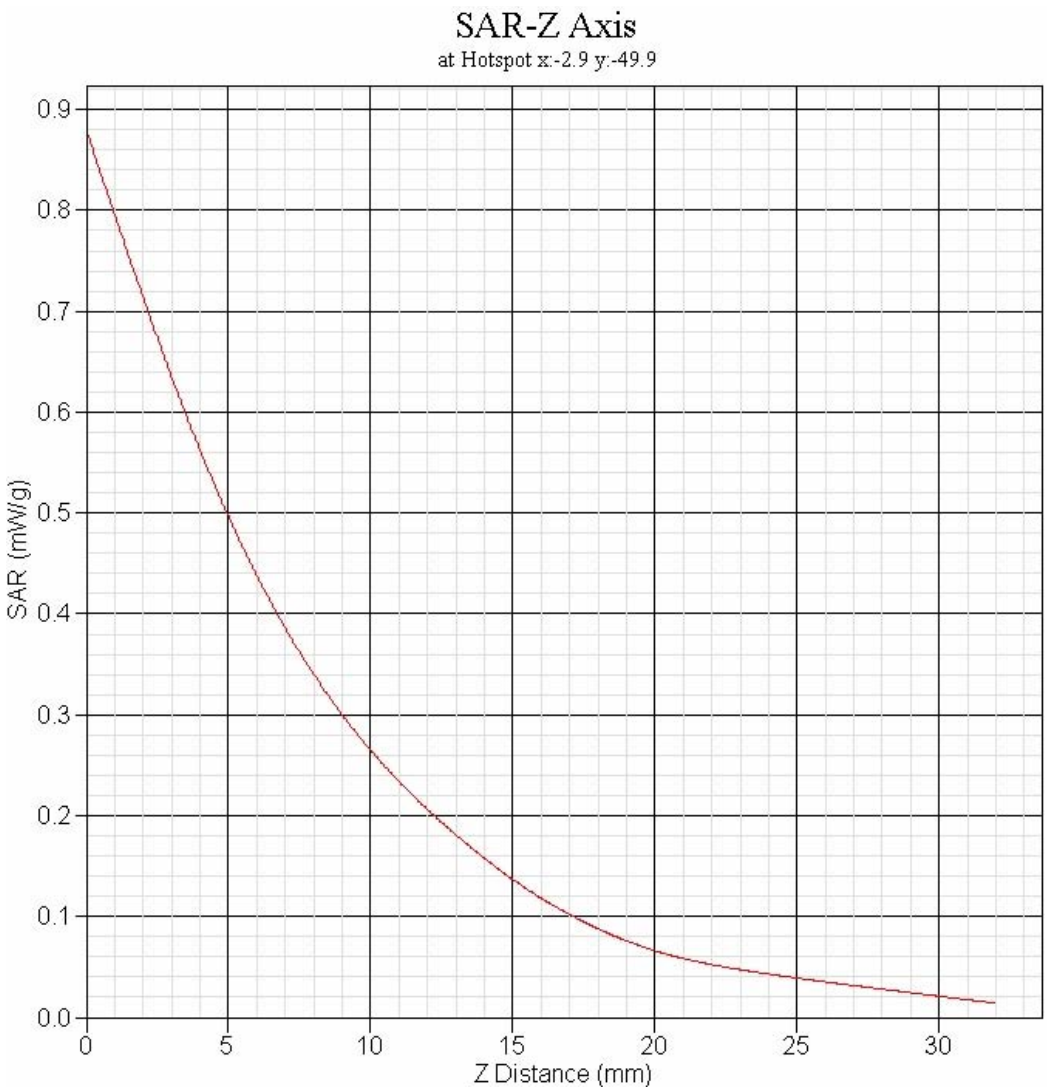

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SAR Test Report

Operator : Chen
Validation Date : 19-Apr-2009
Measurement Date : 19-Apr-2009
Starting Time : 19-Apr-2009 12:13:55 PM
End Time : 19-Apr-2009 12:27:54 PM
Scanning Time : 839 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 100 mm
Width : 150 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.100
Power Drift-Finish: 0.098
Power Drift (%) : -2.000

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

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 19-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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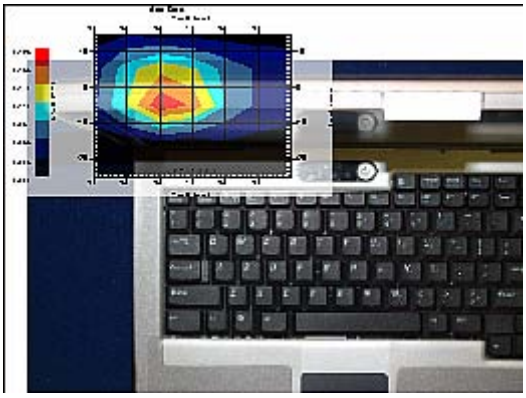
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.156 W/kg
Zoom Scan Peak SAR : 0.300

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
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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	-60.2	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
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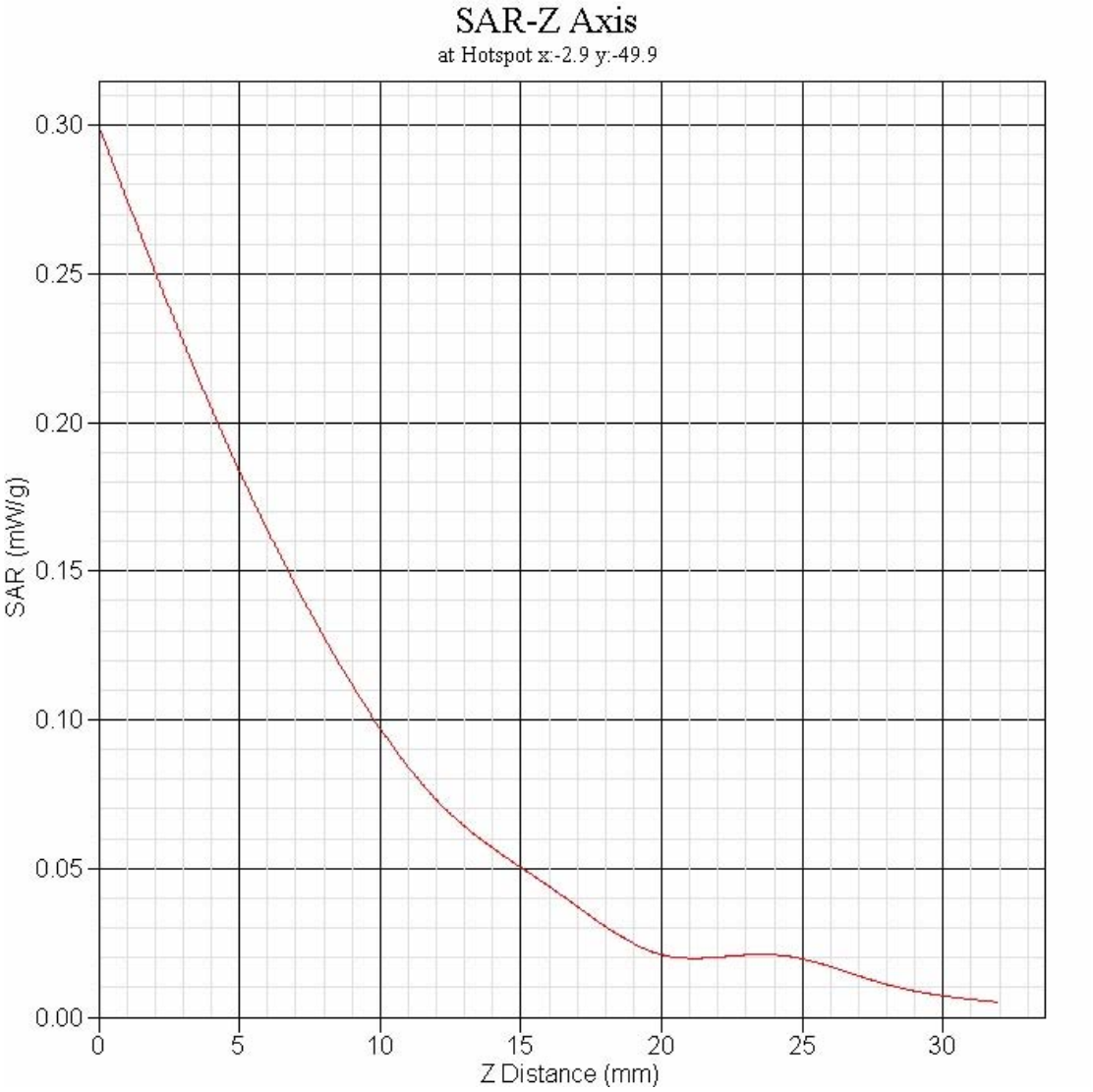

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SAR Test Report

Operator : Chen
Validation Date : 19-Apr-2009
Measurement Date : 19-Apr-2009
Starting Time : 19-Apr-2009 11:20:26 AM
End Time : 19-Apr-2009 11:34:27 AM
Scanning Time : 841 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 100 mm
Width : 150 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.115
Power Drift-Finish: 0.110
Power Drift (%) : -4.348

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

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 19-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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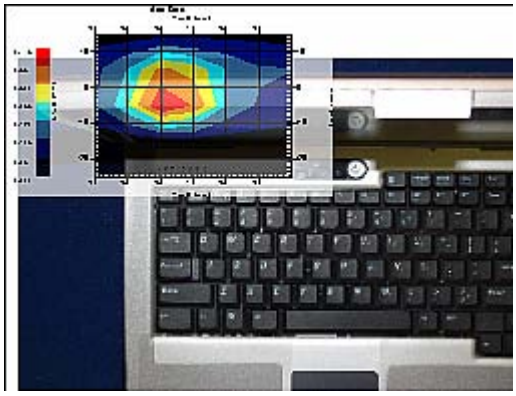
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.354 W/kg
Zoom Scan Peak SAR : 0.720

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
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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	-11.3	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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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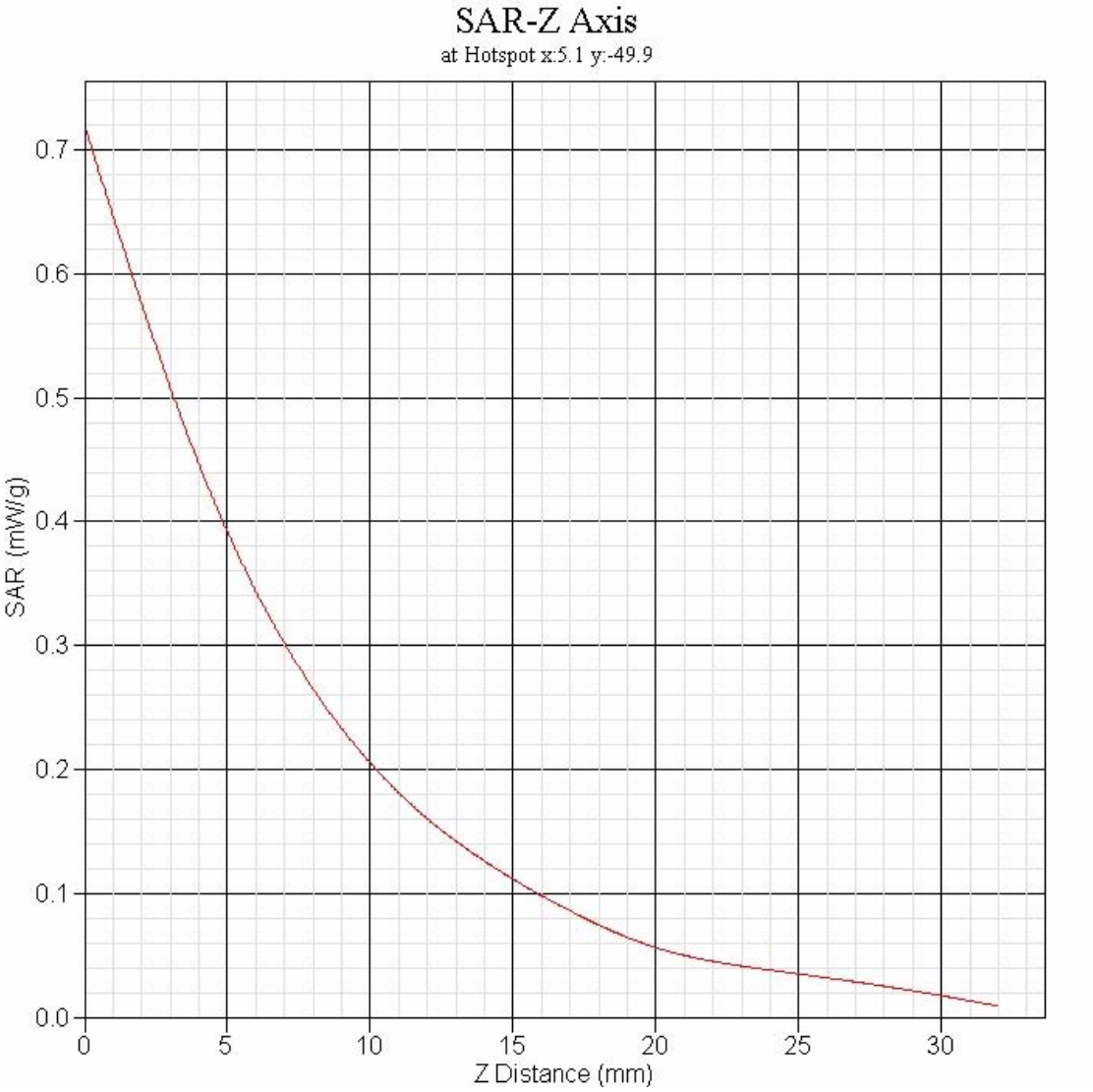

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SAR Test Report

Operator : Chen
Validation Date : 19-Apr-2009
Measurement Date : 19-Apr-2009
Starting Time : 19-Apr-2009 01:21:20 PM
End Time : 19-Apr-2009 01:35:19 PM
Scanning Time : 839 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 100 mm
Width : 150 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.100
Power Drift-Finish: 0.097
Power Drift (%) : -3.000

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

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 19-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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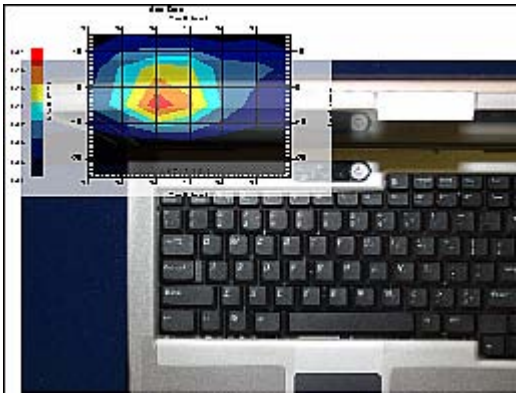
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.154 W/kg
Zoom Scan Peak SAR : 0.310

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161
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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	-61.5	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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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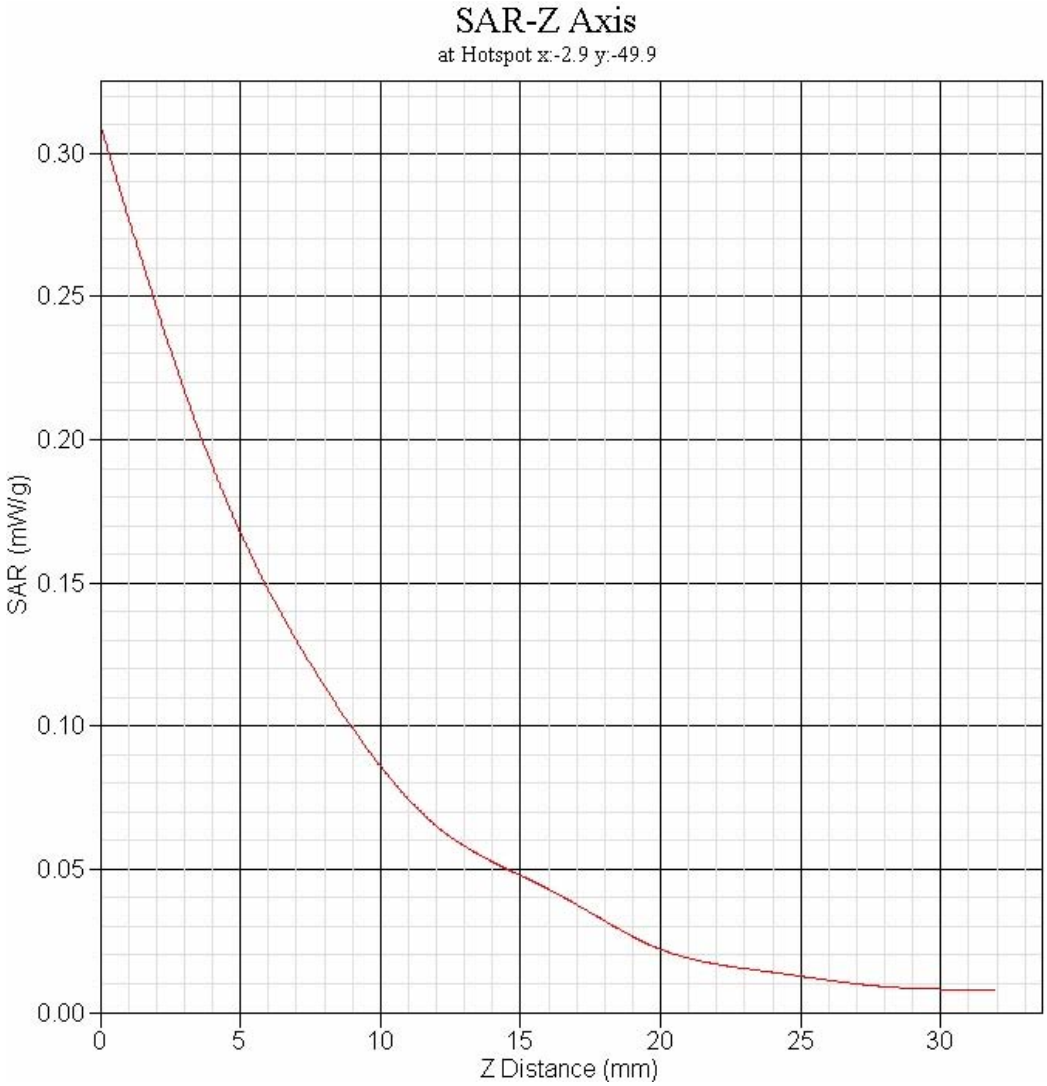

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Ottawa ON Canada K2R 1E6
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info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161
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SAR Test Report

Operator : Chen
Validation Date : 20-Apr-2009
Measurement Date : 20-Apr-2009
Starting Time : 20-Apr-2009 01:45:13 PM
End Time : 20-Apr-2009 01:58:18 PM
Scanning Time : 785 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 150 mm
Width : 120 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.100
Power Drift-Finish: 0.098
Power Drift (%) : -2.503

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

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 20-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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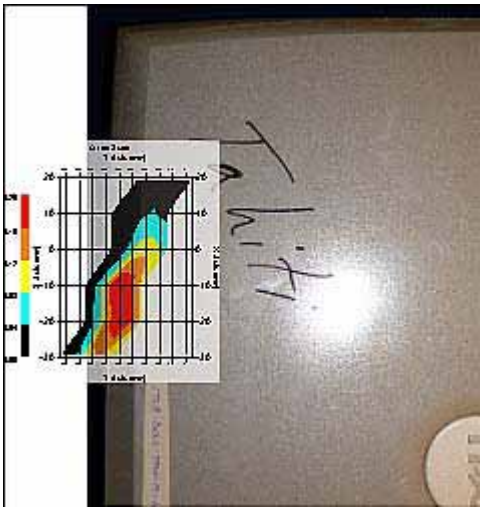
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.185 W/kg
Zoom Scan Peak SAR : 0.360

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Ottawa ON Canada K2R 1E6
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info@aprel.com
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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	-92.5	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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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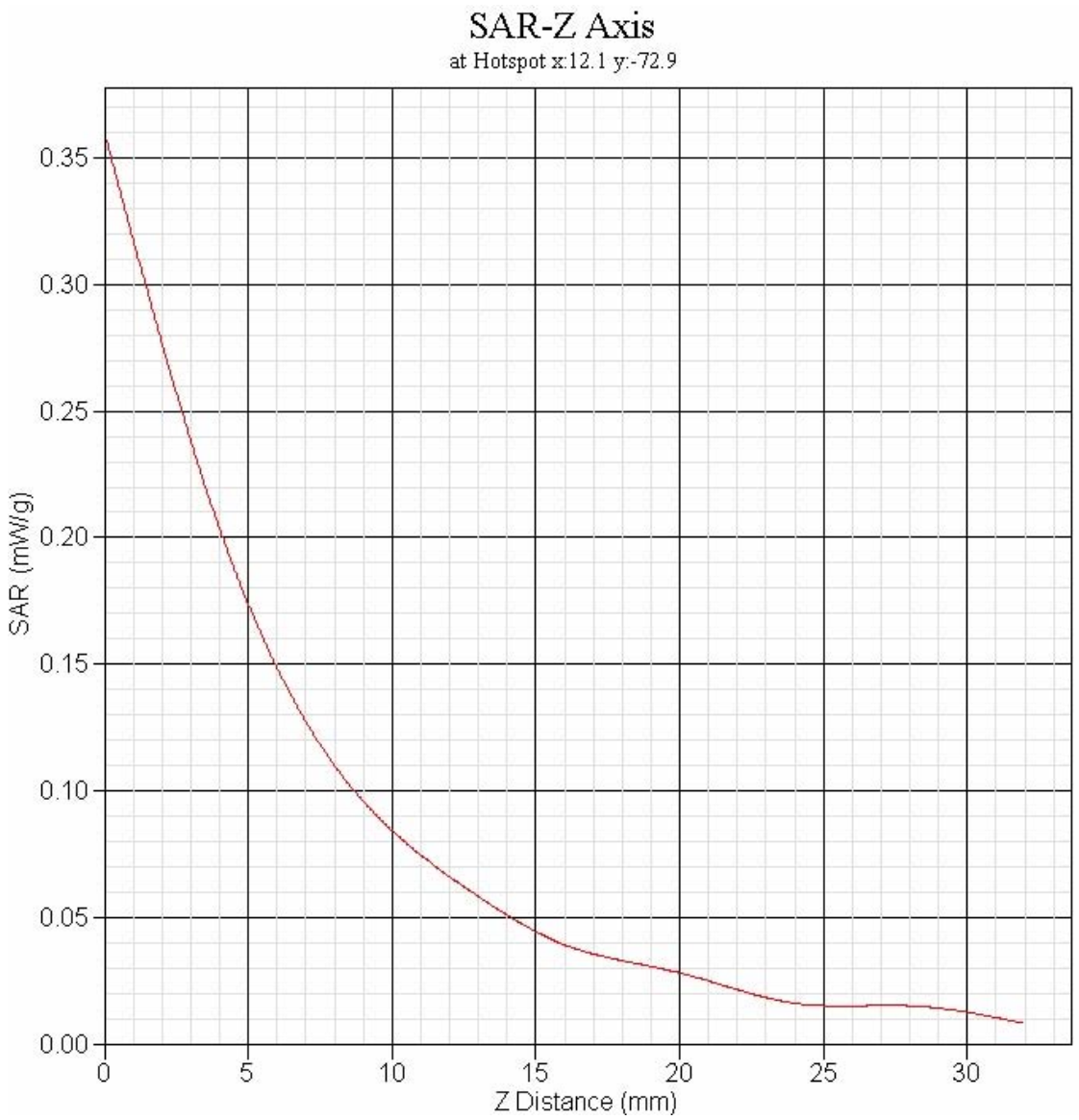

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SAR Test Report

Operator : Chen
Validation Date : 20-Apr-2009
Measurement Date : 20-Apr-2009
Starting Time : 20-Apr-2009 02:20:33 PM
End Time : 20-Apr-2009 02:33:38 PM
Scanning Time : 785 secs

Product Data
Device Name : Dell_Tahiti_Hitachi
Serial No. : N/A
Type : Other
Model : Latitude D510
Frequency : 2450.00 MHz
Max. Transmit Pwr : 0.05 W
Drift Time : 0 min(s)
Length : 150 mm
Width : 120 mm
Depth : 30.4 mm
Antenna Type : Internal
Power Drift-Start : 0.100
Power Drift-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 : User Define Data

Tissue Data
Type : BODY
Serial No. : 2450
Frequency : 2450 MHz
Calibration Date : 20-Apr-2005
Temperature : 21 °C
Ambient Temp. : 22 °C
Humidity : 50 RH%
Epsilon : 54.12 F/m
Sigma : 2.01 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 $\mu V/(V/m)^2$
Compression Point: 95 mV
Offset : 1.56

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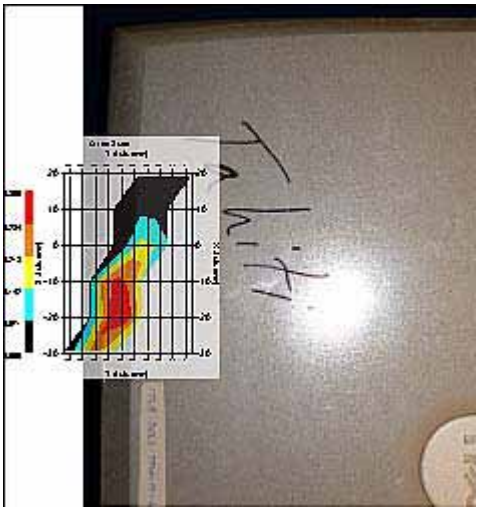
Measurement Data
Crest Factor : 1
Scan Type : Complete
Tissue Temp. : 21 °C
Ambient Temp. : 22°C
Set-up Date : 19-Apr-2009
Set-up Time : 10:54:11 AM

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



1 gram SAR value : 0.328 W/kg
Zoom Scan Peak SAR : 0.670

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
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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	-95.9	rectangular	√3	1	1	0.0	0.0
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.)	0.2	rectangular	√3	0.7	0.5	0.1	0.1
Liquid Permittivity(target)	2.0	rectangular	√3	0.6	0.5	0.7	0.6
Liquid Permittivity(meas.)	5.4	rectangular	√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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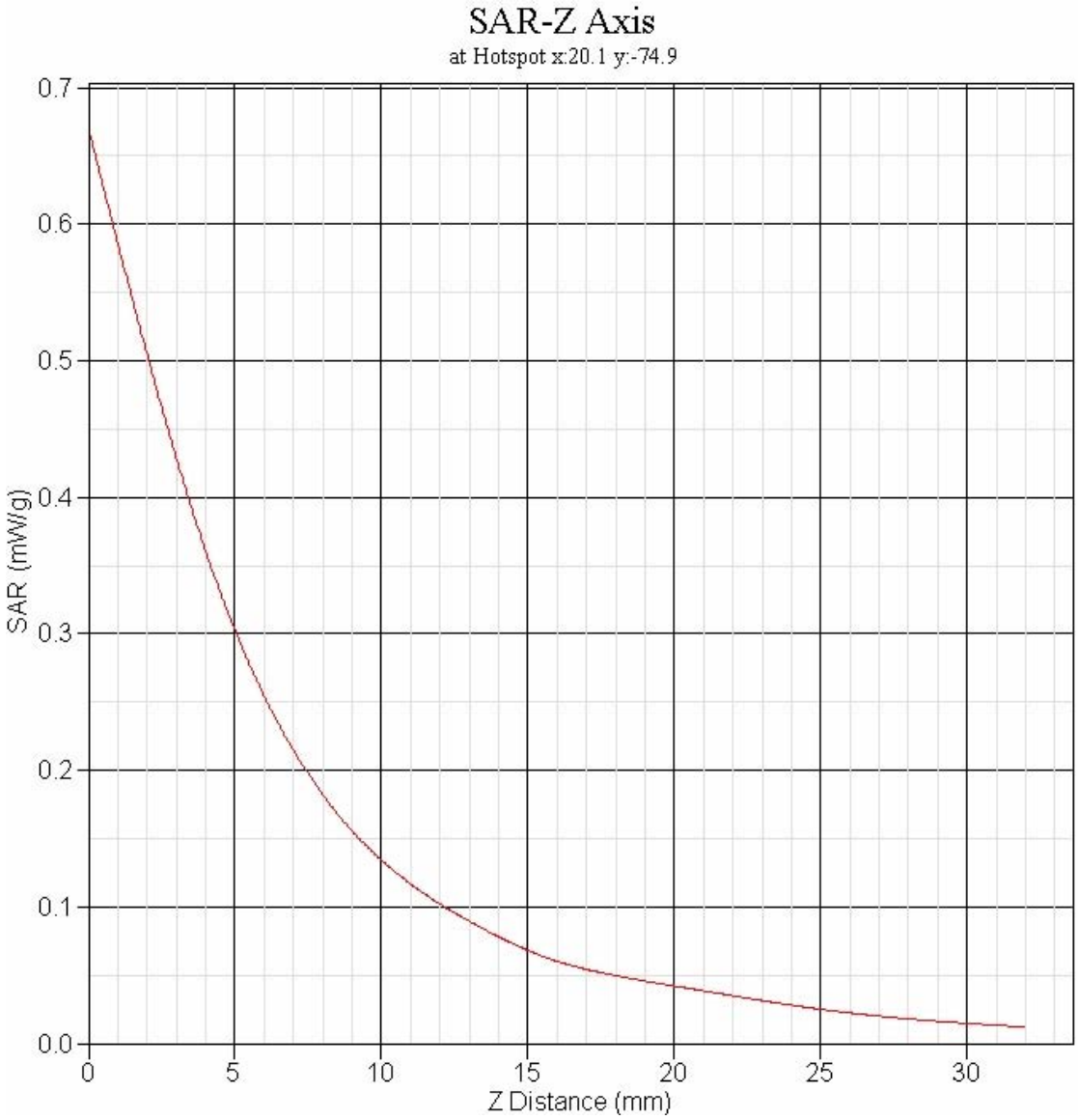

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Appendix B
Probe Calibration Certificate

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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

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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 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 $\mu V/(V/m)^2$
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

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Frequency: 2450 MHz

Epsilon: 50.6 (+/-5%) **Sigma:** 2.01 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)

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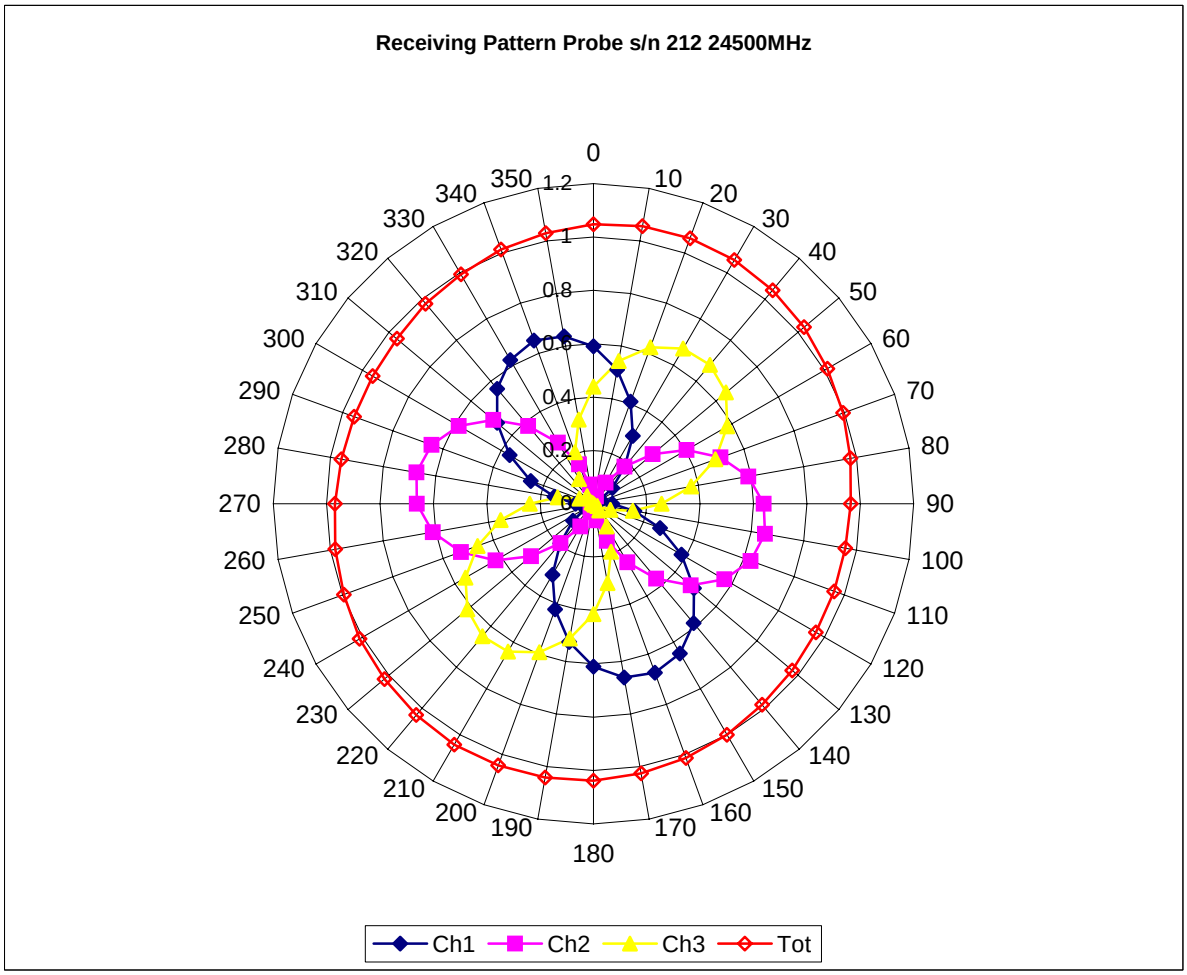

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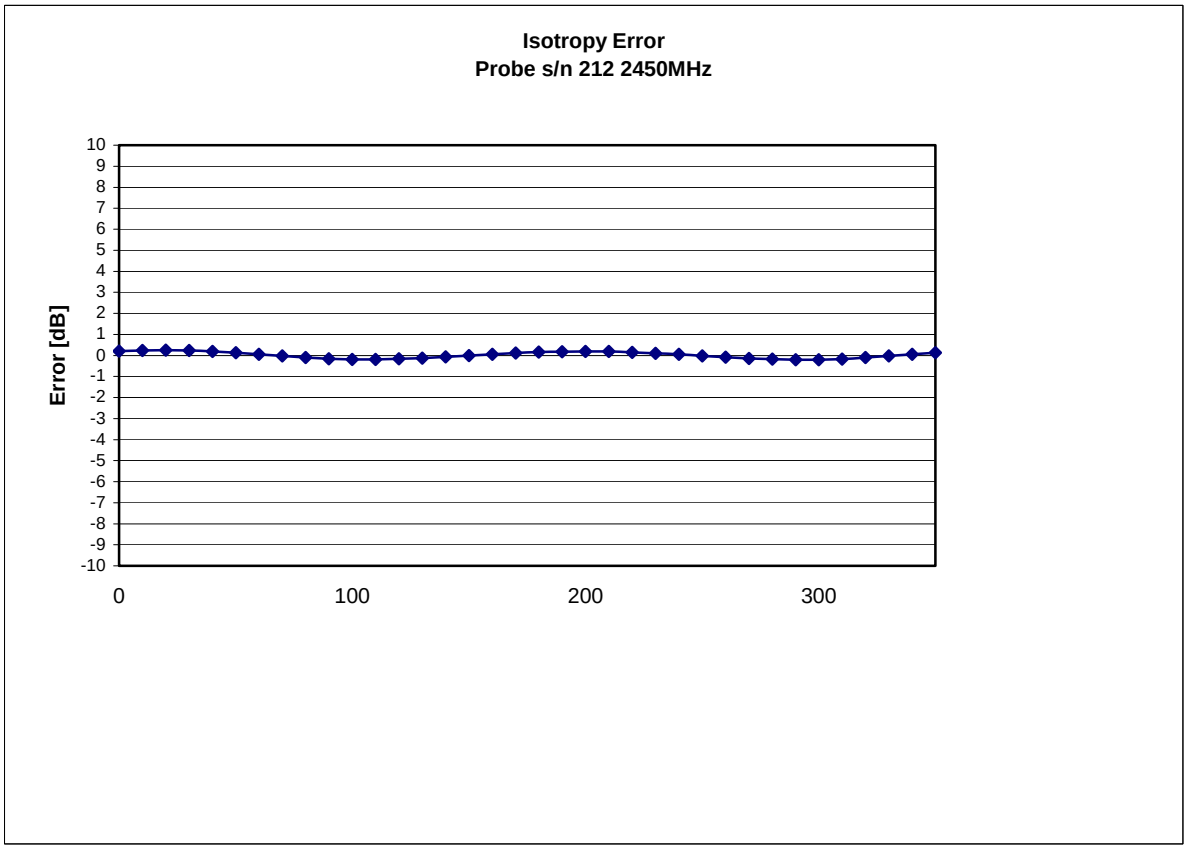
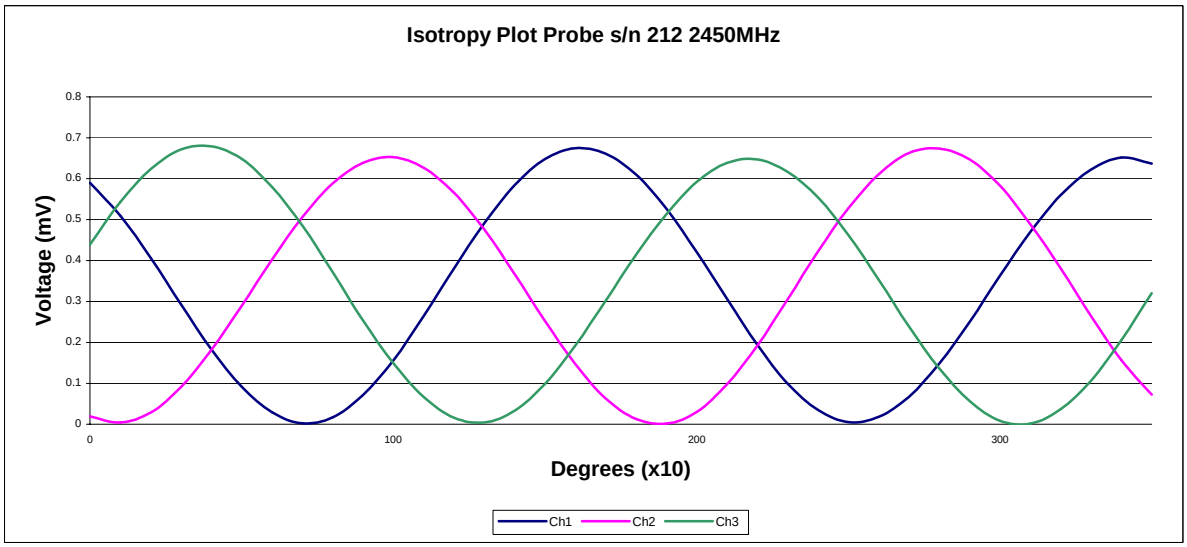
Isotropy Error 2450 MHz (Air)





Isotropicity: 0.10 dB

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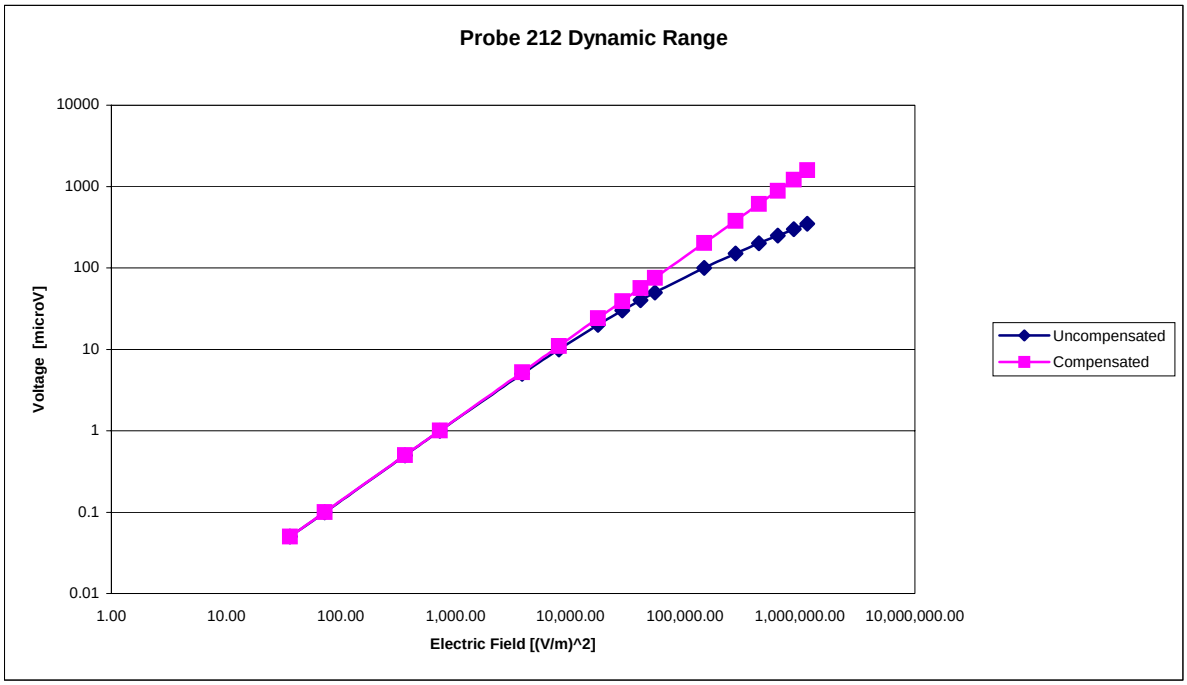
Dynamic Range



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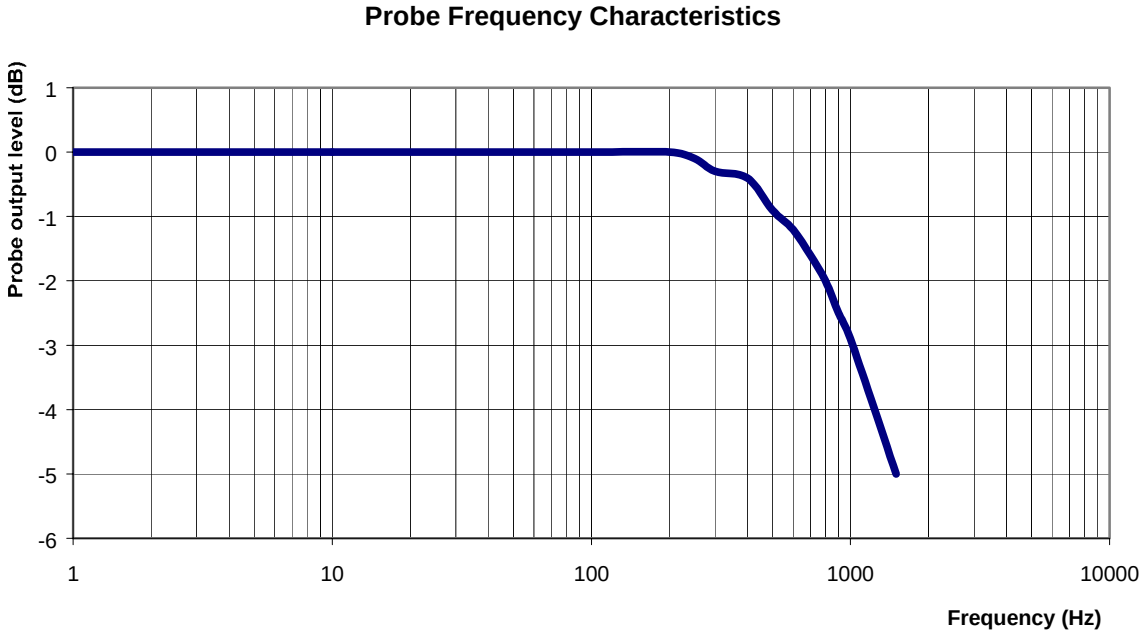
Video Bandwidth



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

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Conversion Factor Uncertainty Assessment

Frequency: 2450MHz

Epsilon: 50.6 (+/-5%) **Sigma:** 2.01 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 MΩ.

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

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.

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

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Calibration Results Summary

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

Mechanical Dimensions

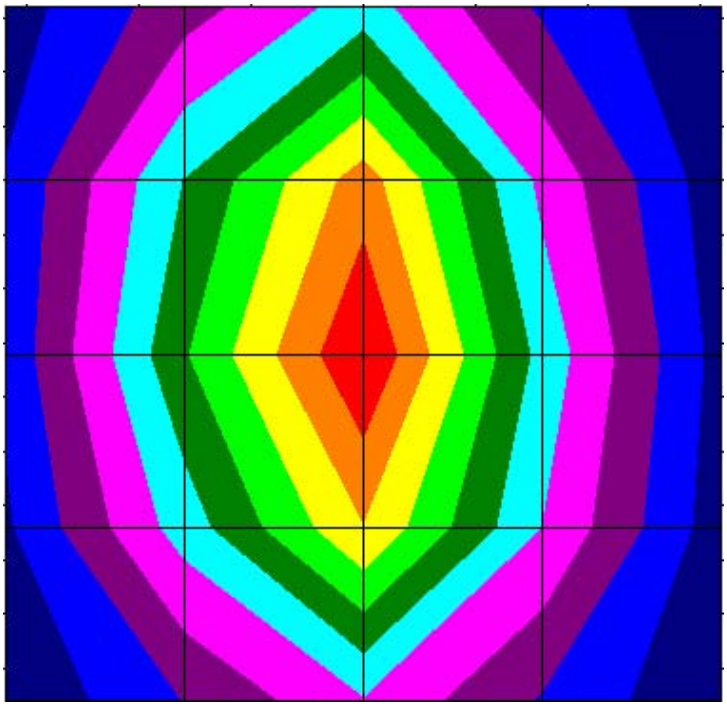
Length: 51.7 mm
Height: 30.8 mm

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



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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

51 Spectrum Way
Ottawa ON Canada K2R 1E6
www.aprel.com
info@aprel.com
Phone (613) 820-2730
Fax (613) 820-4161
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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, ε_r	39.2
Conductivity, σ [S/m]	1.82
Tissue Conversion Factor,	4.61

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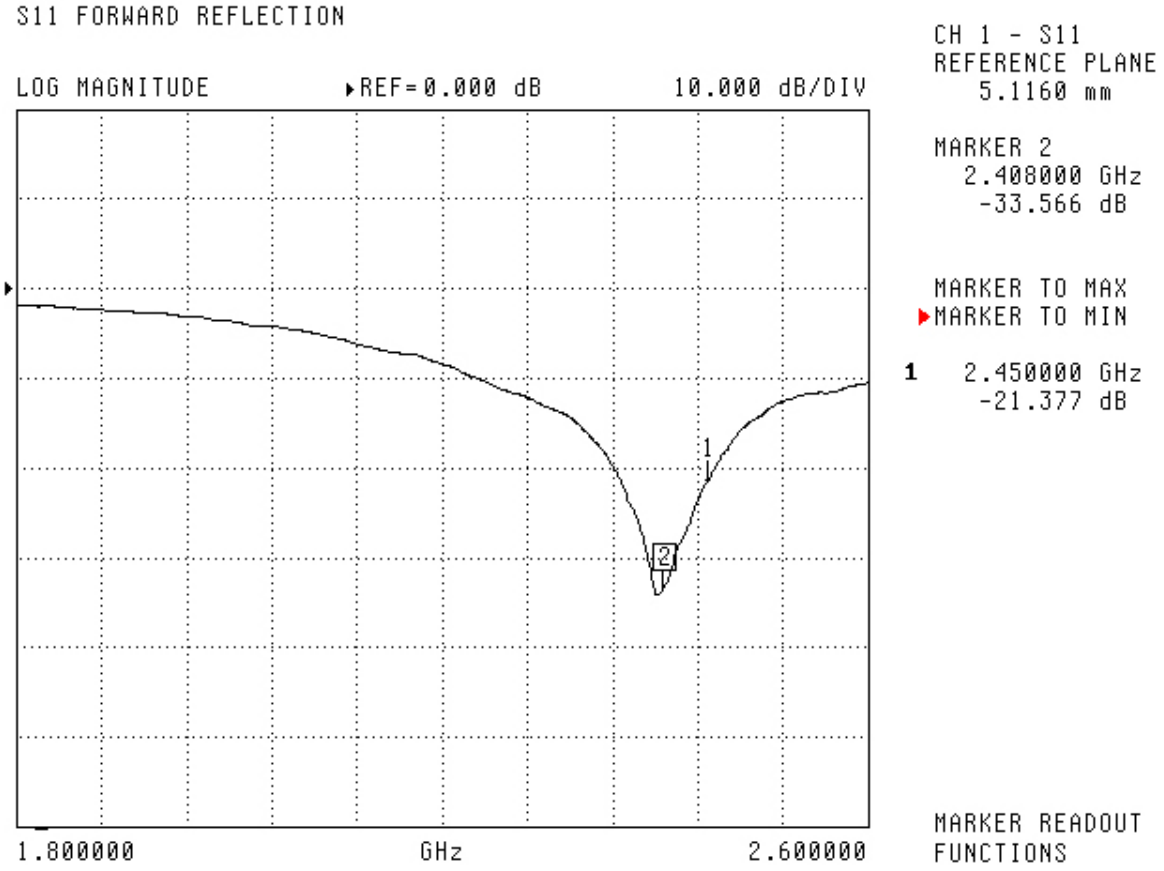
Electrical Calibration

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

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

S11 Parameter Return Loss



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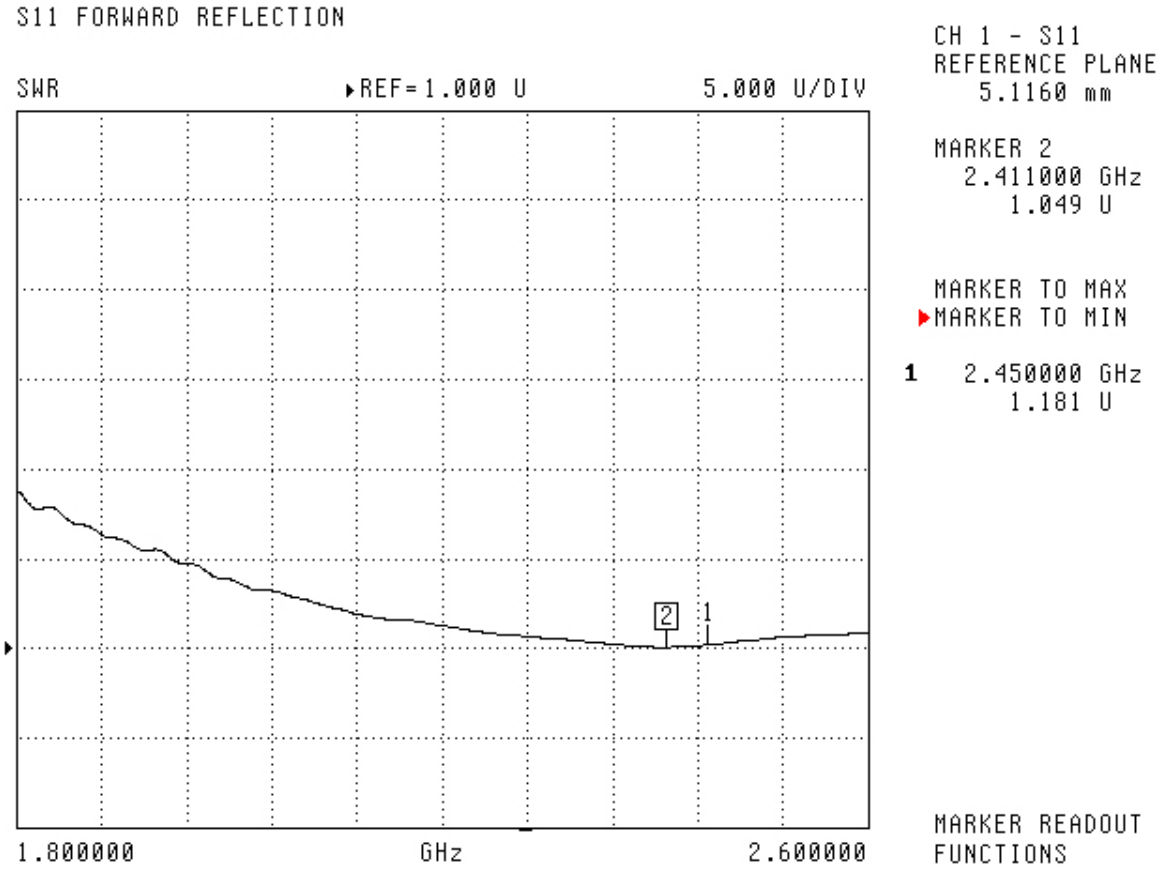
SWR



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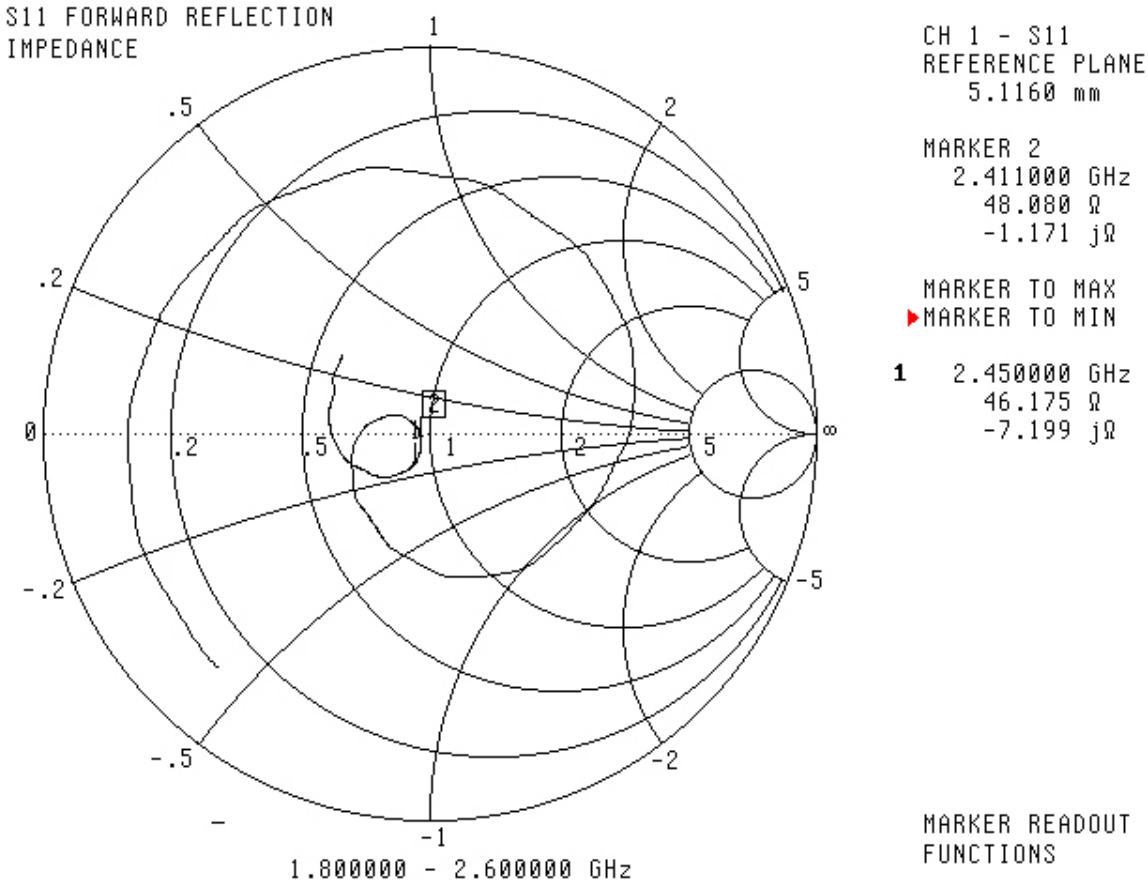
Smith Chart Dipole Impedance



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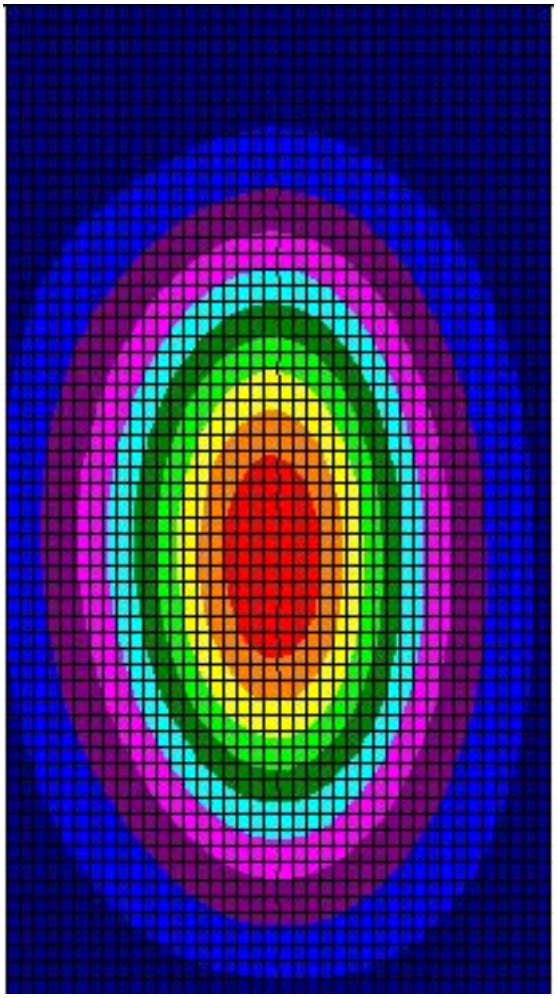
System Validation Results Using the Electrically Calibrated Dipole

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.



51 Spectrum Way
Ottawa ON Canada K2R 1E6
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www.aprel.com
info@aprel.com
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