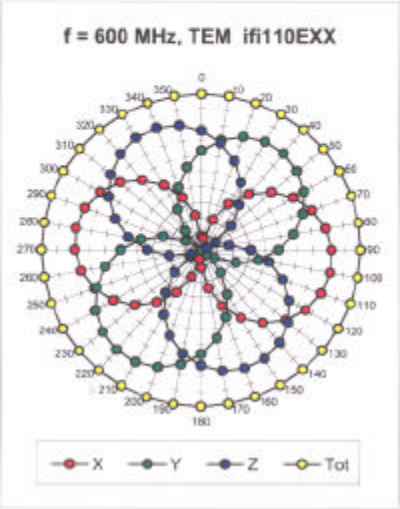
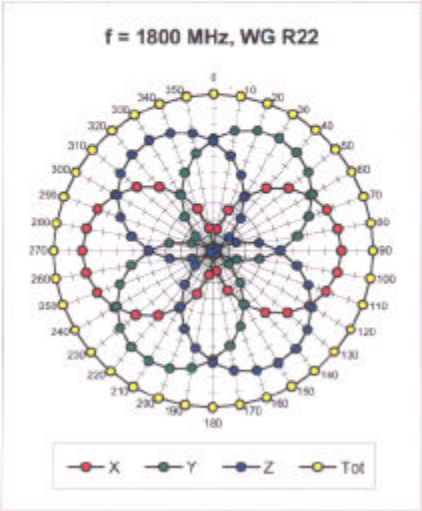
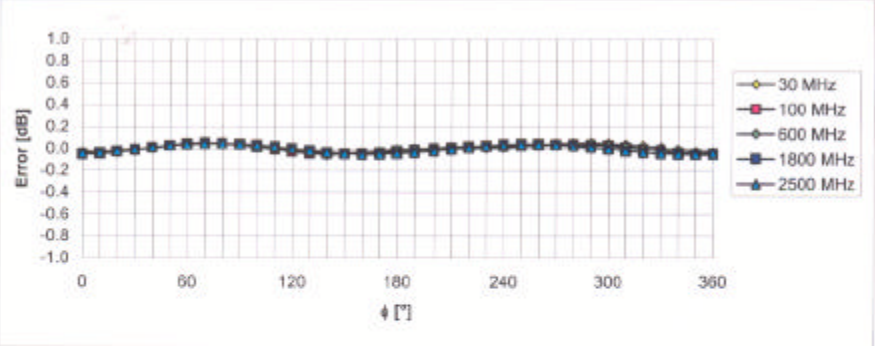
ET3DV6 SN:1604 March 18, 2005

Receiving Pattern (ϕ), ϑ = 0°





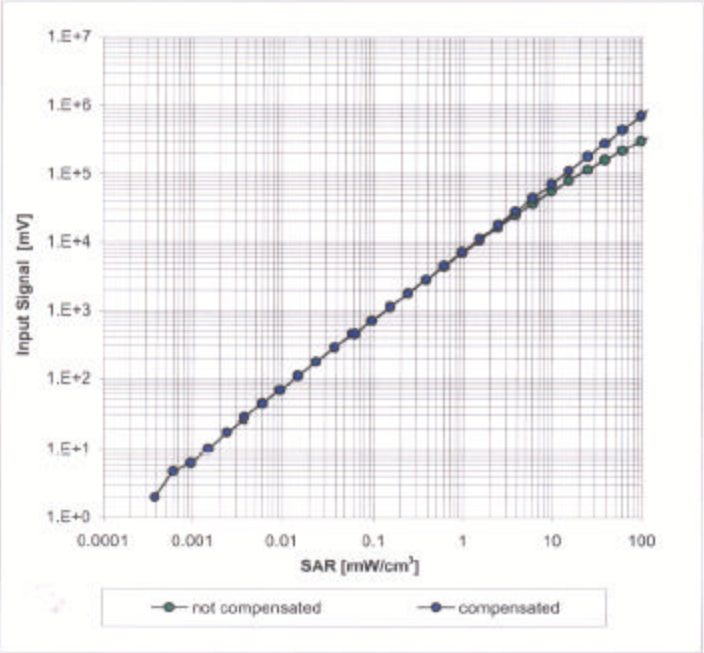


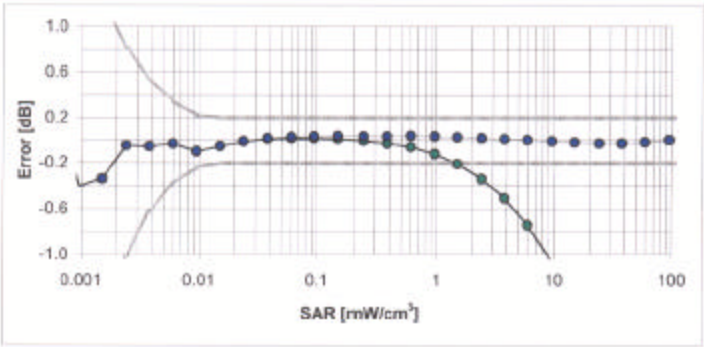
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ET3DV6 SN:1604 March 18, 2005

Dynamic Range f(SAR_{head})

(Waveguide R22, f = 1800 MHz)



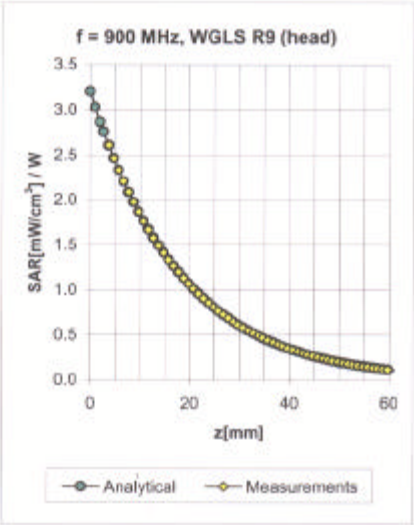


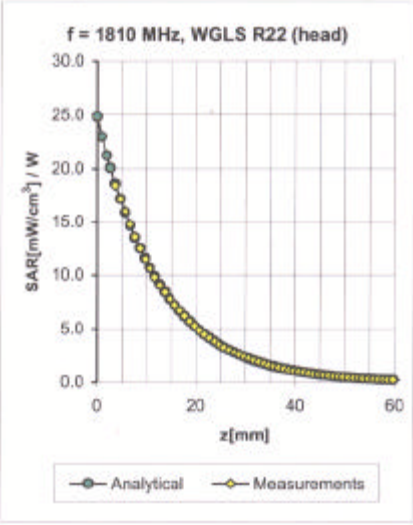
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Certificate No: ET3-1604_Mar05 Page 7 of 9

ET3DV6 SN:1604 **March 18, 2005**

Conversion Factor Assessment





f [MHz]	Validity [MHz][C]	TSL	Permittivity	Conductivity	Alpha	Depth	ConvF Uncertainty
300	± 50 / ± 100	Head	45.3 ± 5%	0.87 ± 5%	0.10	1.14	8.44 ± 13.3% (k=2)
450	± 50 / ± 100	Head	43.5 ± 5%	0.87 ± 5%	0.10	1.10	8.10 ± 13.3% (k=2)
900	± 50 / ± 100	Head	41.5 ± 5%	0.97 ± 5%	0.63	1.78	6.62 ± 11.0% (k=2)
1810	± 50 / ± 100	Head	40.0 ± 5%	1.40 ± 5%	0.58	2.40	5.19 ± 11.0% (k=2)
2450	± 50 / ± 100	Head	39.2 ± 5%	1.80 ± 5%	0.66	2.25	4.58 ± 11.8% (k=2)
450	± 50 / ± 100	Body	56.7 ± 5%	0.94 ± 5%	0.06	1.40	7.54 ± 13.3% (k=2)
900	± 50 / ± 100	Body	55.0 ± 5%	1.05 ± 5%	0.53	2.02	6.27 ± 11.0% (k=2)
1810	± 50 / ± 100	Body	53.3 ± 5%	1.52 ± 5%	0.55	2.75	4.79 ± 11.0% (k=2)
2450	± 50 / ± 100	Body	52.7 ± 5%	1.95 ± 5%	0.70	2.13	4.24 ± 11.8% (k=2)

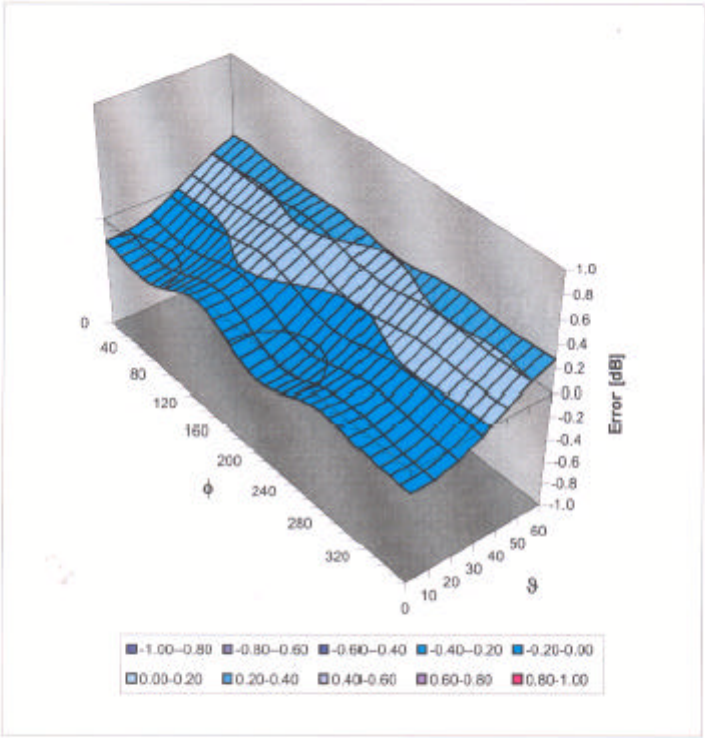
[C] The validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2). The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Certificate No: ET3-1604_Mar05 Page 8 of 9

ET3DV6 SN:1604 March 18, 2005

Deviation from Isotropy in HSL

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: ET3-1604_Mar05 Page 9 of 9

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

s p e a g

Additional Conversion Factors

for Dosimetric E-Field Probe

Type:	**ET3DV6**
Serial Number:	**1604**
Place of Assessment:	**Zurich**
Date of Assessment:	**March 21, 2005**
Probe Calibration Date:	**March 18, 2005**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 900 MHz or at 1800 MHz.

Assessed by:

Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

s p e a g

Dosimetric E-Field Probe ET3DV6 SN:1604

Conversion factor (± standard deviation)

f = 150 MHz	ConvF	**9.0 ± 10%**	ε_r = 52.3 ± 5% σ = 0.76 ± 5% mho/m (head tissue)
f = 150 MHz	ConvF	**8.6 ± 10%**	ε_r = 61.9 ± 5% σ = 0.80 ± 5% mho/m (body tissue)
f = 300 MHz	ConvF	**7.9 ± 9%**	ε_r = 58.2 ± 5% σ = 0.92 ± 5% mho/m (body tissue)

Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also Section 4.7 of the DASY4 Manual.

APPENDIX C – DIPOLE CALIBRATION CERTIFICATES

NCL CALIBRATION LABORATORIES

Calibration File No: DC-266
Project Number: BACL-CAL2450-3986

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.

BACL Validation Dipole

Manufacturer: APREL Laboratories
Part number: D-2450-S-1
Frequency: 2450 MHz
Serial No: BCL-141

Customer: Bay Area Compliance Laboratory

Calibrated: 4th March 2005
Released on: 4th March 2005

Released By: _____

NCL CALIBRATION LABORATORIES
51 SPECTRUM WAY
NEPEAN, ONTARIO
CANADA K2R 1E6
Division of APREL Lab.
TEL: (613) 820-4988
FAX: (613) 820-4182

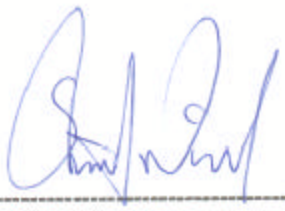
NCL Calibration Laboratories
Division of APREL Laboratories.

Conditions

Dipole BCL-141 was received from customer in good condition for re-calibration, SMA connector required cleaning prior to calibration.

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

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



Stuart Nicol
Director Product Development

D. Brooks
Member of Engineering Staff
(Calibration Engineer)

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

NCL Calibration Laboratories
Division of APREL Laboratories.

Calibration Results Summary

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

Mechanical Dimensions

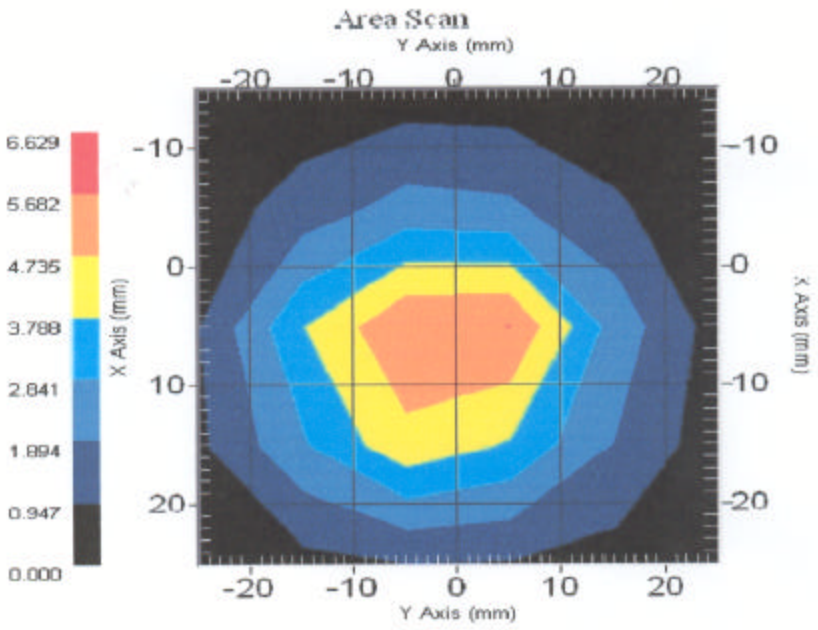
Length: 51.5 mm
Height: 30.4 mm

Electrical Specification

SWR: 1.09 U to 1.38 U
Return Loss: -27.5 dB to –15.9 dB
Impedance: 47.9 Ω to 60.8 Ω

System Validation Results

Frequency	1 Gram	10 Gram	Peak
2450 MHz	5.31	2.44	10.18



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Introduction

This Calibration Report has been produced in line with the SSI Dipole Calibration Procedure SSI-TP-018-ALSAS. The results contained within this report are for Validation Dipole BCL-141. The calibration routine consisted of a three-step process. Step 1 was a mechanical verification of the dipole to ensure that it meets the mechanical specifications. Step 2 was an Electrical Calibration for the Validation Dipole, where the SWR, Impedance, and the Return loss were assessed. Step 3 involved a System Validation using the ALSAS-10U, along with APREL E-020 130 MHz to 26 GHz E-Field Probe Serial Number 212.

References

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

Conditions

Dipole BCL-141 was received from customer in good condition for re-calibration, SMA connector required cleaning prior to calibration.

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

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NCL Calibration Laboratories
Division of APREL Laboratories.

Dipole Calibration Results

Mechanical Verification

APREL Length	APREL Height	Measured Length	Measured Height
51.5 mm	30.4 mm	51.6 mm	30.5 mm

Tissue Validation

Head Tissue 2450 MHz	Measured
Dielectric constant, ε_r	39.2
Conductivity, σ [S/m]	1.80

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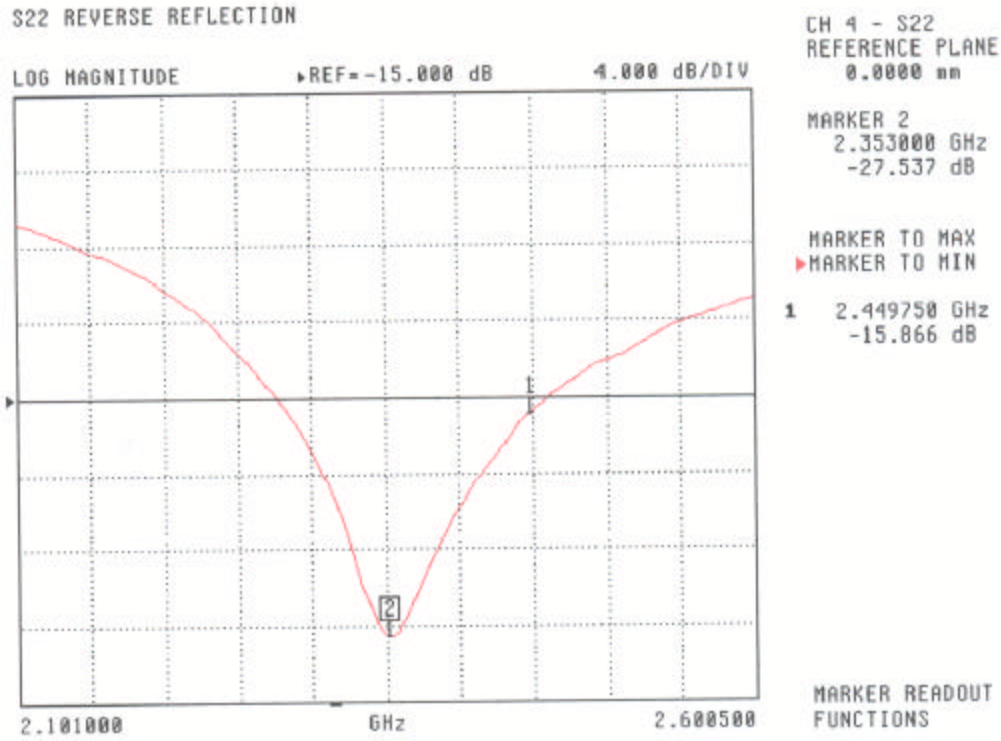
Division of APREL Laboratories.

Electrical Calibration

Test	Result
S11 R/L	-27.5 dB to –15.9 dB
SWR	1.09 U to 1.38 U
Impedance	47.9 Ω to 60.8 Ω

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

S11 Parameter Return Loss



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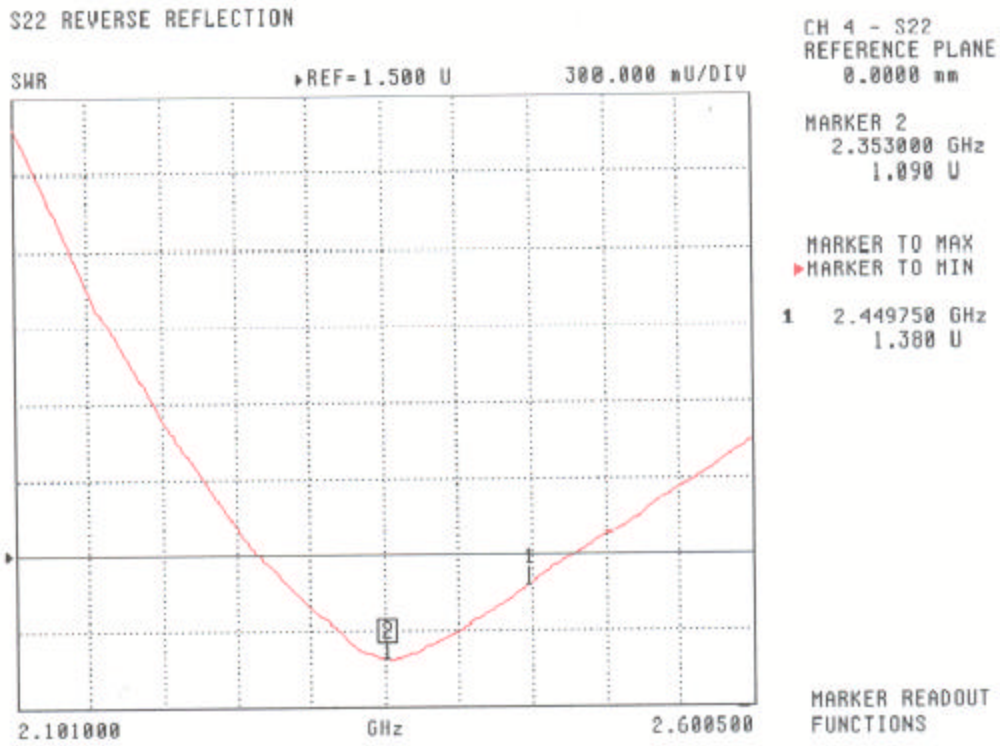
SWR



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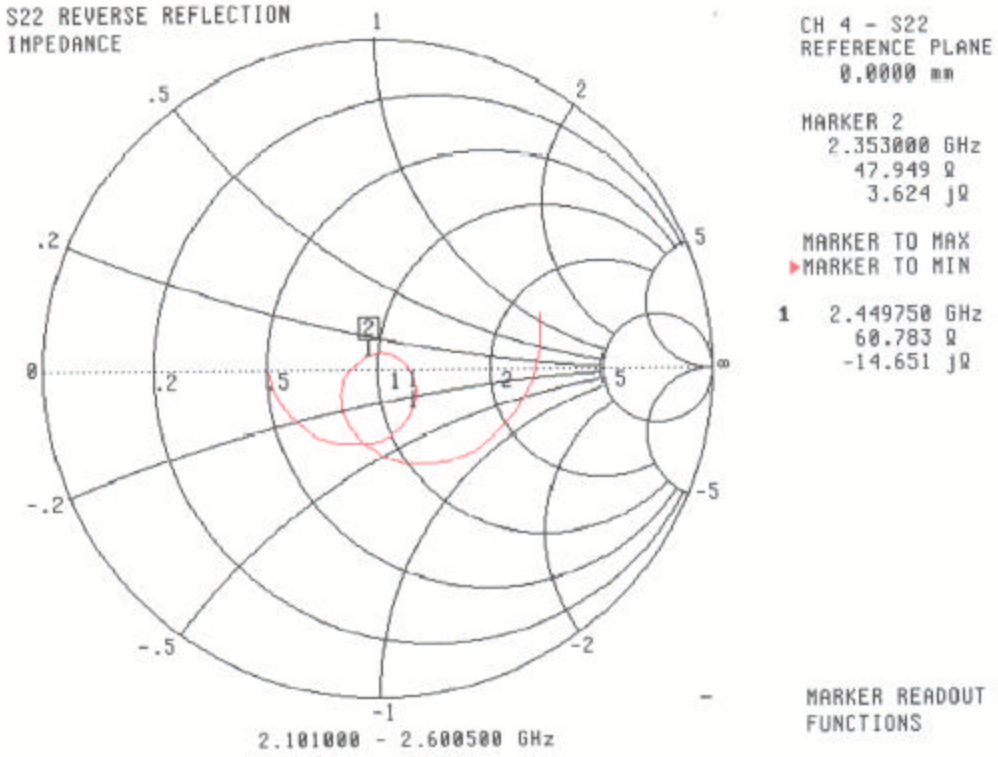
Smith Chart Dipole Impedance



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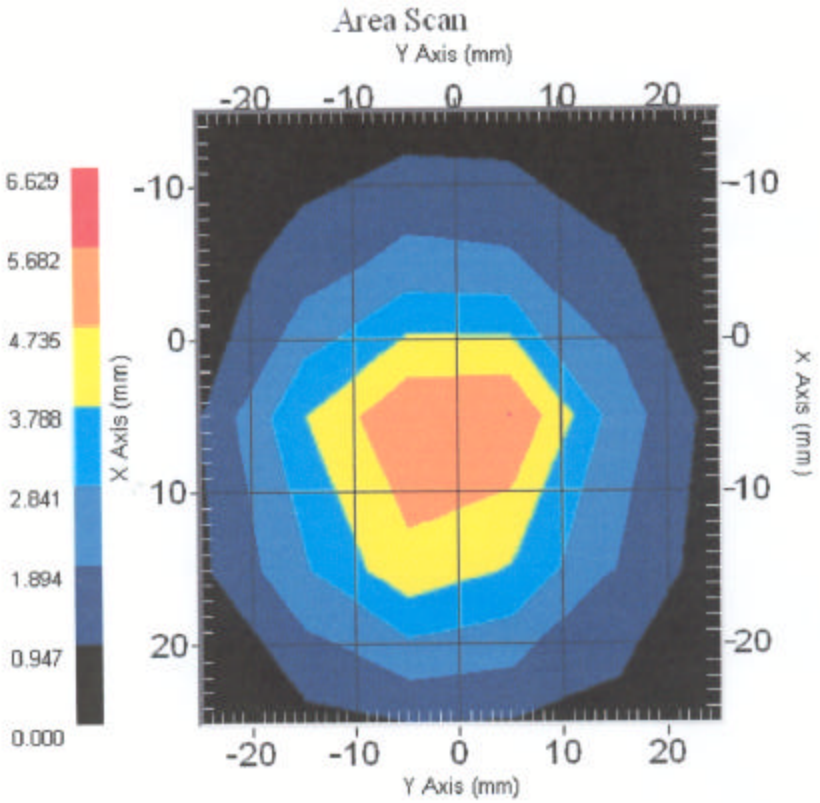
System Validation Results Using the Electrically Calibrated Dipole

Head Tissue Frequency	1 Gram	10 Gram	Peak Above Feed Point
2450 MHz	5.31	2.44	10.18



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NCL Calibration Laboratories
Division of APREL Laboratories.

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 D - TEST SYSTEM VERIFICATIONS SCANS

Liquid Measurement Result

2005-06-29

Simulant	*Freq [MHz]*	*Parameters*	*Liquid Temp [°C]*	*Target Value*	*Measured Value*	*Deviation*	*Limits [%]*
Body	*2450*	e_r	*22.0*	*52.7*	*50.7*	*-3.79*	*±5*
		s	*22.0*	*1.95*	*2.02*	*3.59*	*±5*
		1g SAR	*22.0*	*56.84*	*55.9*	*-1.65*	*±10*

ε_r = relative permittivity, σ = conductivity and ρ=1000kg/m^3

Date/Time: 6/29/2005 9:21:34 AM ; Date/Time: 6/29/2005 9:26:18 AM

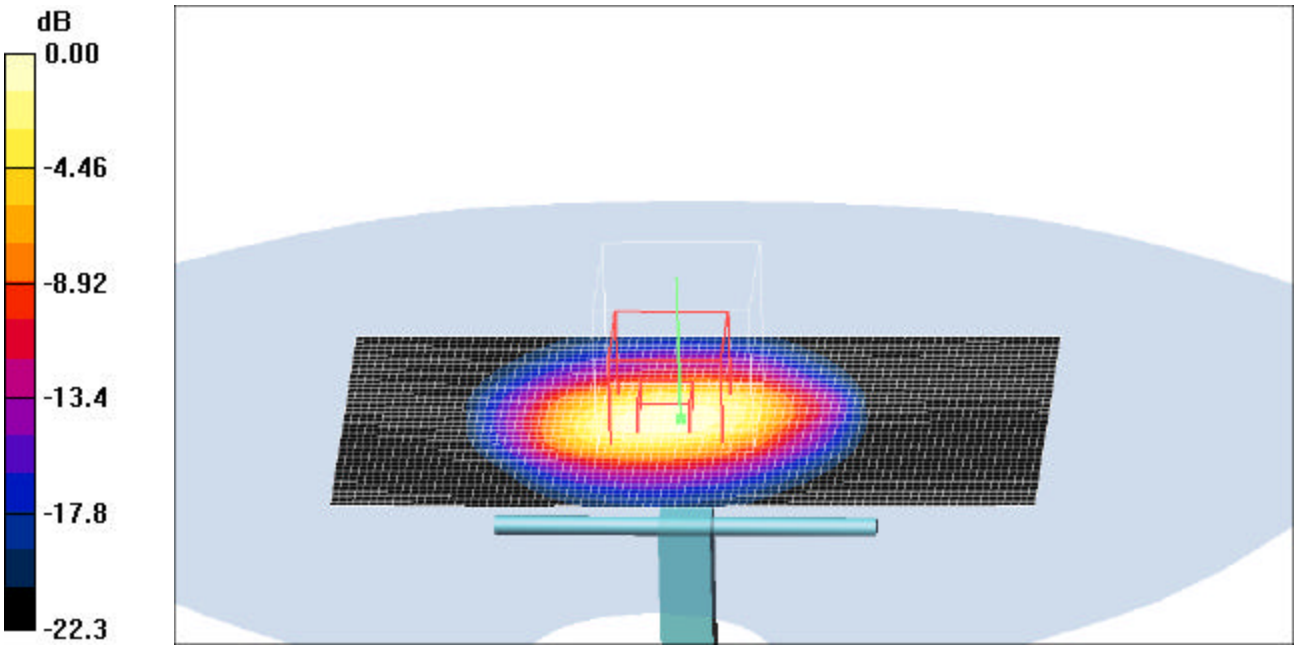
Test Laboratory: Bay Area Compliance Lab Corp.

050622_ET_1604_SystemValidationCheck_D2437MHz_Body
DUT: Dipole 2450 MHz;
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; s = 2.02 mho/m; e_r = 50.7; ? = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.24, 4.24, 4.24); Calibrated: 3/18/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn456; Calibrated: 6/1/2004
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

d=10mm, Pin=1W/Area Scan (51x91x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 72.0 mW/g

d=10mm, Pin=1W/Zoom Scan Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 183.9 V/m; Power Drift = 0.023 dB
Peak SAR (extrapolated) = 124.4 W/kg
SAR(1 g) = 55.9 mW/g; SAR(10 g) = 25.9 mW/g
Maximum value of SAR (measured) = 62.4 mW/g



0 dB = 62.4mW/g

APPENDIX E - EUT SCANS

Date/Time: 6/29/2005 10:38:10 AM ; Date/Time: 6/29/2005 10:49:49 AM

Test Laboratory: Bay Area Compliance Lab Corp.

Bright Star 802.11B_Body

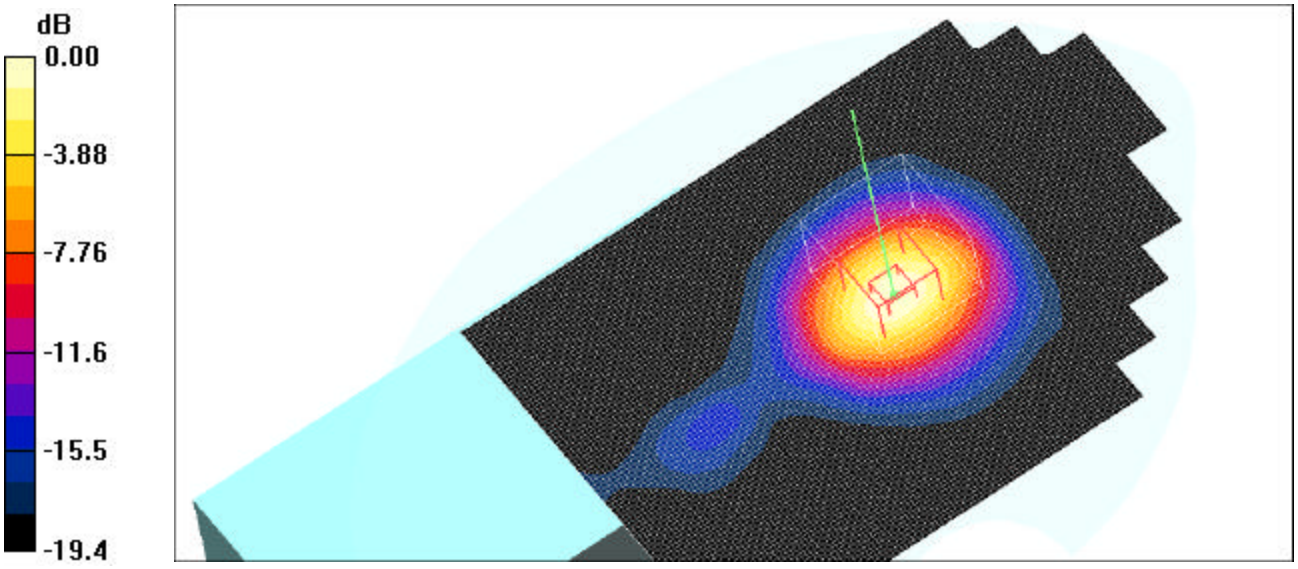
DUT: Bright Star; Type: Sample; Serial: sample# C0504-00075
Communication System: 802.11B; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; s = 2.02 mho/m; e_r = 50.7; ? = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.24, 4.24, 4.24); Calibrated: 3/18/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn456; Calibrated: 6/1/2004
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

TOUCH Body position - 8.02.11b/Area Scan (101x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.906 mW/g

TOUCH Body position - 8.02.11b/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (interpolated) = 0.354 mW/g

TOUCH Body position - 8.02.11b/Zoom Scan(5x5x5): Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.00 V/m; Power Drift = -0.084 dB
Peak SAR (extrapolated) = 1.46 W/kg
SAR(1 g) = 0.790 mW/g; SAR(10 g) = 0.401 mW/g
Maximum value of SAR (measured) = 0.898 mW/g



0 dB = 0.898mW/g

Plot #1

Date/Time: 6/29/2005 9:47:59 AM ; Date/Time: 6/29/2005 9:58:55 AM

Test Laboratory: Bay Area Compliance Lab Corp.

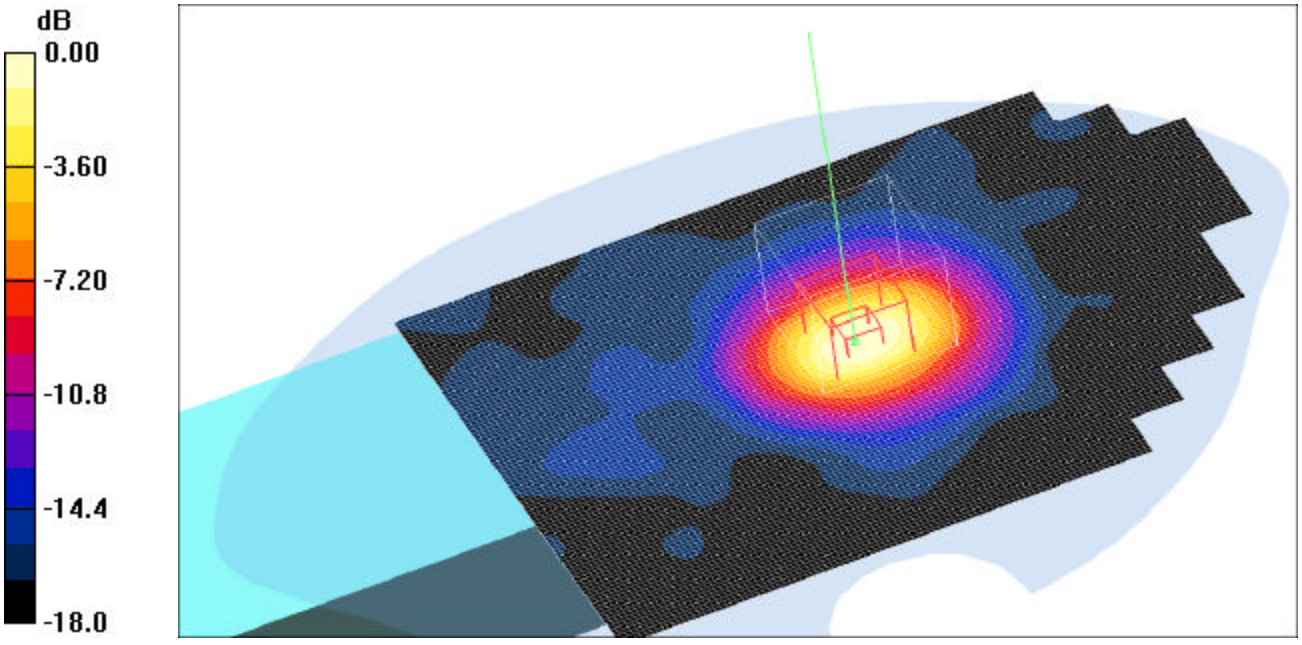
Bright Star 802.11G_Body
DUT: Bright Star; Type: Sample; Serial: sample#C0504-00075
Communication System: 802.11G; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2412 MHz; s = 1.95 mho/m; e_r = 50.9; ? = 1000 kg/m^3
Phantom section: Flat Section
DASY4 Configuration:

- Probe: ET3DV6 - SN1604; ConvF(4.24, 4.24, 4.24); Calibrated: 3/18/2005
- Sensor-Surface: 4mm (Mechanical Surface Detection)Sensor-Surface: 0mm (Fix Surface)
- Electronics: DAE3 Sn456; Calibrated: 6/1/2004
- Phantom: SAM with CRP; Type: Twin SAM; Serial: TP-1032
- Measurement SW: DASY4, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 146

TOUCH Body position - 8.02.11G 2/Area Scan (101x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.299 mW/g

TOUCH Body position - 8.02.11G 2/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=10mm
Maximum value of SAR (interpolated) = 0.092 mW/g

TOUCH Body position - 8.02.11G 2/Zoom Scan(5x5x5): Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.94 V/m; Power Drift = -0.315 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.250 mW/g; SAR(10 g) = 0.136 mW/g
Maximum value of SAR (measured) = 0.290 mW/g



0 dB = 0.290mW/g

Plot #2

APPENDIX F – CONDUCTED OUTPUT POWER MEASUREMENT

Provision Applicable

The measured peak output power should be greater and within 5% than EMI measurement.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

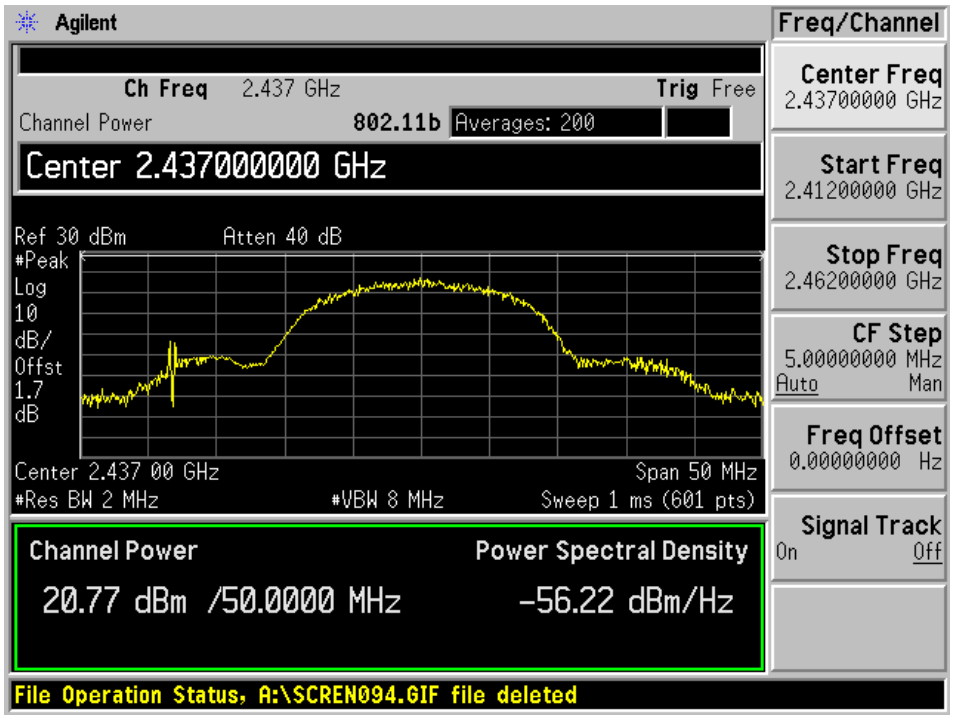
Test equipment

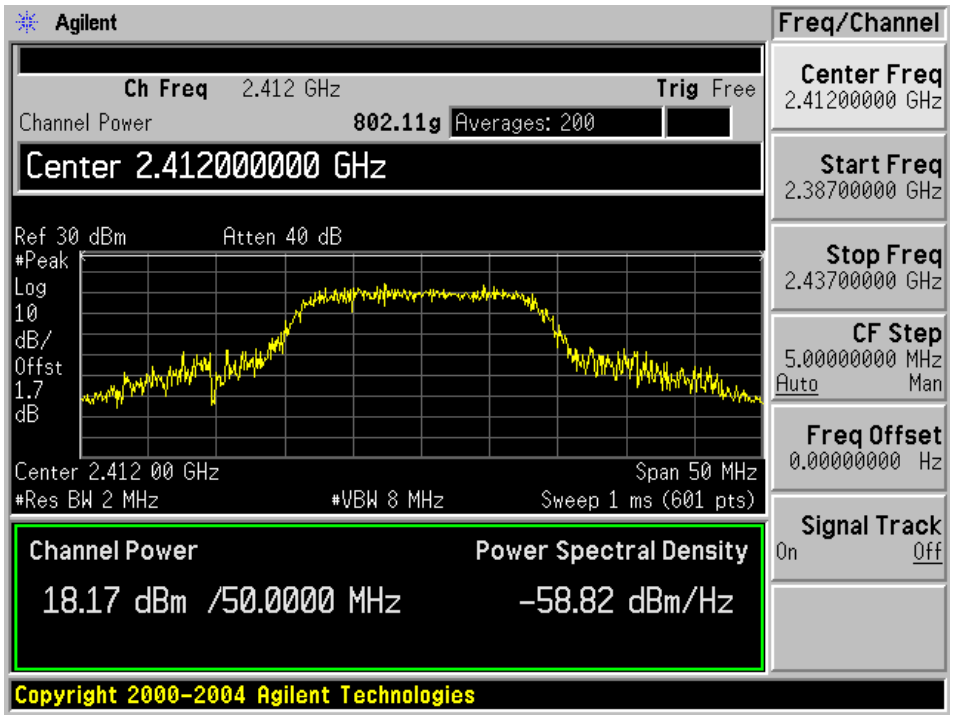
Hewlett Packard HP8564E Spectrum Analyzer, Calibration Due Date: 2005-10-04.
Hewlett Packard HP 7470A Plotter, Calibration not required.
A.H. Systems SAS200 Horn Antenna, Calibration Due Date: 2005-05-31
Com-Power AB-100 Dipole Antenna, Calibration Due Date: 2005-09-05

Test Results

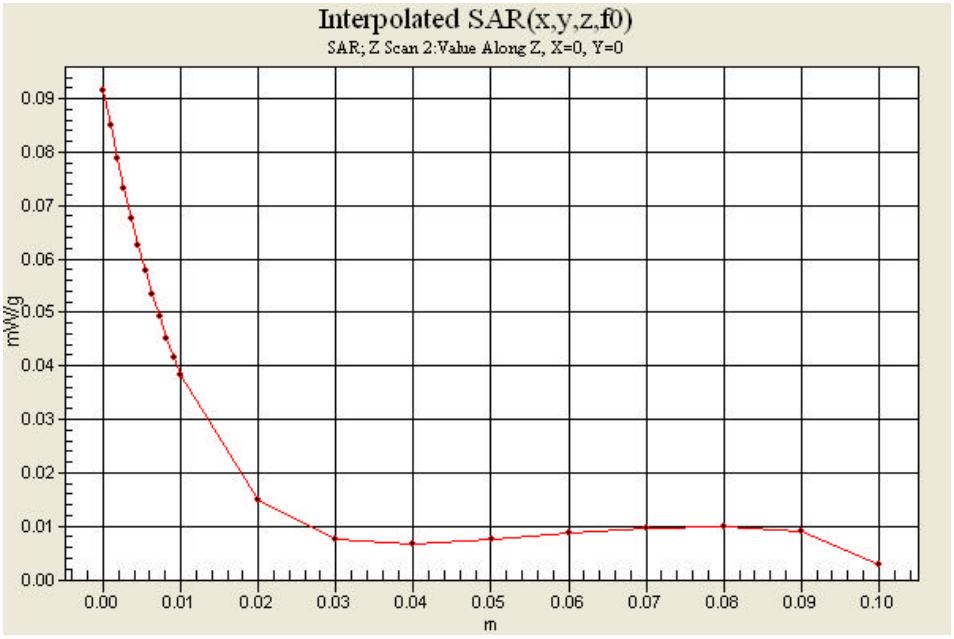
Frequency (MHz)	Output Power in dBm	Output Power in W
2437	20.77	0.119
2412	18.17	0.066

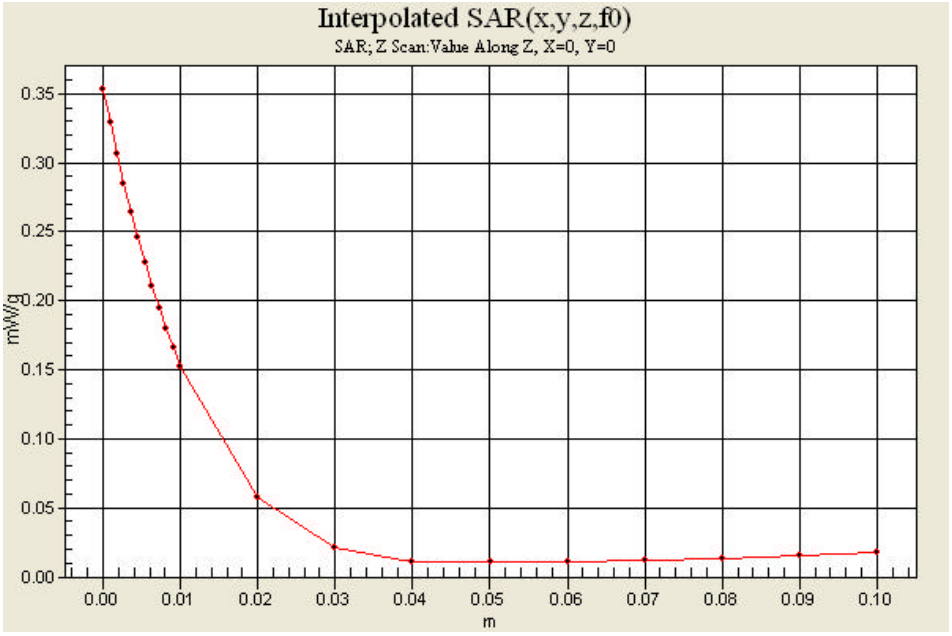
Please refer to the following plots.




Agilent
Freq/Channel
Ch Freq 2.412 GHz
Trig Free
Channel Power
802.11g
Averages: 200
Center 2.412000000 GHz
Ref 30 dBm
Atten 40 dB
#Peak
Log
10
dB/
Offst
1.7
dB
Center 2.412 00 GHz
Span 50 MHz
#Res BW 2 MHz
#VBW 8 MHz
Sweep 1 ms (601 pts)
Channel Power
18.17 dBm /50.0000 MHz
Power Spectral Density
-58.82 dBm/Hz
Center Freq
2.41200000 GHz
Start Freq
2.38700000 GHz
Stop Freq
2.43700000 GHz
CF Step
5.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2004 Agilent Technologies

APPENDIX G – Z-AXIS PLOT





APPENDIX H – EUT TEST POSITION PHOTOS

Body Touch Setup Photo

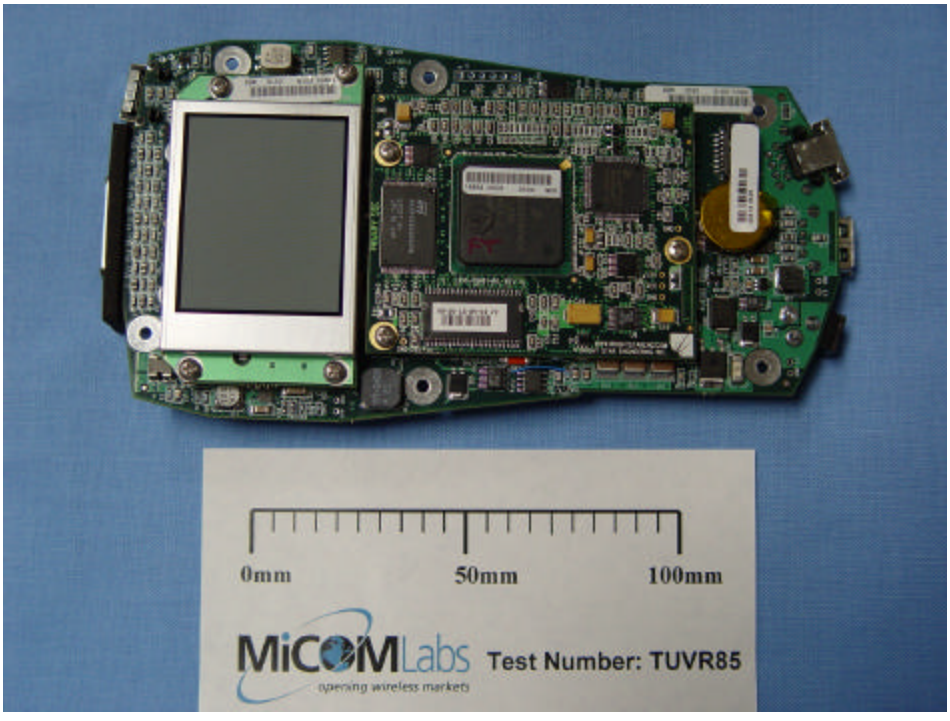
APPENDIX I – EUT & ACCESSORIES PHOTOS

EUT – Front View

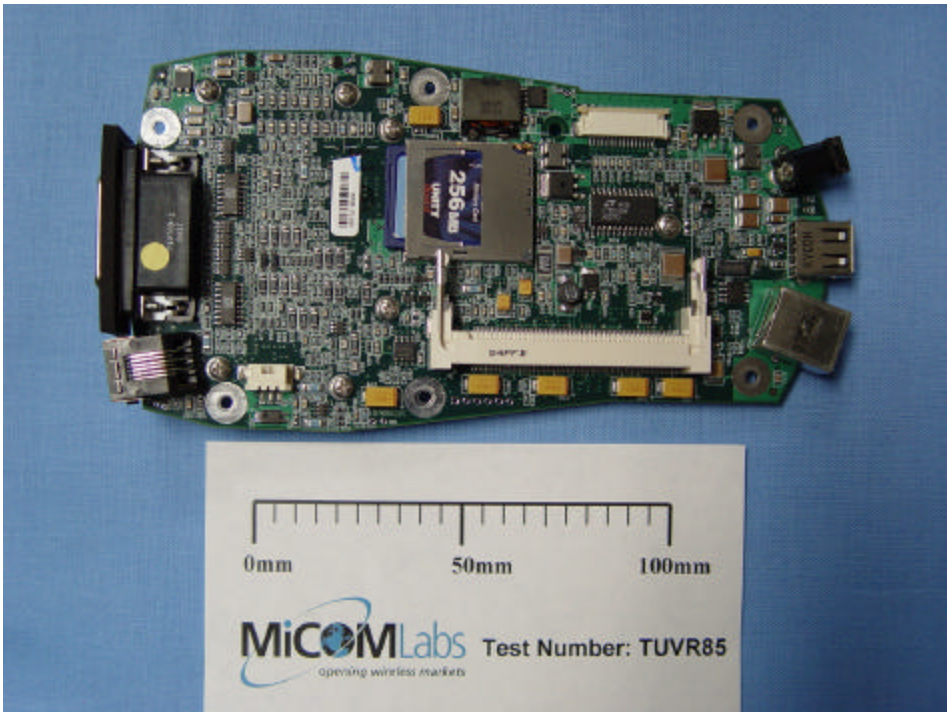
EUT – Rear View

EUT – Cover Off View

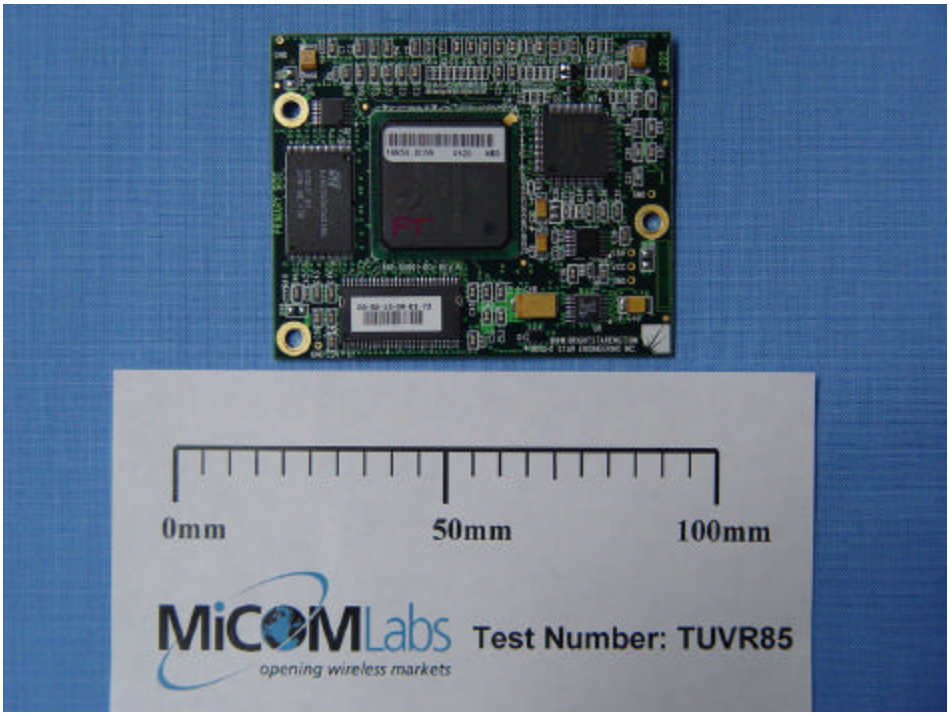
EUT – Main Board with LCD Top View



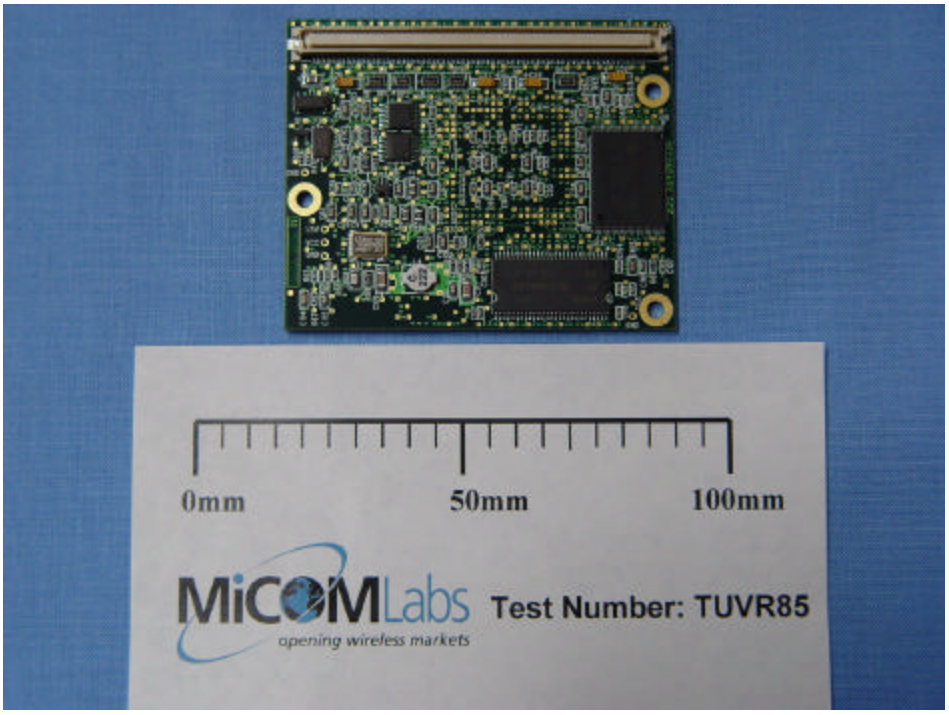
EUT – Main Board Lower Side View



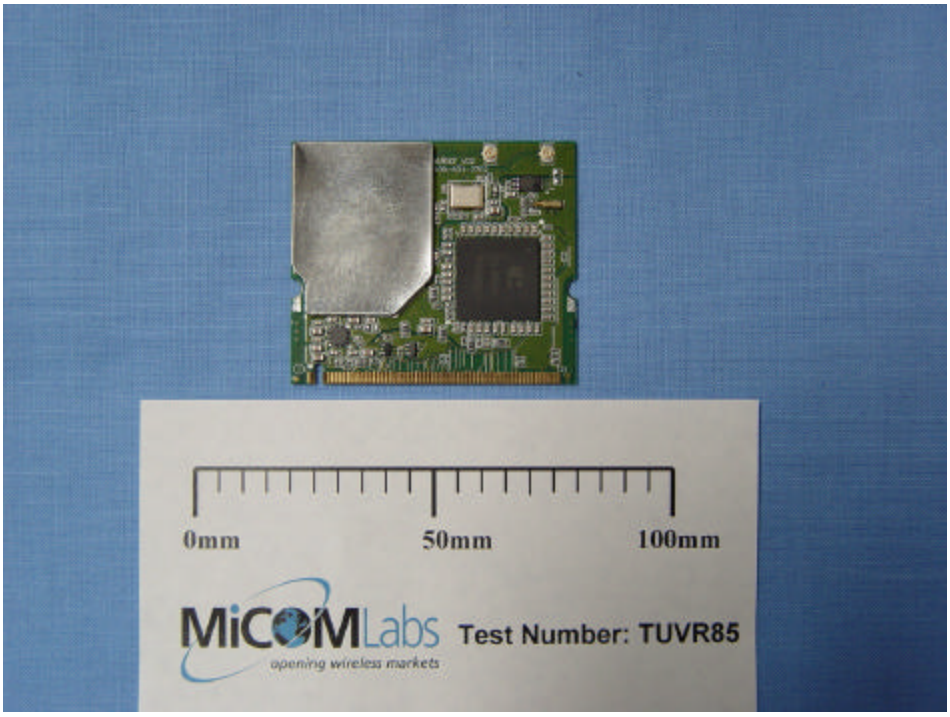
EUT – Power Engine Top View



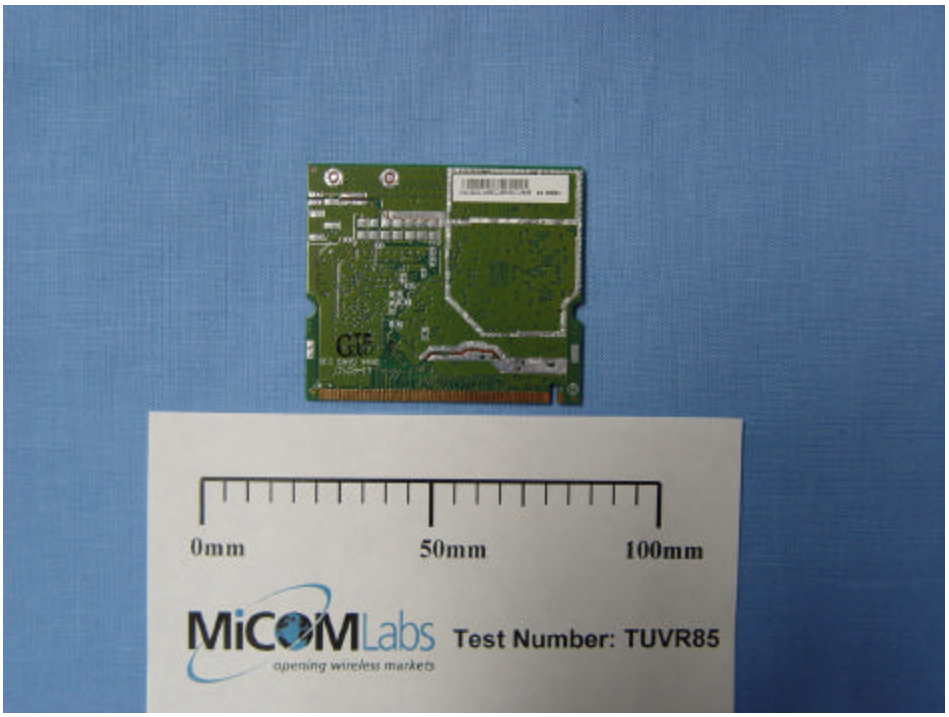
EUT – Power Engine Lower Side View



EUT – Mini PCI Wireless Card Top View



EUT – Mini PCI Wireless Card Lower Side View



APPENDIX J - INFORMATIVE REFERENCES

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