ITS Intertek Testing Services
ETL SEMKO

Specific Absorption Rate (SAR) Test Report

for

Sierra Wireless Inc.

Performed on the

CDMA Cellular and PCS PCMCIA Card
Model: AIRCARD 555 with PDA
FCC ID: N7NACRD555

Test Report: 20544792
Date of Report: July 28, 2001

Job #: 20054479
Date of Test: July 16 to 28, 2001

Total number of pages in report: 55.

NVLAP®

NVLAP Laboratory Code 200201-0
Accredited for testing to FCC Parts 15

Tested by:	Xi-Ming Yang	Review Date: 7/31/01
Reviewed by: David Chernomordik	David Chernomordik, Ph.D., EMC Technical Manager	Review Date: 7/31/01

Intertek Testing Services NA, Inc.
1365 Adams Court, Menlo Park, CA 94025
Telephone 650-463-2900 Fax 650-463-2910 Home Page www.etlsemko.com

TABLE OF CONTENTS

1.0 JOB DESCRIPTION

1.1 Client Information

The EUT has been tested at the request of:

Company: Sierra Wireless, Inc.
Address: 13811 Wireless Way
Richmond, BC V6V 3A4
Canada
Name of contact: Mr.Gordon Carey

Telephone: (604) 231-1145
Fax: (604) 231-1109

1.2 Equipment under test (EUT)

Product Descriptions:

Equipment	Cell band and PCS band CDMA Radio Card installed into hand held computer (PDA)		
Trade Name	Sierra Wireless, Inc.	Model No:	AIRCARD 555
FCC ID	**N7NACRD555**	S/N No.	Not Labeled
Category	Portable	RF Exposure	Uncontrolled Environment
Frequency Band (up link)	824 - 849 MHz 1850 - 1910 MHz	System	CDMA
Antenna Type	Rotatable rod antenna, ~0 dBi		
Location:	Outside the card (PDA)		

Use of Product : Wireless Data Communications

Manufacturer: Sierra Wireless, Inc.

Production is planned [X] Yes, [ ] No

EUT receive date: July 16, 2001

EUT received condition: Prototype in good condition.

Test start date: July 16, 2001

Test end date: July 28,2001

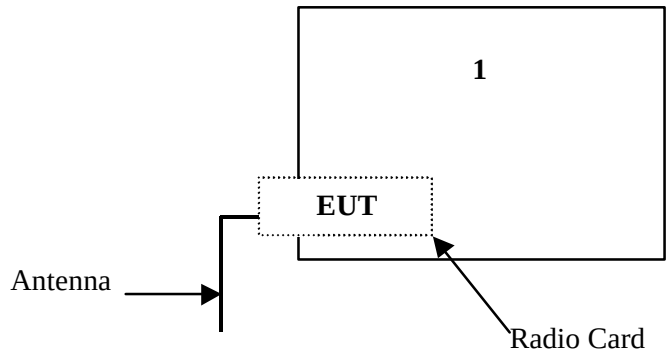
1.3 Test plan reference

FCC rule part 2.1093, FCC Docket 96-326 & Supplement C to OET Bulletin 65

1.4 System test configuration

1.4.1 System block diagram & Support equipment

Item #	Description	Model No.	Serial No.
1	Hewlett Packard PDA	HPF1260A	SG84602056



* = EUT	**S** = Shielded;	**F** = With Ferrite
** = No ferrites on video cable	**U** = Unshielded	**M** = Length in Meters

1.4.3 Test Position for Muscle

The AIRCARD 555 WITH PDA was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in C95.1 (1992) and Supplement C of OET 65 (2001). Please refer to figures
1 – 3 below for the position details:

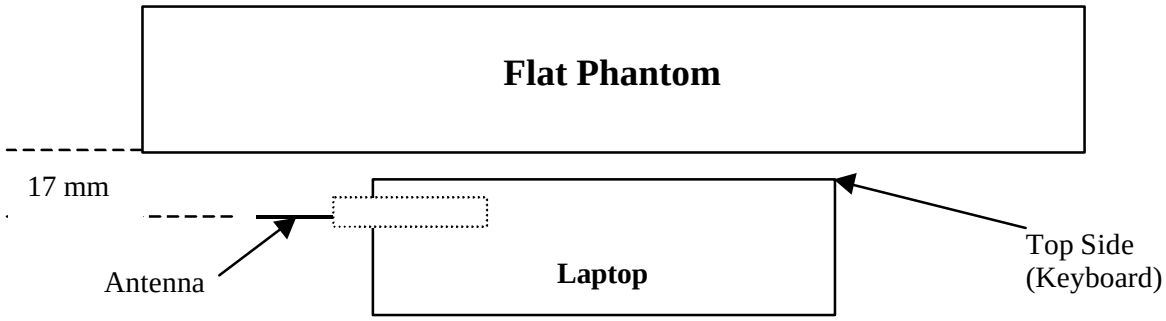


Figure 1: Face Up Position

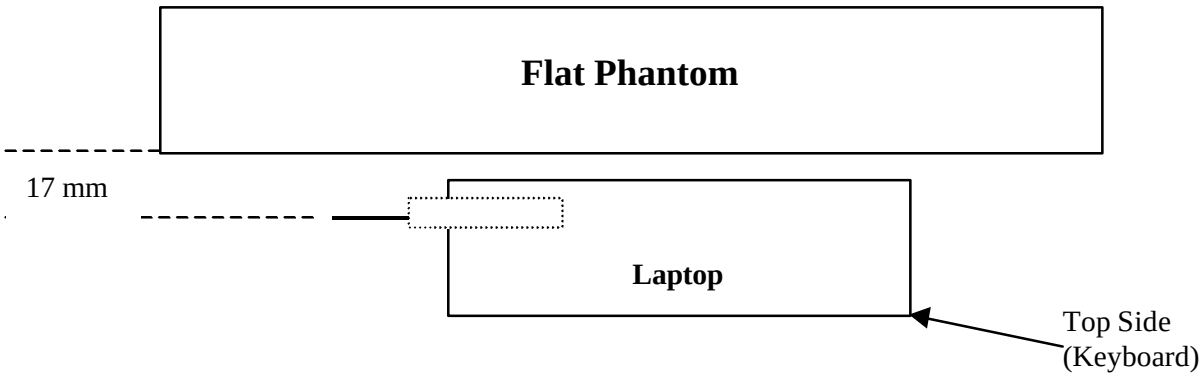


Figure 2: Face Down Position

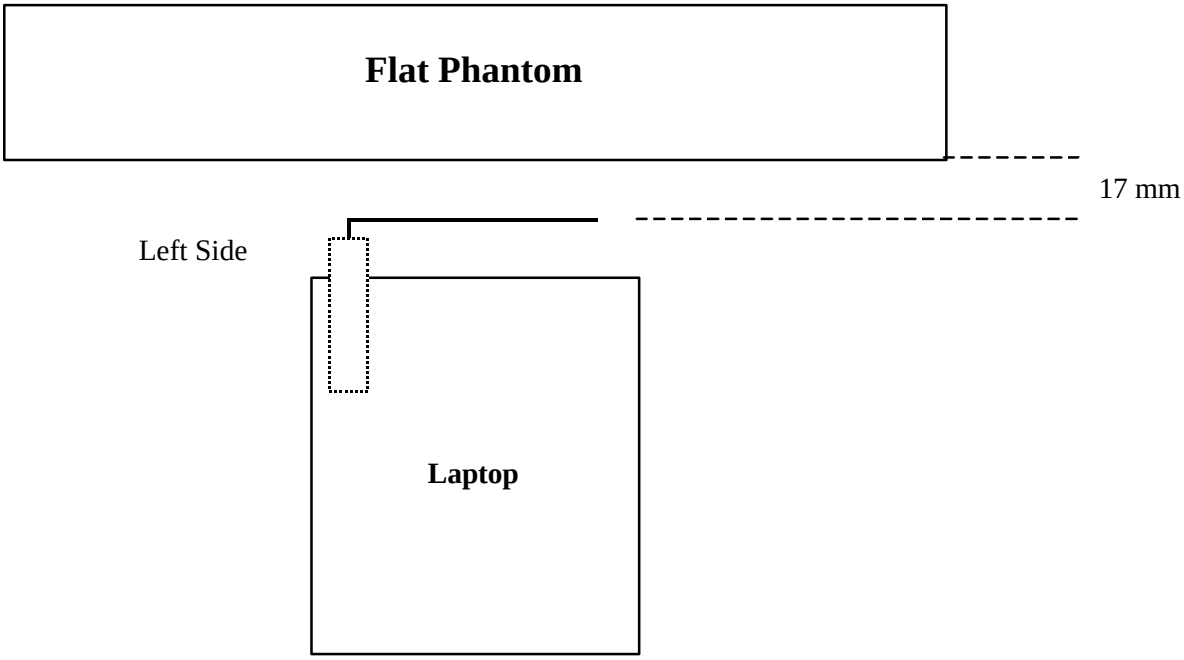


Figure 3: Vertical Position

1.4.4 Test Condition

During tests the worst case data (max RF coupling) was determined with following conditions:

EUT Antenna	Straight out position	Orientation	Flat (Muscle)
Usage	Body	Distance between antenna axis at the joint and the liquid surface:	17 mm with PDA in upside position. 17 mm with PDA in normal position. 17 mm with PDA in vertical position
Simulating human hand	Not Used	EUT Battery	EUT is powered from the PDA
Power output	23 dBm (average); 27.4 dBm (peak)		

The manufacturer accessed the spatial peak SAR values for lowest, middle and highest operating channels defined.

1.5 Modifications required for compliance

No modifications were implemented by Intertek Testing Services.

1.6 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.0 SAR EVALUATION

2.1 SAR Limits

The following FCC limits for SAR apply to devices operate in General Population/Uncontrolled Exposure environment:

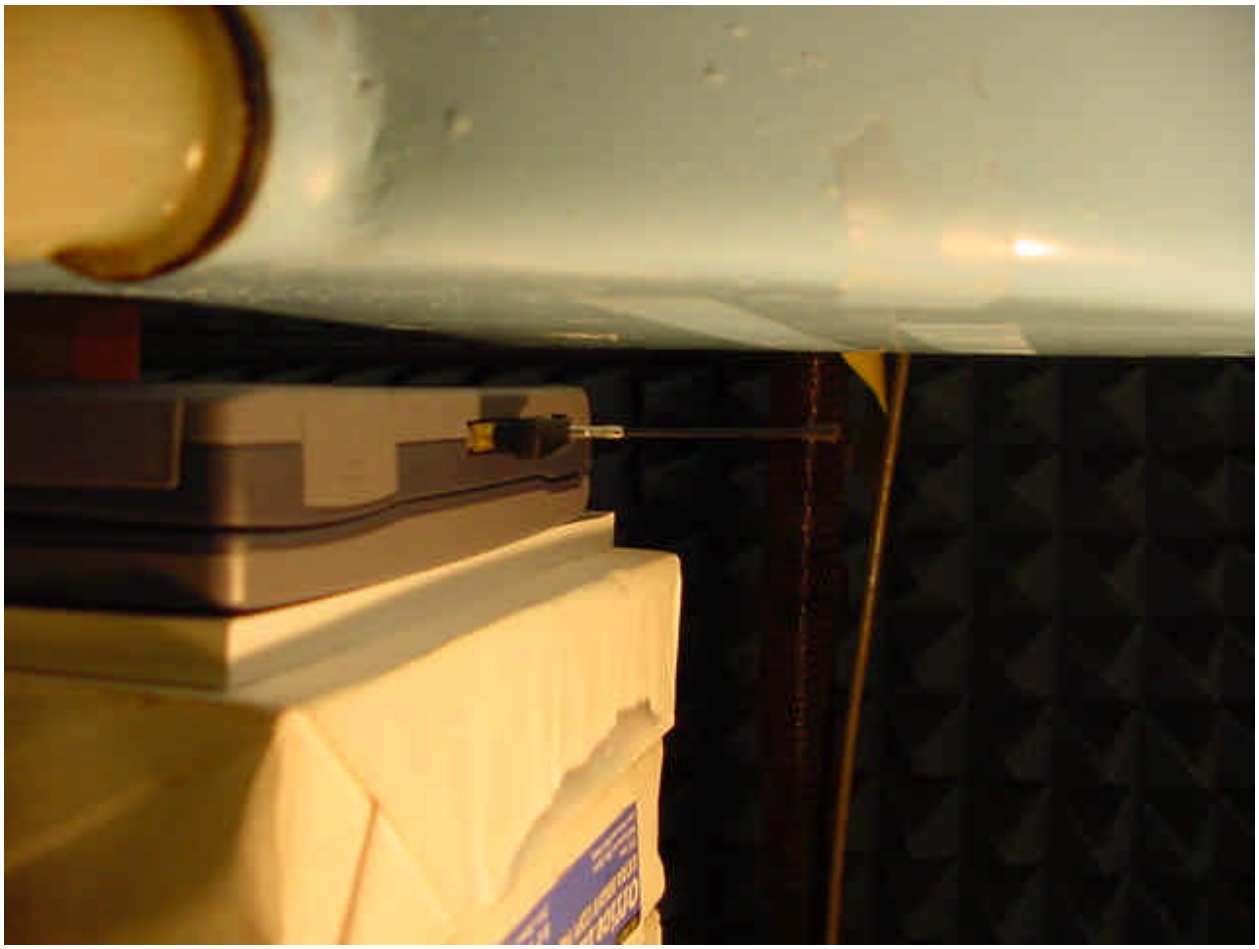
EXPOSURE (General Population/Uncontrolled Exposure environment)	**SAR (W/kg)**
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

2.2 Configuration Photographs

SAR Measurement Test Setup

2.2 Configuration Photographs Continued

SAR Measurement Test Setup



.2 Configuration Photographs – Continued

SAR Measurement Test Setup

2.3 System Verification

Prior to the assessment, the system was verified to the ±5% of the specifications by using the system validation kit. The validation was performed at 1800 MHz.

Validation kit	Targeted SAR_{1g} (mW/g)	Measured SAR_{1g} (mW/g)
D900V2, S/N #: 013	9.45	9.31

2.4 Evaluation Procedures

The SAR evaluation was performed with the following procedures:

a. SAR was measured at a fixed location above the ear point and used as a reference value for the assessing the power drop.

b. The SAR distribution at the exposed side of the head was measured at a distance of 4.0 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 20 mm x 20 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

c. Around this point, a volume of 32 mm x 32 mm x 34 mm was assessed by measuring 5 x 5 x 7 points. Based on this data set, the spatial peak SAR value was evaluated with the following procedure:

   I) The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measurement point is 1.6 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in Z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   ii) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3-D spline interpolation algorithm. The 3-D spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y and z directions). The volume was integrated with the trapezoidal algorithm. 1000 points (10 x 10 x 10) were interpolated to calculate the average.

   iii) All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

d. Re-measurements of the SAR value at the same location as in step a. above. If the value changed by more than 5 %, the evaluation was repeated.

2.5 Test Results

The following pages contain data tables with the test results obtained when the device was tested in the condition described in this report. Detailed measurement plots, which reveal information about the location of the maximum SAR with respect to the device, are reported in Appendix A.

Trade Name:	Sierra Wireless, Inc.	**Model No.:**	AIRCARD 555 WITH PDA
Serial No.:	Not Labeled	**Test Engineer:**	Xi-Ming Yang

TEST CONDITIONS			
Ambient Temperature	22 °C	Relative Humidity	48 %
Test Signal Source	Test Mode	Signal Modulation	CDMA
Output Power Before SAR Test	23 dBm (average)	Output Power After SAR Test	23 dBm (average)
Test Duration	23 Min.	Number of Battery Change	Not Applicable

EUT Position: Upside Down Parallel					
Channel MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{10g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
824	CDMA	1	0.258	1.6	1
835	CDMA	1	0.318	1.6	2
849	CDMA	1	0.245	1.6	3

EUT Position: Upside Down Straight Out					
Channel MHz	**Operating Mode**	**Duty Cycle ratio**	**Measured SAR_{1g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
824	CDMA	1	0.602	1.6	4
835	CDMA	1	0.482	1.6	5
849	CDMA	1	0.468	1.6	6

EUT Position: Vertical					
Channel MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{1g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
824	CDMA	1	0.434	1.6	7
835	CDMA	1	0.447	1.6	8
849	CDMA	1	0.370	1.6	9

EUT Position: Keyboard Face Up Straight out					
Channel MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{1g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
824	CDMA	1	0.537	1.6	10
835	CDMA	1	0.397	1.6	11
849	CDMA	1	0.503	1.6	12

EUT Position: Vertical On Left					
Channel MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{1g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
1850	CDMA	1	1.04	1.6	13
1880	CDMA	1	1.06	1.6	14
1910	CDMA	1	1.23	1.6	15

EUT Position: Upside Down Parallel					
Channel MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{1g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
1850	CDMA	1	1.32	1.6	16
1880	CDMA	1	1.00	1.6	17
1910	CDMA	1	0.851	1.6	18

EUT Position: Upside Down Straight Out					
Channel MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{1g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
1850	CDMA	1	1.43	1.6	19
1880	CDMA	1	1.48	1.6	20
1910	CDMA	1	1.21	1.6	21

EUT Position: Keyboard Face Up					
Channel MHz	**Operating Mode**	**Crest Factor**	**Measured SAR_{1g} (mW/g)**	**Limit SAR (W/kg)**	**Plot Number**
1850	CDMA	1	1.47	1.6	22
1880	CDMA	1	1.21	1.6	23
1910	CDMA	1	1.38	1.6	24

Notes: a) Worst case data reported
b) Uncertainty of the system is not included

3.0 EQUIPMENT

3.1 Equipment List

The Specific Absorption Rate (SAR) tests were performed with the SPEAG model DASY 3 automated near-field scanning system, which is a package, optimized for dosimetric evaluation of mobile radios [3].

The following major equipment/components were used for the SAR evaluations:

SAR Measurement System			
EQUIPMENT	SPECIFICATIONS	S/N #	LAST CAL. DATE
Robot	**Stäubi RX60L**	597412-01	N/A
	Repeatability: ± 0.025mm Accuracy: 0.806x10^{-3} degree Number of Axes: 6		
E-Field Probe	**ET3DV5**	1333	04/23/01
	Frequency Range: 10 MHz to 6 GHz Linearity: ± 0.2 dB Directivity: ± 0.1 dB in brain tissue		
Data Acquisition	**DAE3**	317	N/A
	Measurement Range: 1µV to >200mV Input offset Voltage: < 1µV (with auto zero) Input Resistance: 200 M		
Phantom	**Generic Twin V3.0**	N/A	N/A
	Type: Generic Twin, Homogenous Shell Material: Fiberglass Thickness: 2 ± 0.1 mm Capacity: 20 liter Ear spacer: 4 mm (between EUT ear piece and tissue simulating liquid)		
Simulated Tissue	**Mixture**	N/A	07/15/01
	Please see section 6.2 for details		
Power Meter	**HP 8900D** w/ 84811A sensor	3607U00673	08/01/00
	Frequency Range: 100kHz to 18 GHz Power Range: 300µW to 3W		

3.2 Tissue Simulating Liquid

Muscle	
Ingredient	**Frequency** (800 – 900 MHz)
Water	54.05 %
Sugar	45.05 %
Salt	0.1 %
Bactericide	0.8%

Muscle	
Ingredient	**Frequency** (1900 MHz)
Water	55.5 %
Sugar	43.5 %
Salt	0 %
Cellulose	1.0 %

The dielectric parameters were verified prior to assessment using the HP 85070A dielectric probe kit and the HP 8753C network Analyzer. The dielectric parameters were:

Frequency (MHz)	**e_r***	**s *(mho/m)**	**r **(kg/m$^{3)}$**
835	56.5 ± 5%	0.95 ± 10%	1000

Frequency (MHz)	**e_r***	**s *(mho/m)**	**r **(kg/m$^{3)}$**
1900	52.1 ± 5%	1.69 ± 10%	1000

* *Worst case uncertainty of the HP 85070A dielectric probe kit*
** *Worst case assumption*

Note: The amount of each ingredient specified in the table is not the exact amount of the final test solution. The final test solution was adjusted by adding small amounts of water, sugar, and/or salt to calibrate the solution to meet the proper dielectric parameters.

3.3 E-Field Probe Calibration

Probes were calibrated by the manufacturer in an IFI Model 110 TEM Cell. To ensure consistency, a strict protocol was followed. The conversion factor (ConF) between this calibration and the measurement in the tissue simulation solution was performed by comparison with temperature measurement and computer simulations. Probe calibration factors are included in Appendix B.

3.4 Measurement Uncertainty

The uncertainty budget has been determined for the DASY3 measurement system according to the NIS81 [5] and the NIST 1297 [6] documents and is given in the following table. The extended uncertainty (K=2) was assessed to be 23.5 %

UNCERTAINTY BUDGET				
Uncertainty Description	**Error**	**Distrib.**	**Weight**	**Std.Dev.**
Probe Uncertainty				
Axial isotropy	±0.2 dB	U-shape	0.5	±2.4 %
Spherical isotropy	±0.4 dB	U-shape	0.5	±4.8 %
Isotropy from gradient	±0.5 dB	U-shape	0	
Spatial resolution	±0.5 %	Normal	1	±0.5 %
Linearity error	±0.2 dB	Rectang.	1	±2.7 %
Calibration error	±3.3 %	Normal	1	±3.3 %
SAR Evaluation Uncertainty				
Data acquisition error	±1 %	Rectang.	1	±0.6 %
ELF and RF disturbances	±0.25 %	Normal	1	±0.25 %
Conductivity assessment	±10 %	Rectang.	1	±5.8 %
Spatial Peak SAR Evaluation Uncertainty				
Extrapol boundary effect	±3 %	Normal	1	±3 %
Probe positioning error	±0.1 mm	Normal	1	±1 %
Integrat. And cube orient	±3 %	Normal	1	±3 %
Cube shape inaccuracies	±2 %	Rectang.	1	±1.2 %
Device positioning	±6 %	Normal	1	±6 %
Combined Uncertanties				**±11.7 %**

3.5 Measurement Traceability

All measurements described in this report are traceable to National Institute of Standards and Technology (NIST) standards or appropriate national standards.

4.0 WARNING LABEL INFORMATION - USA

See users manual.

5.0 REFERENCES

[1] ANSI, ANSI/IEEE C95.1-1991: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz, The Institute of electrical and Electronics Engineers, Inc., New York, NY 10017, 1992

[2] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", OET Bulletin 65, FCC, Washington, D.C. 20554, 1997

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", *IEEE Transaction on Microwave Theory and Techniques*, vol. 44, pp. 105-113, Jan. 1996.

[4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetic evaluation of mobile communications equipment with know precision", IEICE Transactions on Communications, vol. E80-B, no. 5, pp.645-652, May 1997.

[5] NIS81, NAMAS, "The treatment of uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddinton, Middlesex, England, 1994.

[6] Barry N. Tayor and Chris E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994.

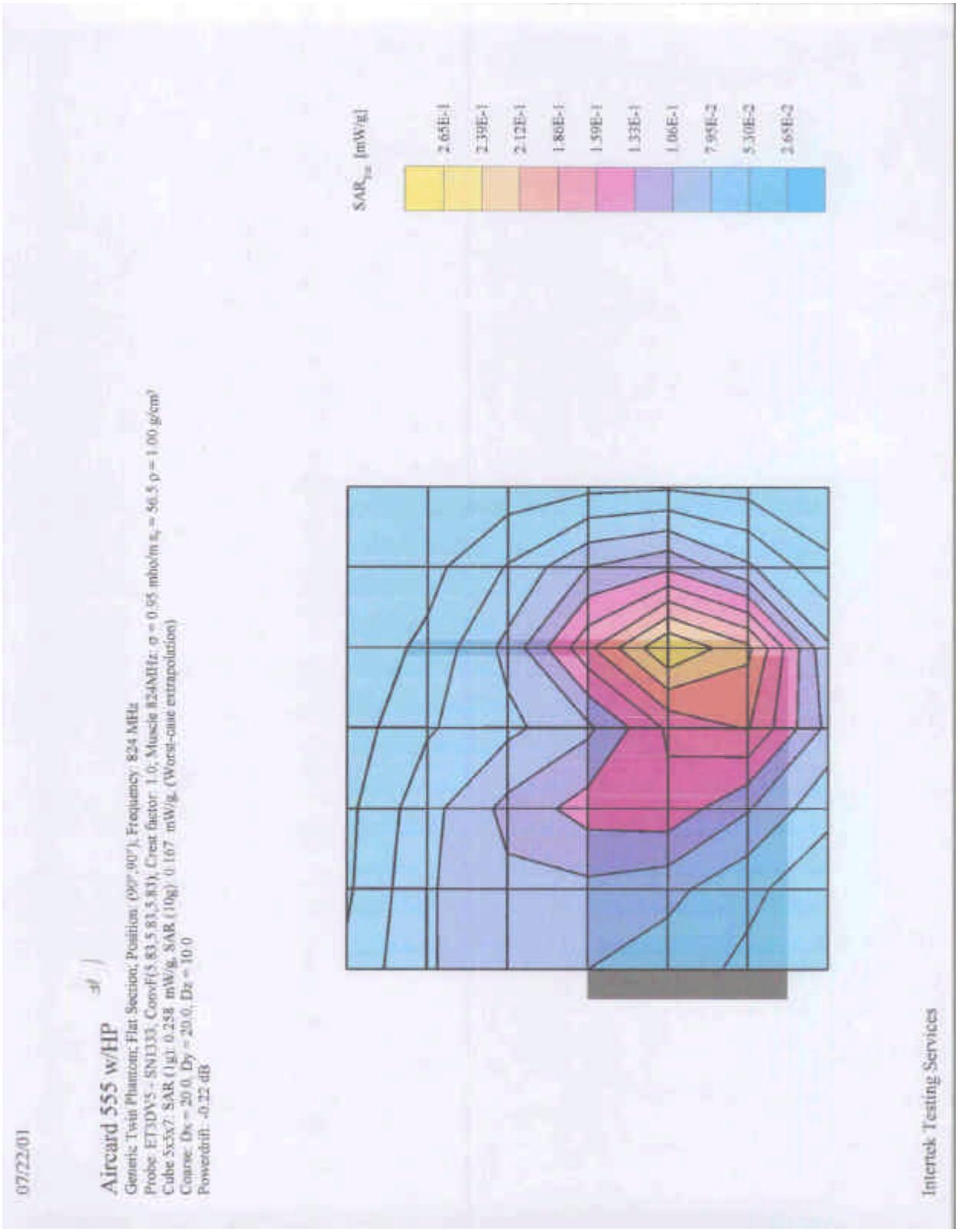
6.0 Document History

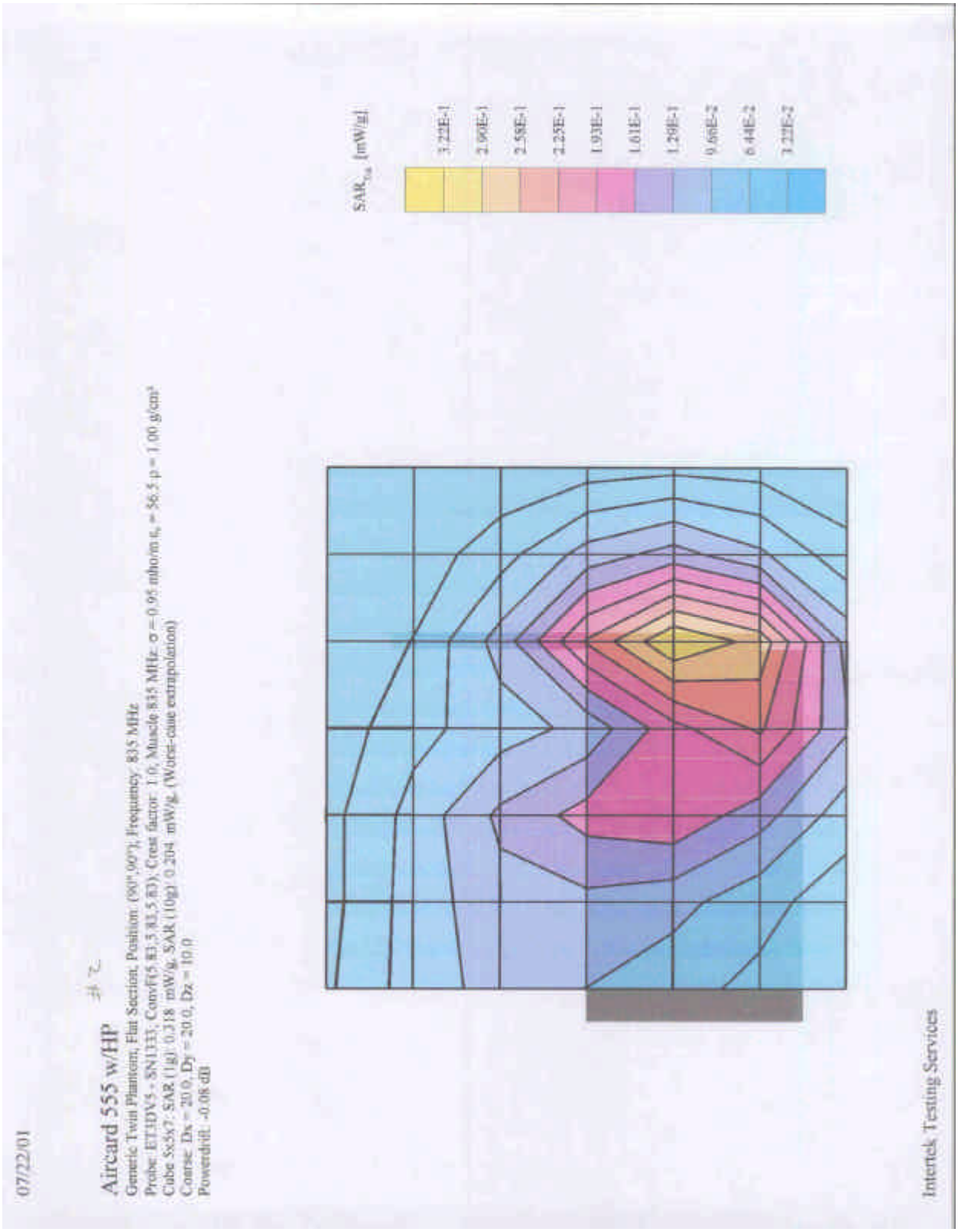
Revision/ Job Number	Writer Initials	Date	Change
1.0 / 20544792	SS	July 28 2001	Original document

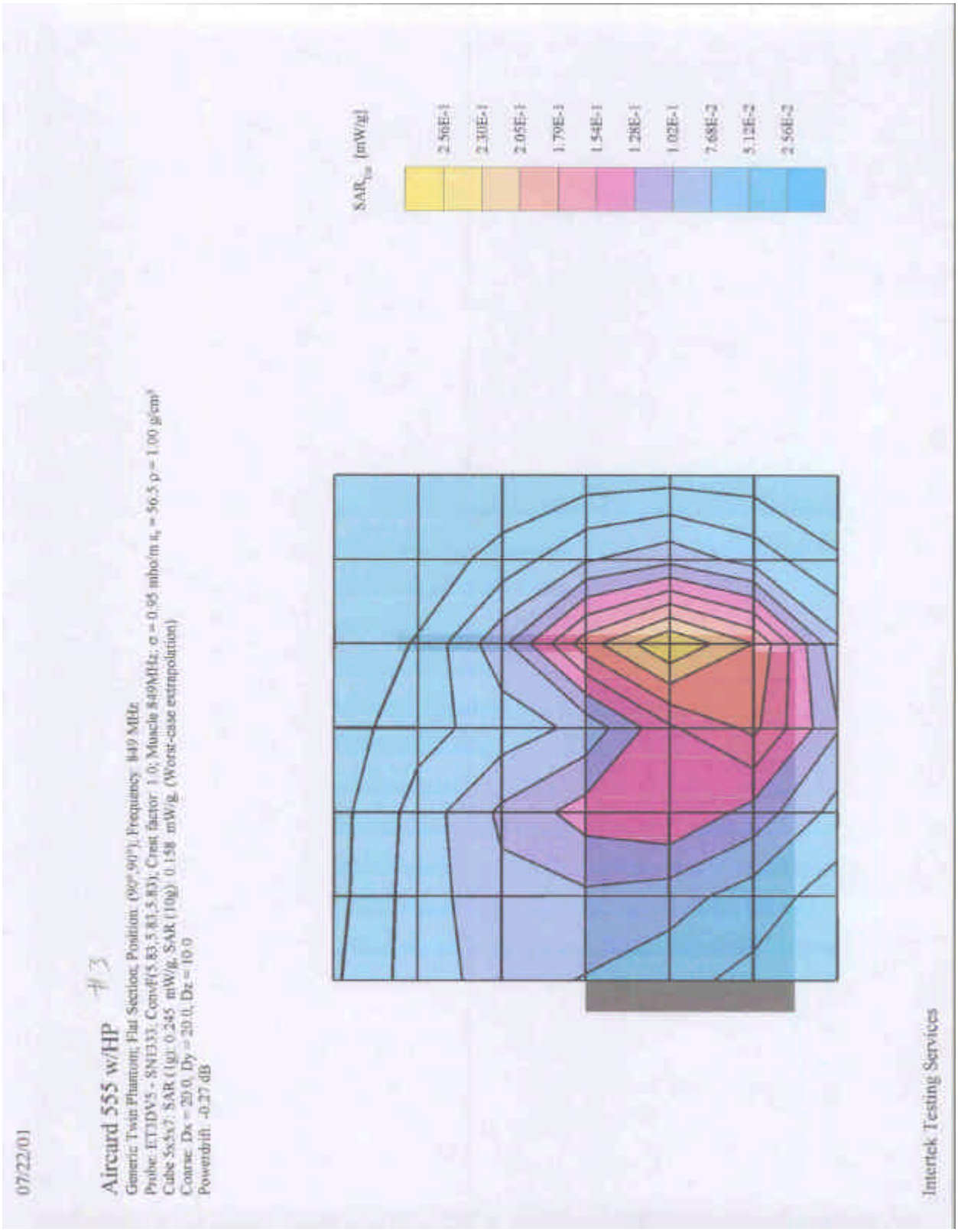
APPENDIX A - SAR Evaluation Data

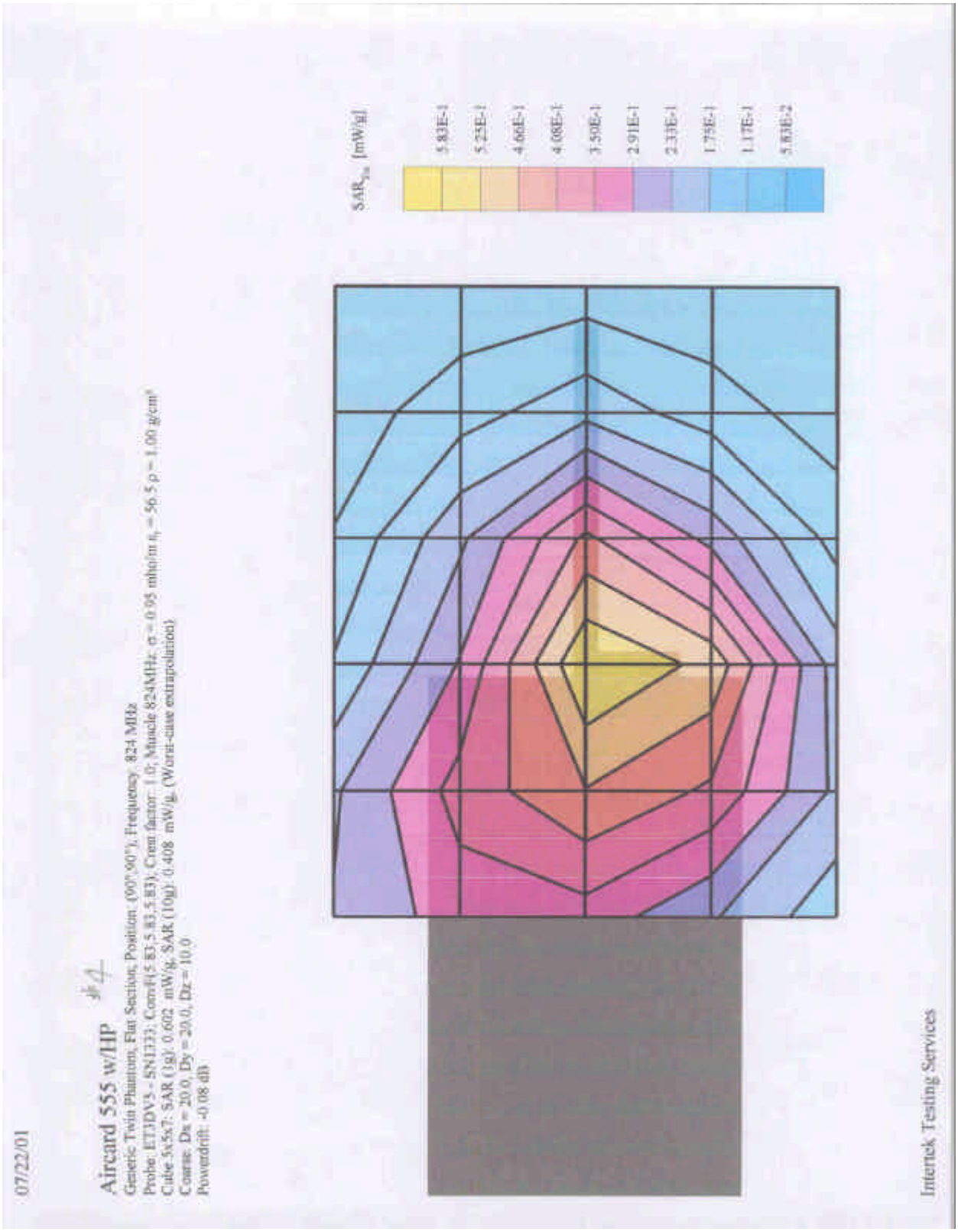
Please note that the graphical visualization of the phone position onto the SAR distribution gives only limited information on the current distribution of the device, since the curvature of the head results in graphical distortion. Full information can only be obtained either by H-field scans in free space or SAR evaluation with a flat phantom.

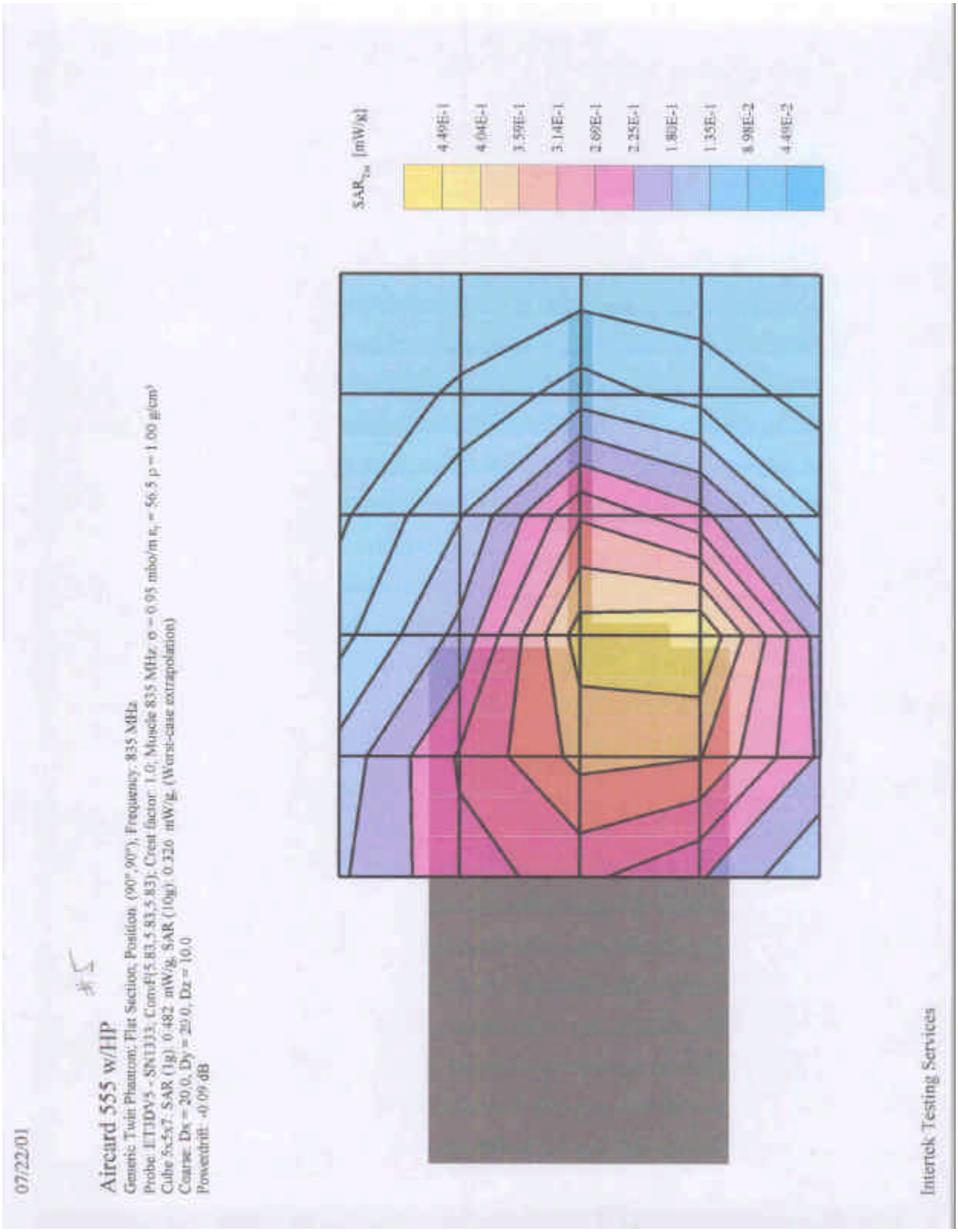
Powerdrift is the measurement of power drift of the device over one complete SAR scan.

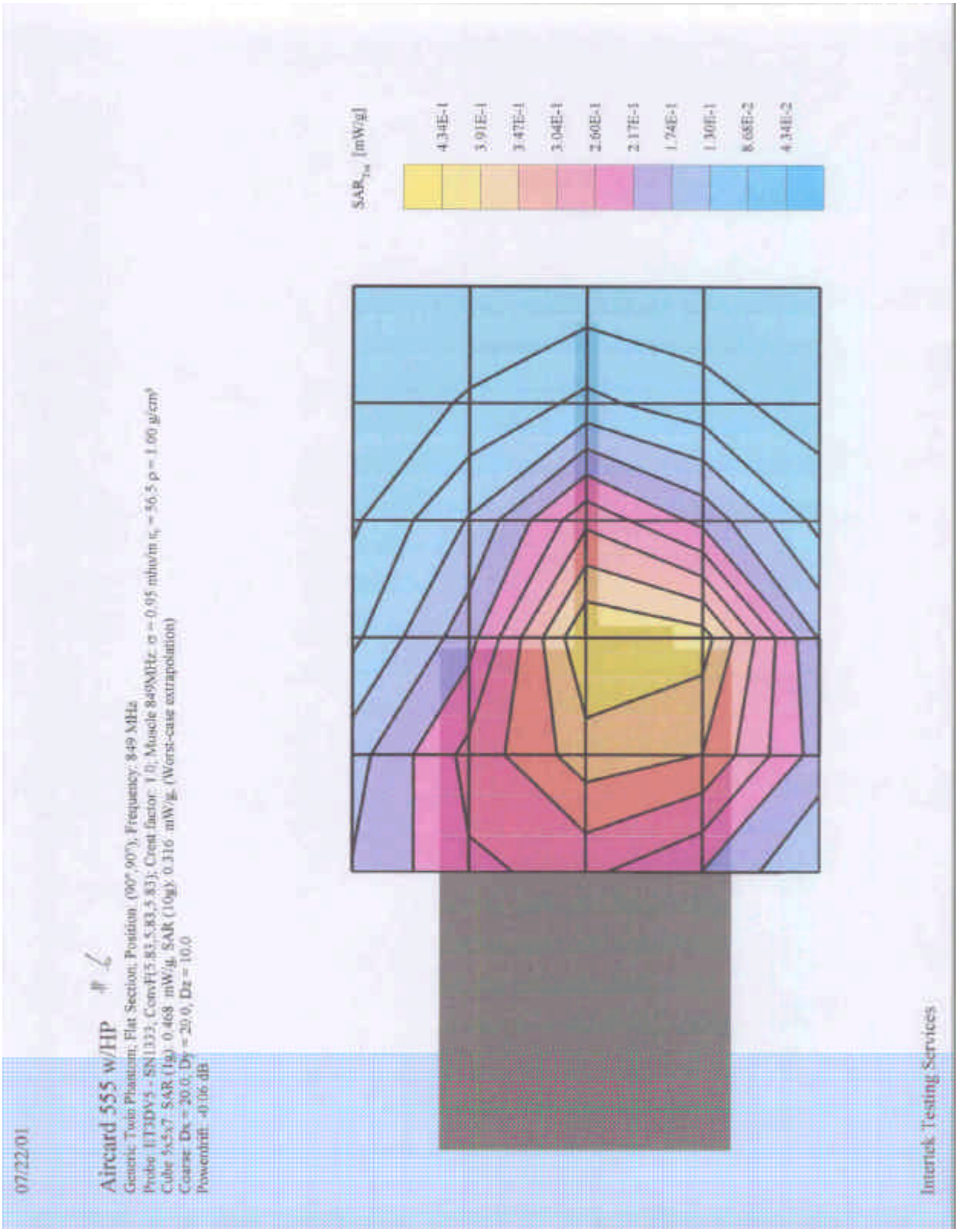

SAR$_{1g}$ [mW/g]
2.65E-1
2.39E-1
2.12E-1
1.86E-1
1.59E-1
1.33E-1
1.06E-1
7.95E-2
5.30E-2
2.65E-2
07/22/01
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 824 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 824MHz: σ = 0.95 mho/m ε$_r$ = 56.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.258 mW/g, SAR (10g): 0.167 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.22 dB
Intertek Testing Services

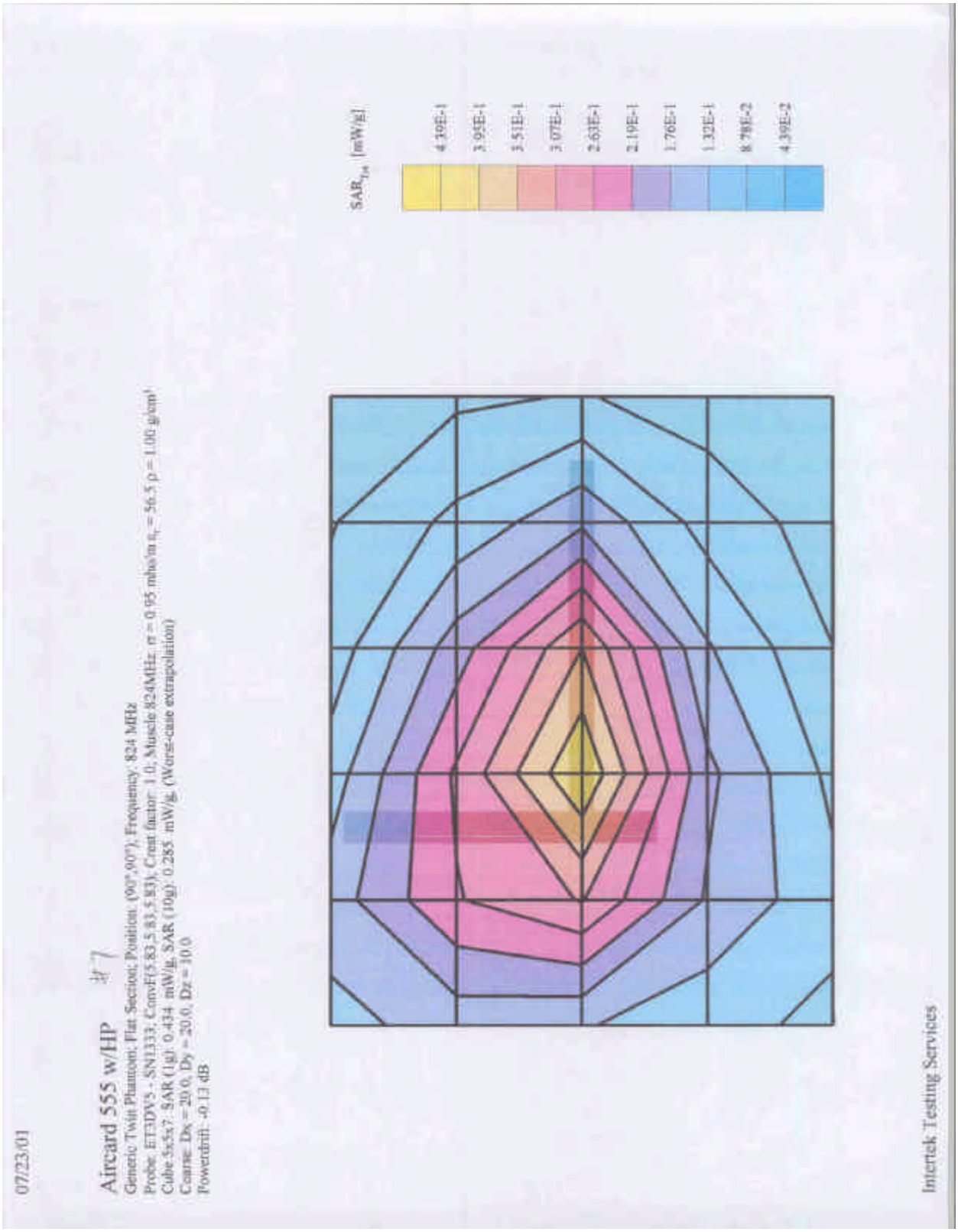

07/22/01
#2
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV5 - SN1733; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 835 MHz: σ = 0.95 mho/m εr = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.318 mW/g; SAR (10g): 0.204 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.08 dB
SAR tot [mW/g]
3.22E-1
2.90E-1
2.58E-1
2.25E-1
1.93E-1
1.61E-1
1.29E-1
9.66E-2
6.44E-2
3.22E-2
Intertek Testing Services

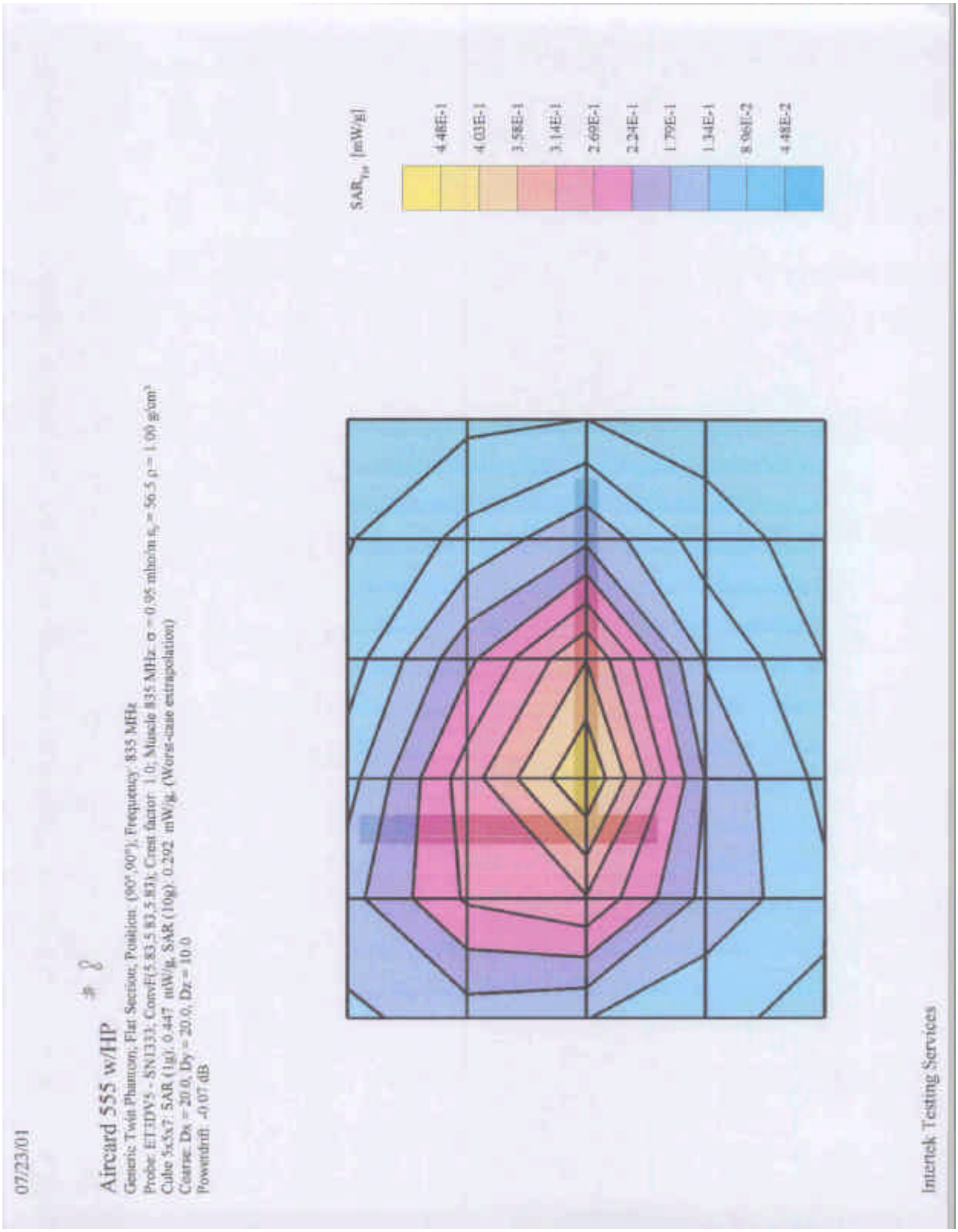

SAR1g (mW/g)
2.56E-1
2.30E-1
2.05E-1
1.79E-1
1.54E-1
1.28E-1
1.02E-1
7.68E-2
5.12E-2
2.56E-2
07/22/01
Aircard 555 w/HP
#3
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 849 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 849MHz: σ = 0.95 mho/m εr = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.245 mW/g, SAR (10g): 0.158 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.27 dB
Intertek Testing Services

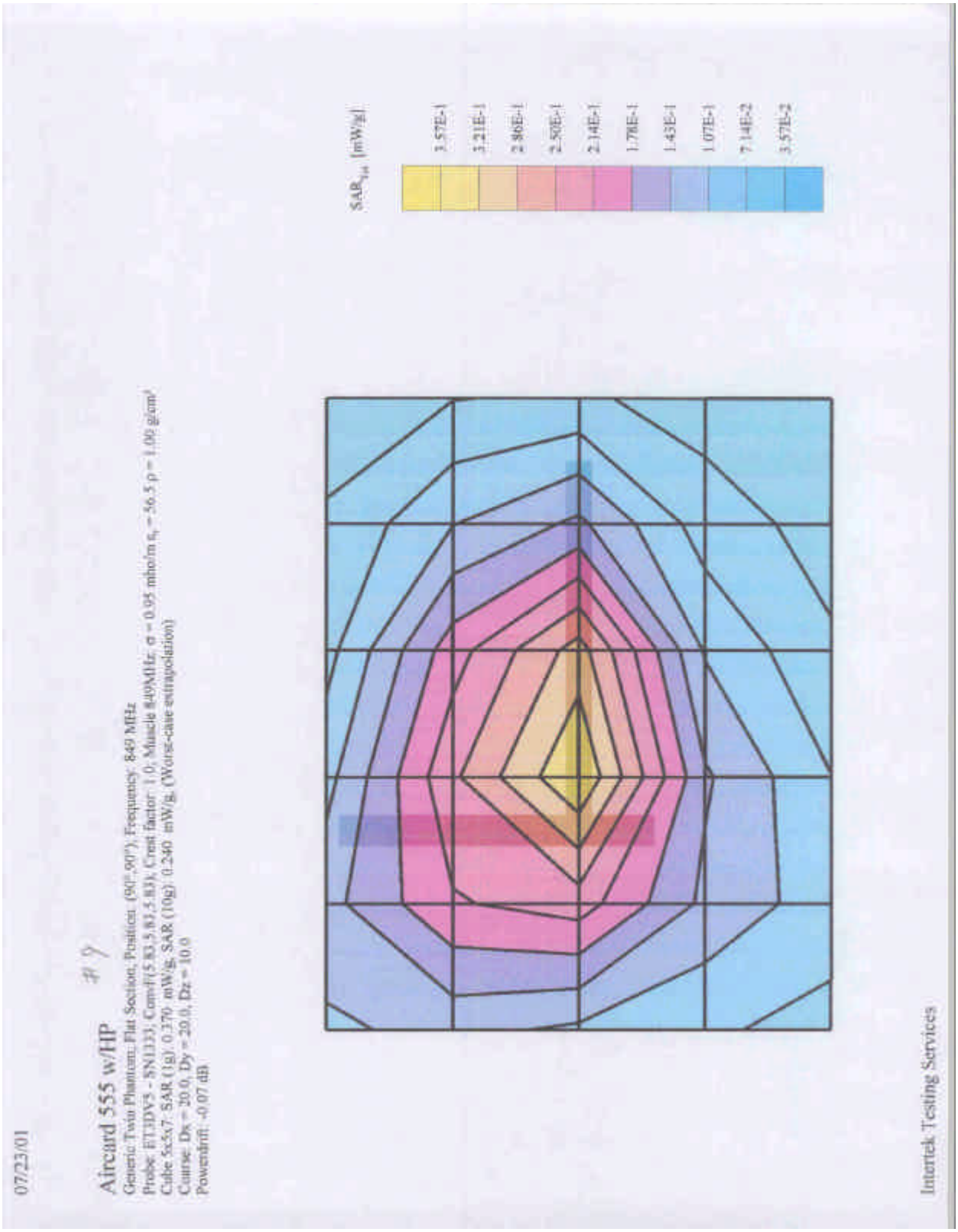

SAR1g [mW/g]
5.83E-1
5.25E-1
4.66E-1
4.08E-1
3.50E-1
2.91E-1
2.33E-1
1.75E-1
1.17E-1
5.83E-2
07/22/01
Aircard 555 w/HP
#4
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 824 MHz
Probe: ET3DV5 - SN1737; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 824MHz: σ = 0.95 mho/m εr = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.602 mW/g; SAR (10g): 0.408 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.08 dB
Intertek Testing Services

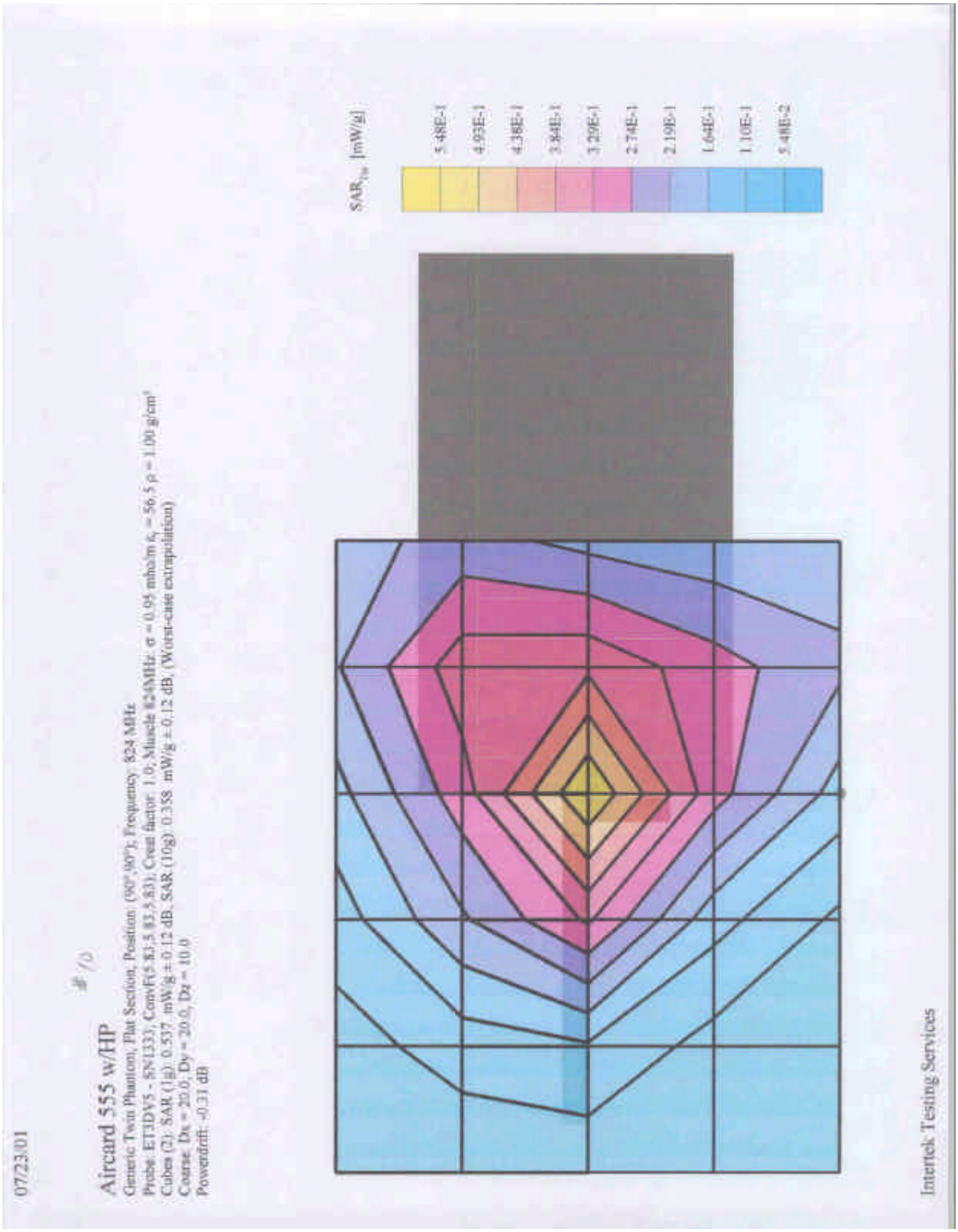

07/22/01
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 835 MHz: σ = 0.95 mho/m ε_r = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.482 mW/g, SAR (10g): 0.326 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: +0.09 dB
SAR_Tot [mW/g]
4.49E-1
4.04E-1
3.59E-1
3.14E-1
2.69E-1
2.25E-1
1.80E-1
1.35E-1
8.98E-2
4.49E-2
Intertek Testing Services

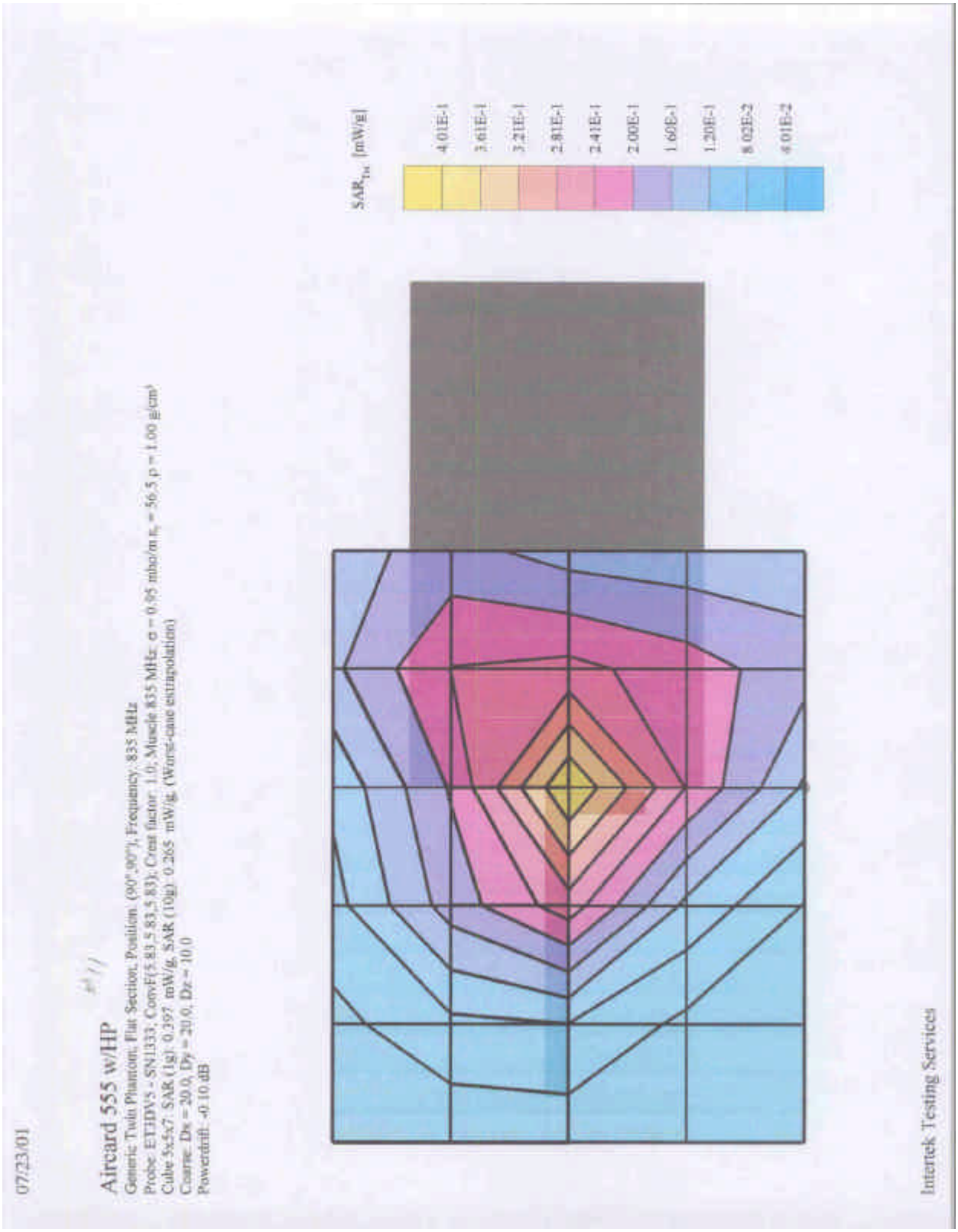

SAR1g [mW/g]
4.34E-1
3.91E-1
3.47E-1
3.04E-1
2.60E-1
2.17E-1
1.74E-1
1.30E-1
8.68E-2
4.34E-2
07/22/01
Aircard 555 w/HP
#4
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 849 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 849MHz: σ = 0.95 mho/m εr = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.468 mW/g, SAR (10g): 0.316 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.116 dB
Intertek Testing Services

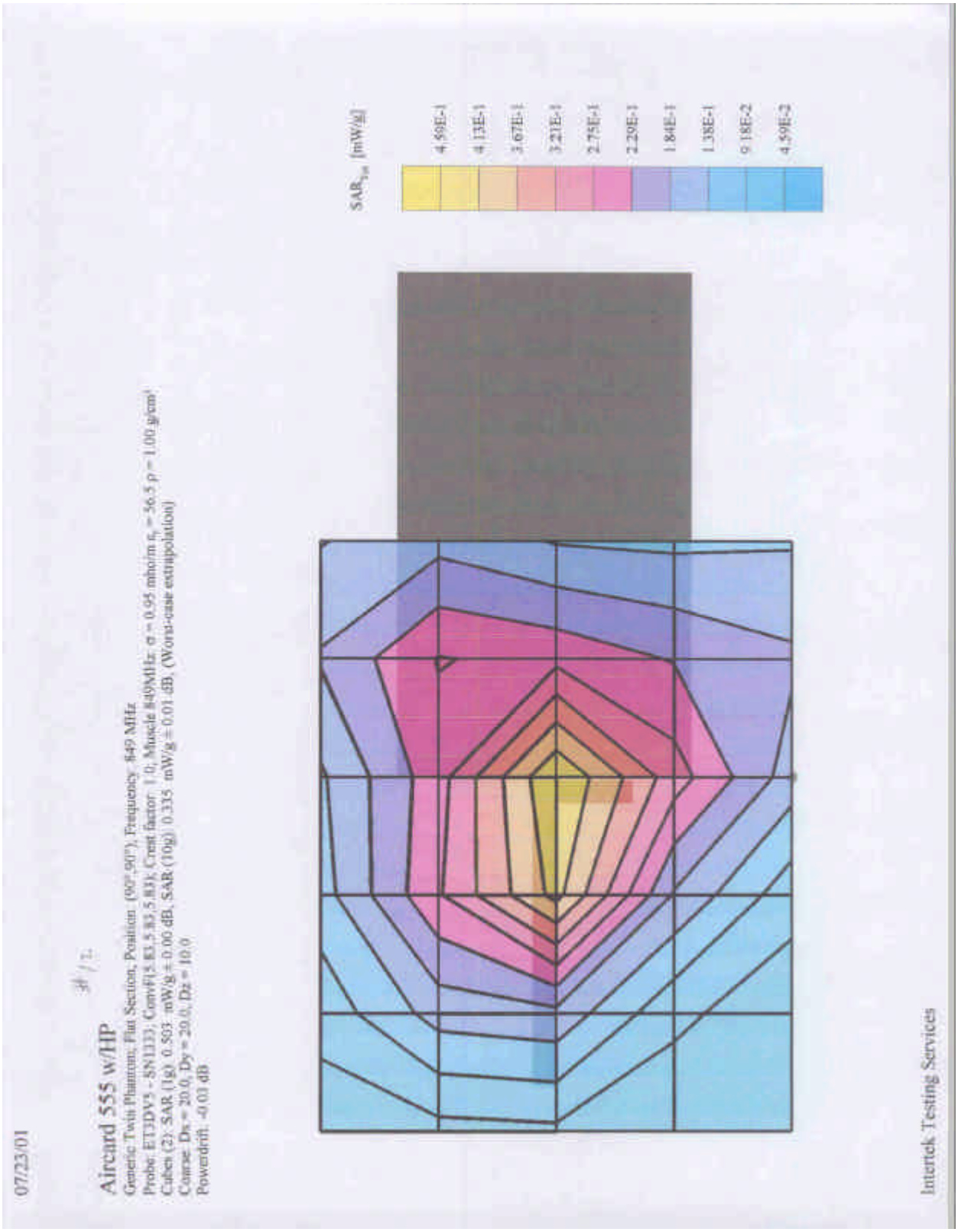

SAR1g [mW/g]
4.39E-1
3.95E-1
3.51E-1
3.07E-1
2.63E-1
2.19E-1
1.76E-1
1.32E-1
8.78E-2
4.39E-2
07/23/01
Aircard 555 w/HP #7
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 824 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 824MHz: σ = 0.95 mho/m ε_r = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.434 mW/g, SAR (10g): 0.285 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.13 dB
Intertek Testing Services

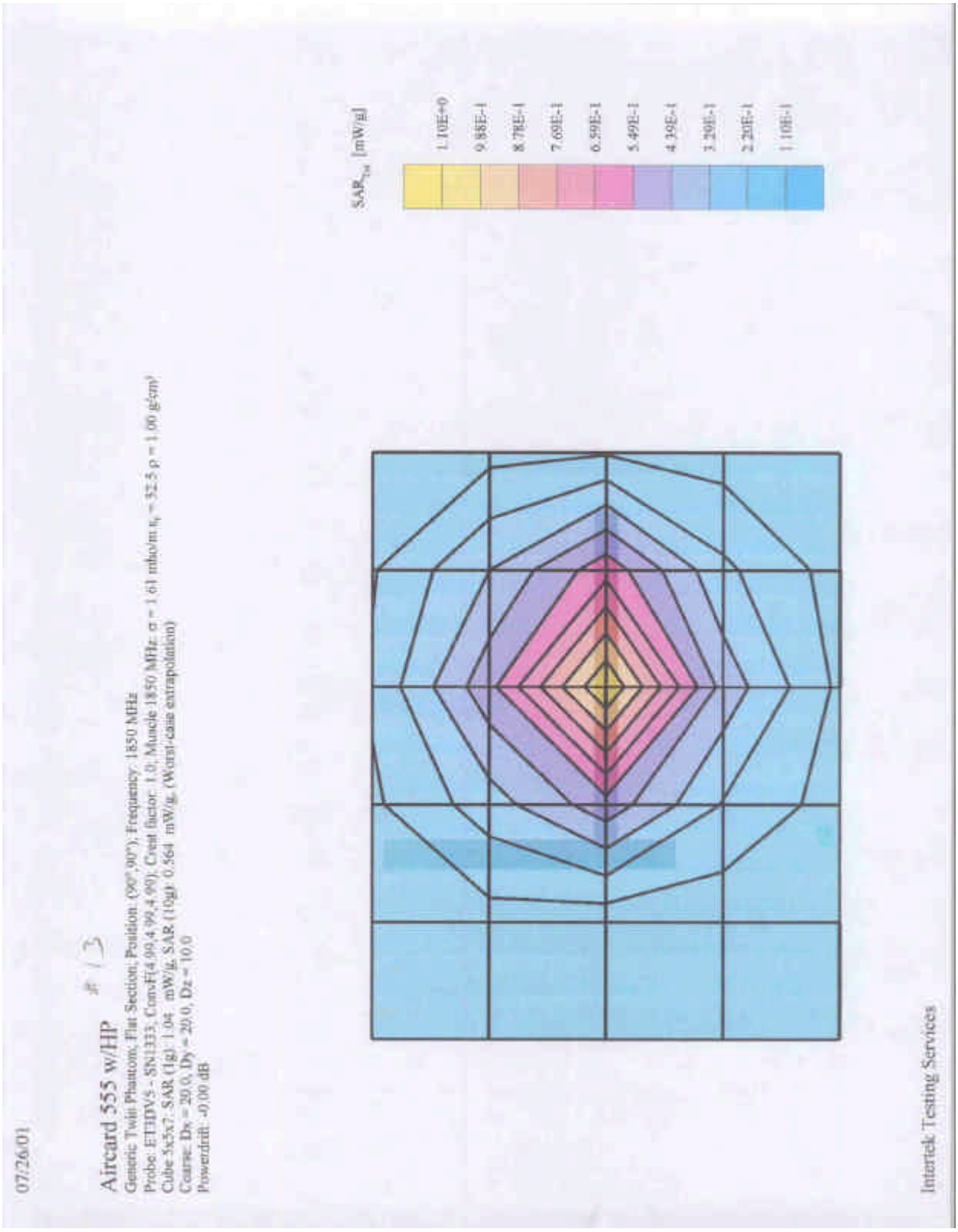

07/23/01
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.87); Crest factor: 1.0; Muscle 835 MHz: σ = 0.95 mho/m ε_r = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.447 mW/g, SAR (10g): 0.292 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.07 dB
SAR1st [mW/g]
4.46E-1
4.03E-1
3.58E-1
3.14E-1
2.69E-1
2.24E-1
1.79E-1
1.34E-1
8.96E-2
4.48E-2
Intertek Testing Services

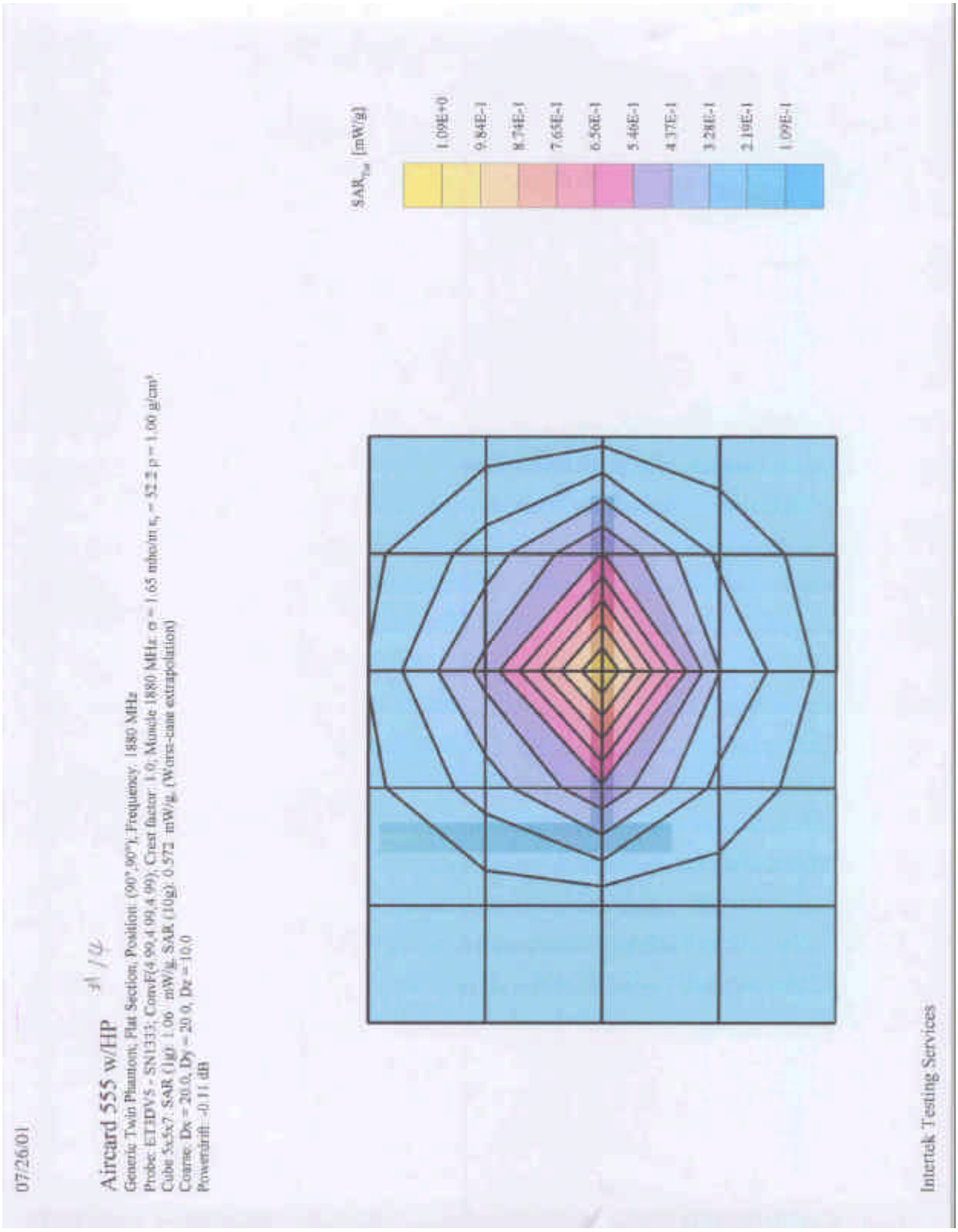

07/23/01
#9
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 849 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 849MHz: σ = 0.95 mho/m ε_r = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.370 mW/g, SAR (10g): 0.240 mW/g, (Worst-case extrapolation)
Course: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.07 dB
SAR1g (mW/g)
3.57E-1
3.21E-1
2.86E-1
2.50E-1
2.14E-1
1.78E-1
1.43E-1
1.07E-1
7.14E-2
3.57E-2
Intertek Testing Services

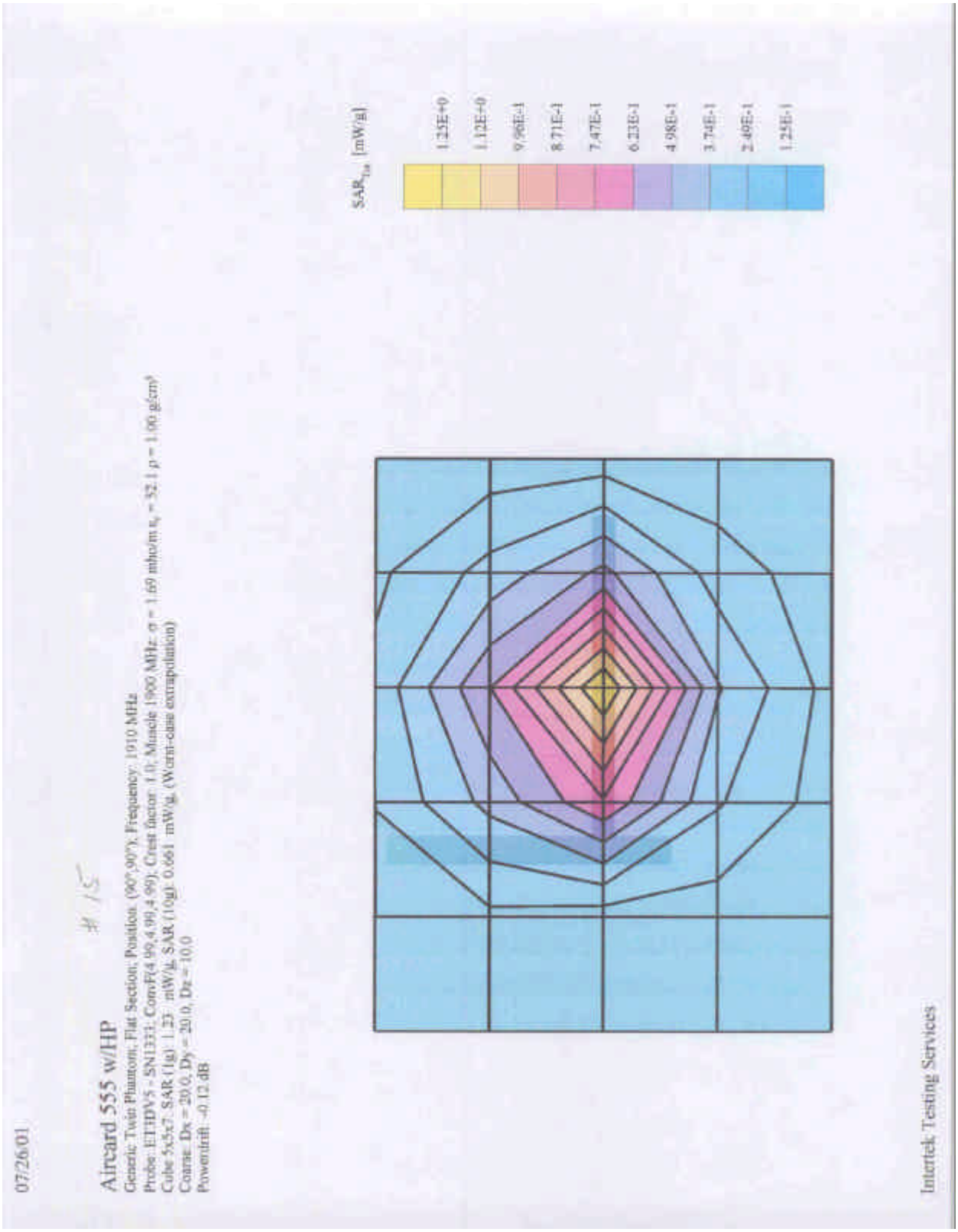

SAR1g [mW/g]
5.48E-1
4.93E-1
4.38E-1
3.84E-1
3.29E-1
2.74E-1
2.19E-1
1.64E-1
1.10E-1
5.48E-2
07/23/01
#10
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 824 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 824MHz: σ = 0.95 mho/m, εr = 56.5 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 0.537 mW/g ± 0.12 dB, SAR (10g): 0.358 mW/g ± 0.12 dB, (Worst-case extrapolation)
Coarse: Dx = 25.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.31 dB
Intertek Testing Services

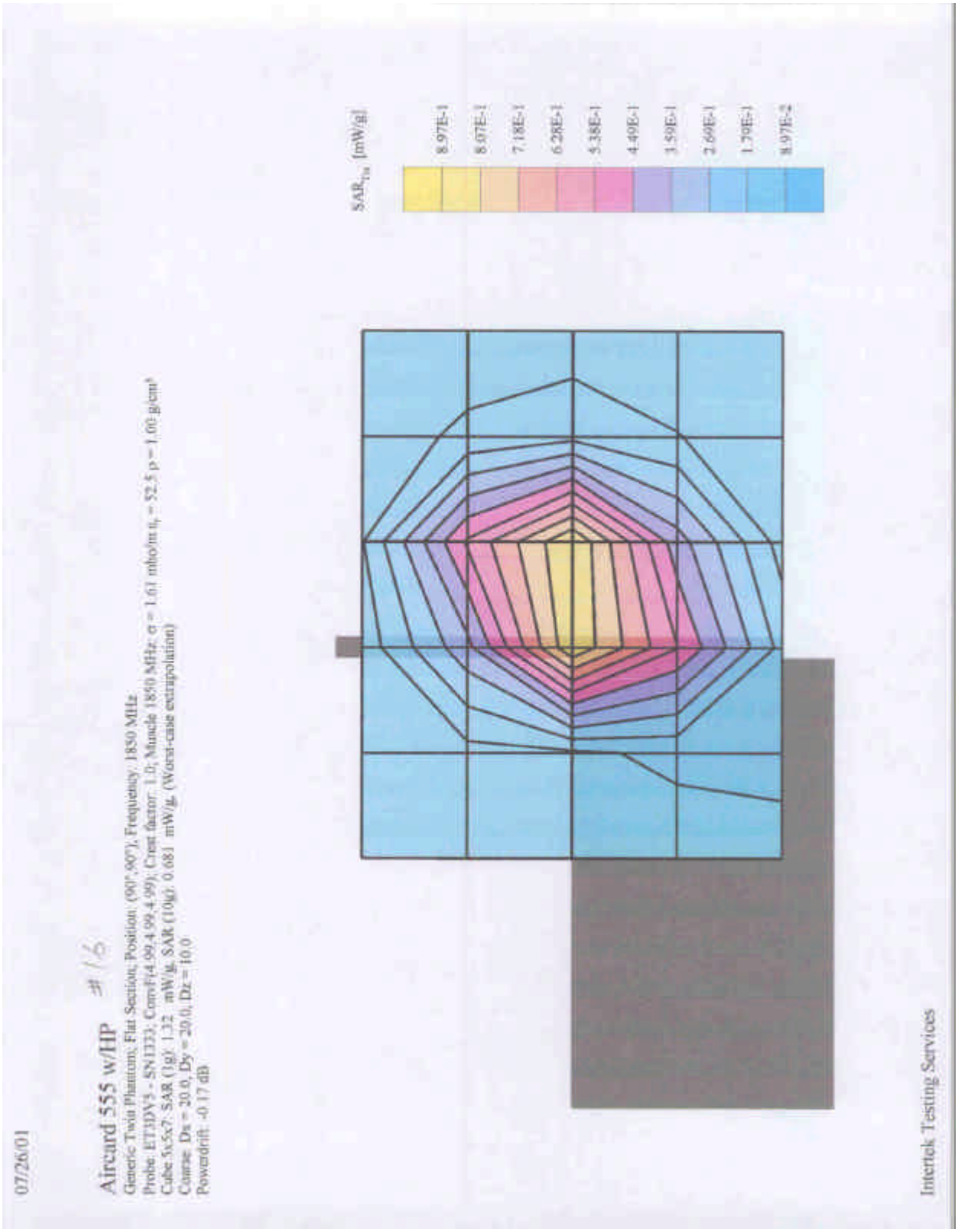

07/23/01
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 835 MHz
Probe: ET3DV5 - SN1333; ConvF(5.83,5.83,5.83); Crest factor: 1.0; Muscle 835 MHz: σ = 0.95 mho/m ε_r = 56.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.397 mW/g, SAR (10g): 0.265 mW/g (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.10 dB
SAR_tot [mW/g]
4.01E-1
3.61E-1
3.21E-1
2.81E-1
2.41E-1
2.00E-1
1.60E-1
1.20E-1
8.02E-2
4.01E-2
Intertek Testing Services

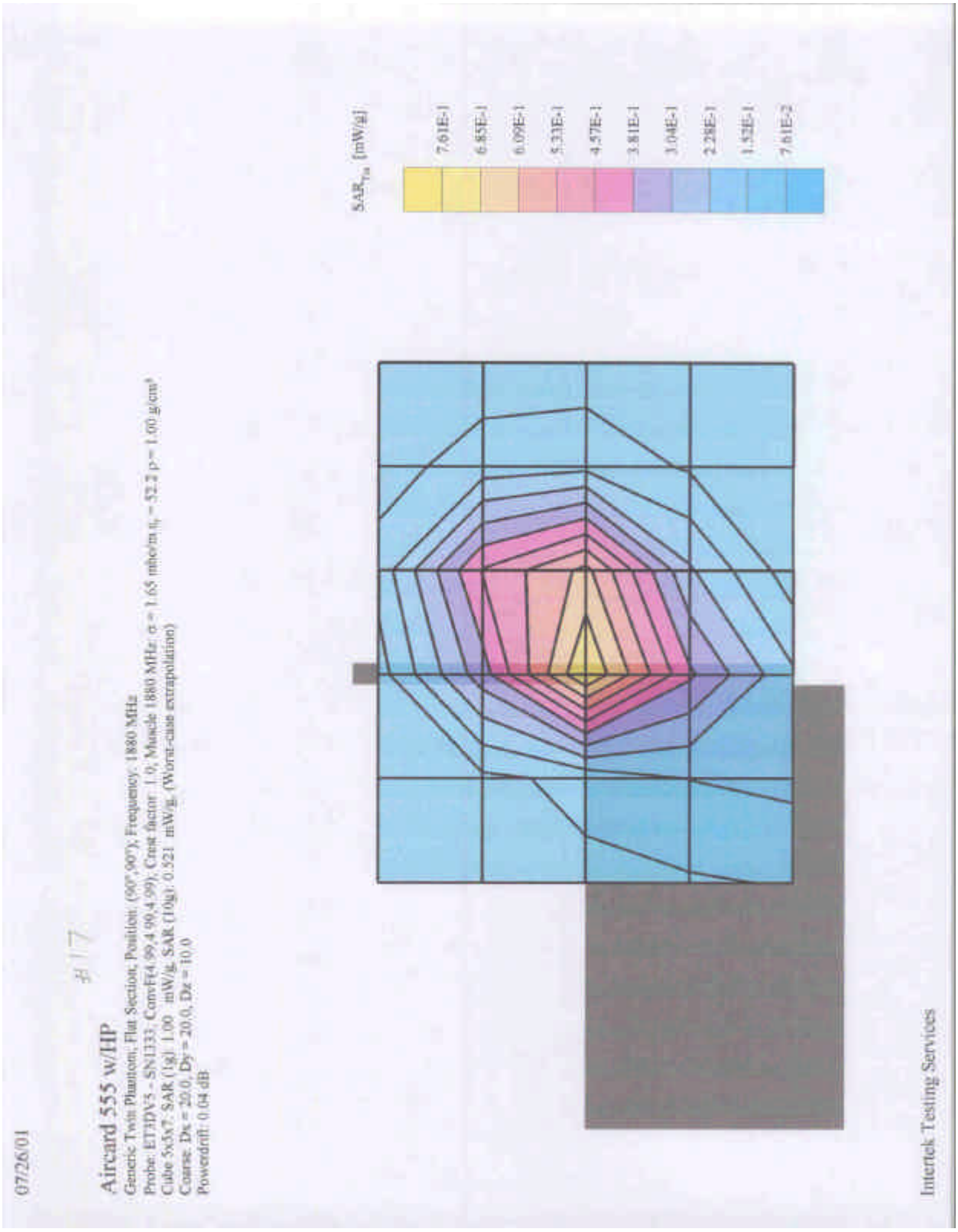

SAR1g [mW/g]
4.59E-1
4.13E-1
3.67E-1
3.21E-1
2.75E-1
2.29E-1
1.84E-1
1.38E-1
9.18E-2
4.59E-2
07/23/01
#1/2
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 849 MHz
Probe: ET3DV5 - SN1333; ConvF(4.83,5.83,5.83); Crest factor: 1.0; Muscle 849MHz: σ = 0.95 mho/m εr = 56.5 ρ = 1.00 g/cm³
Cube (2): SAR (1g): 0.503 mW/g ± 0.00 dB, SAR (10g): 0.335 mW/g ± 0.01 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.03 dB
Intertek Testing Services

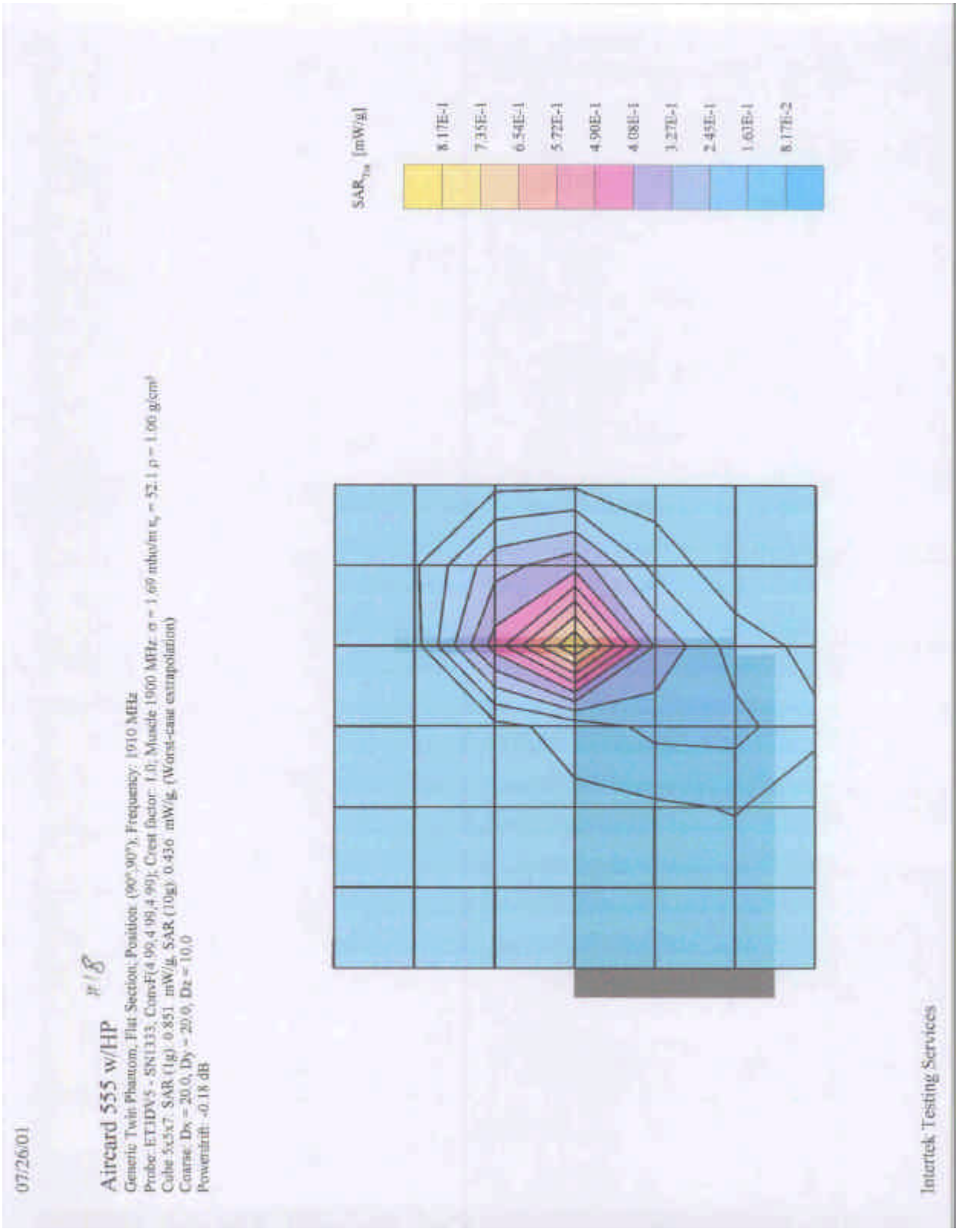

07/26/01
Aircard 555 w/HP
13
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1850 MHz
Probe: ET3DV5 - SN1333; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1850 MHz: σ = 1.61 mho/m ε_r = 52.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.04 mW/g, SAR (10g): 0.564 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.00 dB
SAR_tot [mW/g]
1.10E+0
9.88E-1
8.78E-1
7.69E-1
6.59E-1
5.49E-1
4.39E-1
3.29E-1
2.20E-1
1.10E-1
Intertek Testing Services

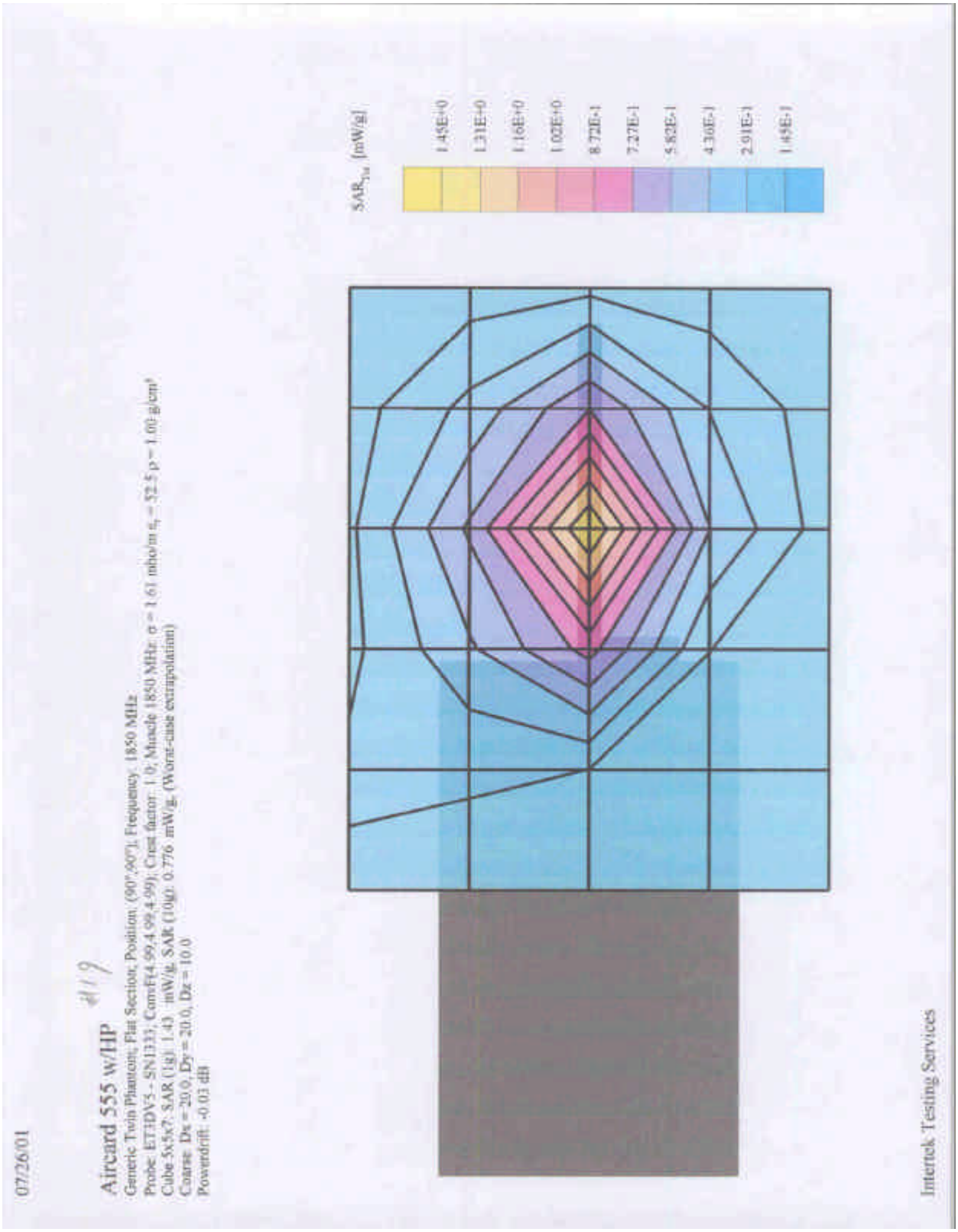

07/26/01
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1880 MHz
Probe: ET3DV5 - SN1333; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1880 MHz: σ = 1.65 mho/m ε_r = 52.2 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.06 mW/g, SAR (10g): 0.572 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.11 dB
SAR_Tot [mW/g]
1.09E+0
9.84E-1
8.74E-1
7.65E-1
6.56E-1
5.46E-1
4.37E-1
3.28E-1
2.19E-1
1.09E-1
Intertek Testing Services

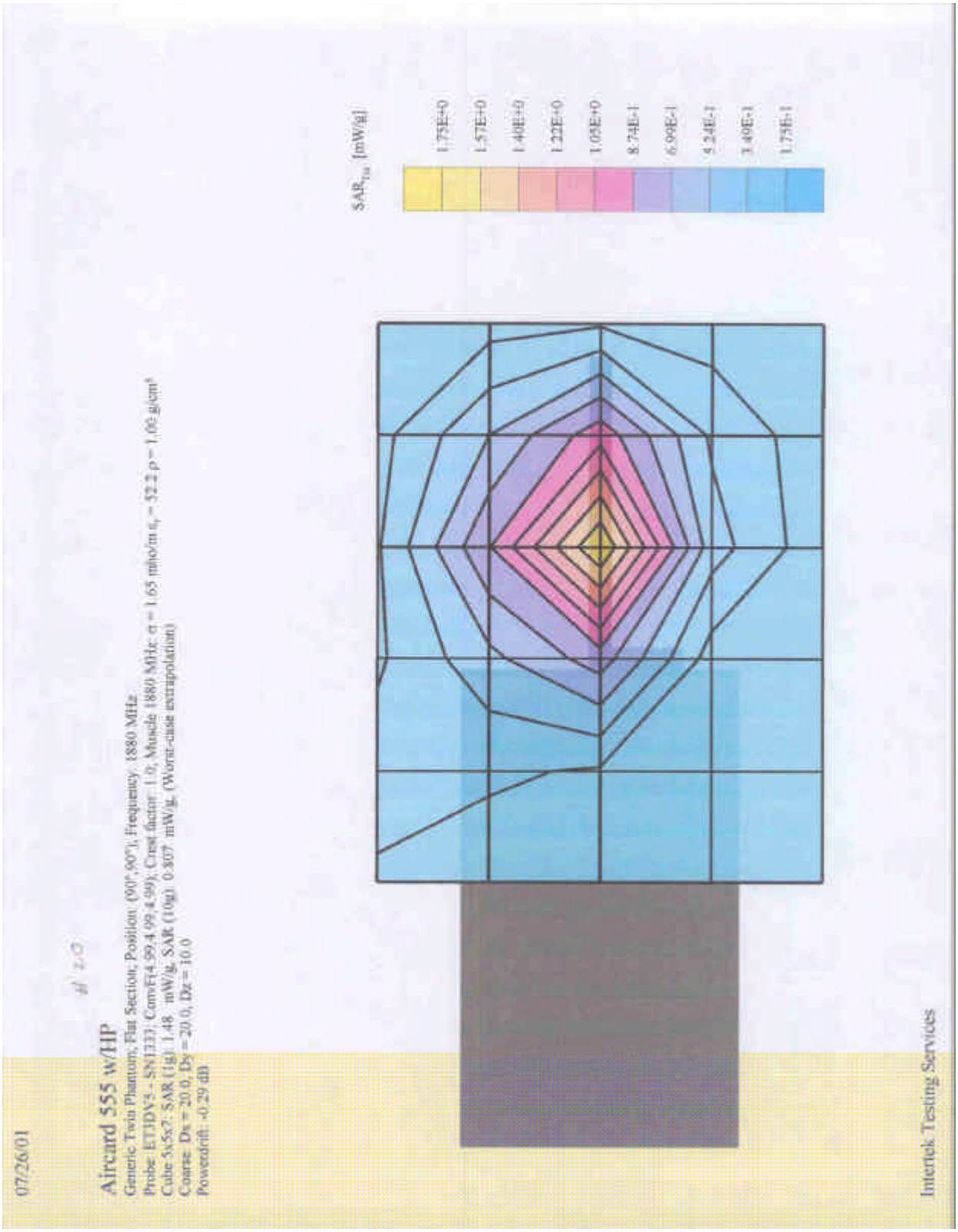

07/26/01
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1910 MHz
Probe: ET3DV5 - SN1331; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1900 MHz: σ = 1.69 mho/m ε_r = 52.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.23 mW/g, SAR (10g): 0.661 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.12 dB
SAR_Tot [mW/g]
1.25E+0
1.12E+0
9.96E-1
8.71E-1
7.47E-1
6.23E-1
4.98E-1
3.74E-1
2.49E-1
1.25E-1
Intertek Testing Services

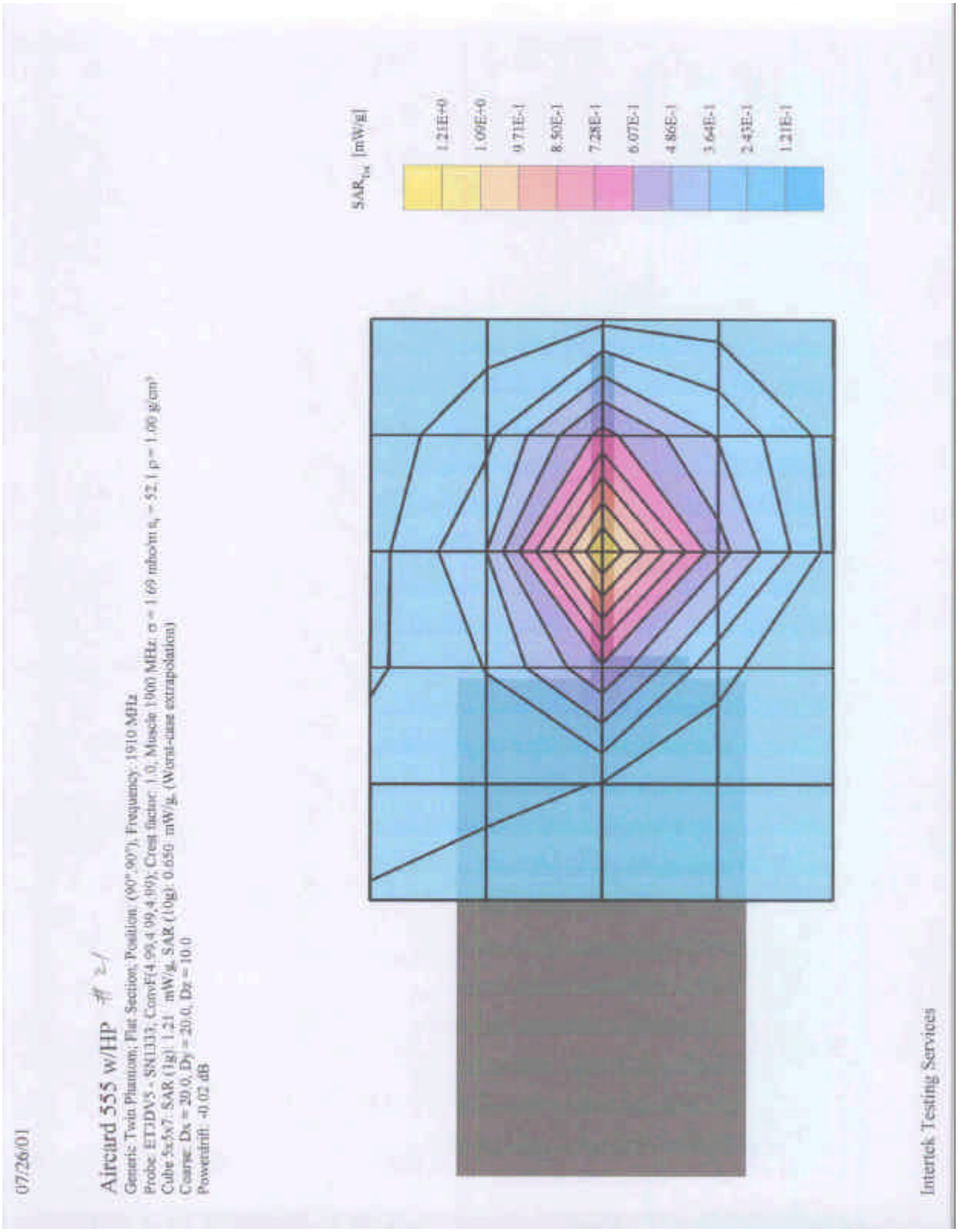

07/26/01
#16
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1850 MHz
Probe: ET3DV5 - SN1733; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1850 MHz: σ = 1.61 mho/m ε_r = 52.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.32 mW/g, SAR (10g): 0.681 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.17 dB
SAR_1g [mW/g]
8.97E-1
8.97E-1
7.18E-1
6.28E-1
5.38E-1
4.49E-1
3.59E-1
2.69E-1
1.79E-1
8.97E-2
Intertek Testing Services

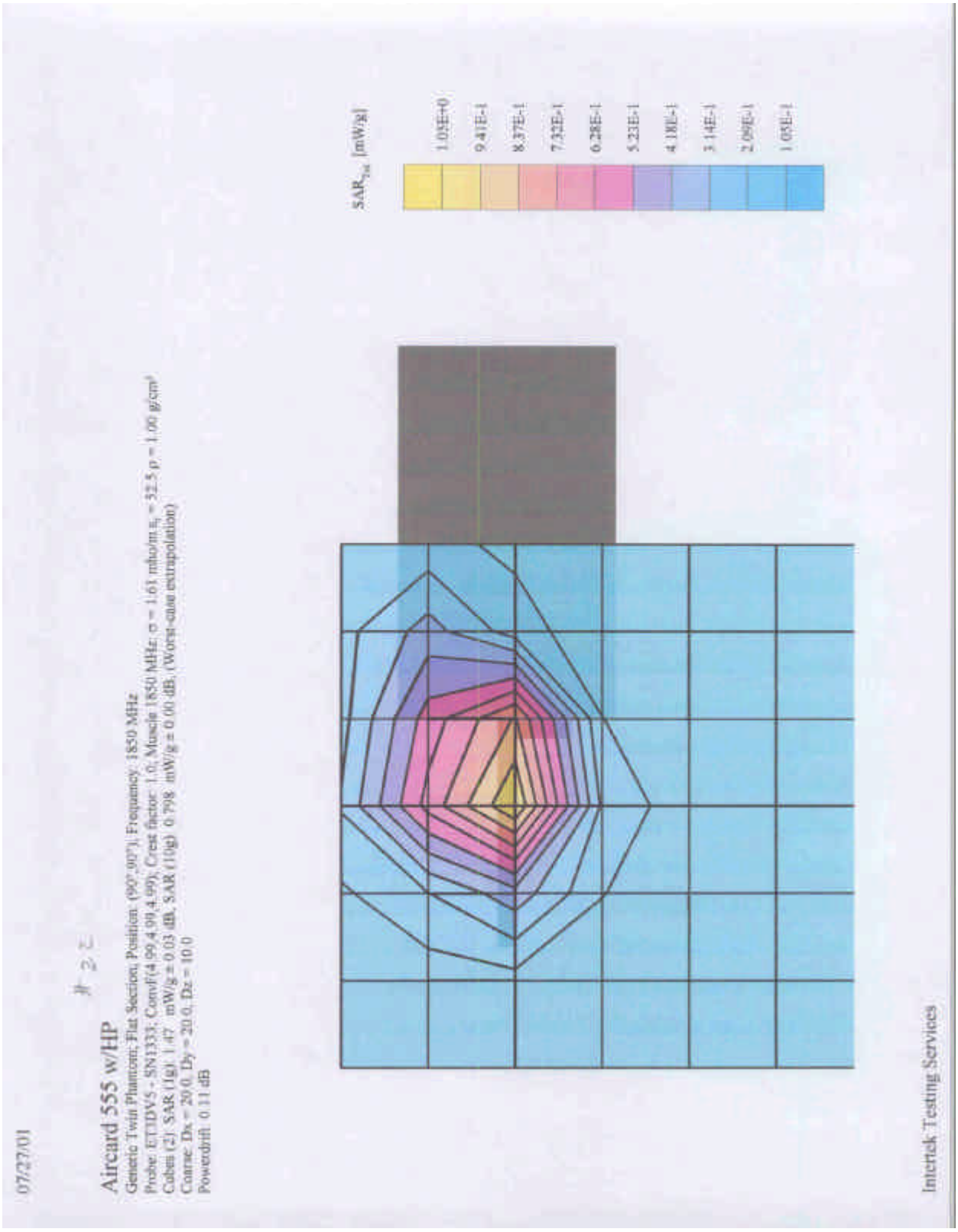

SAR_1g [mW/g]
7.61E-1
6.85E-1
6.09E-1
5.33E-1
4.57E-1
3.81E-1
3.04E-1
2.28E-1
1.52E-1
7.61E-2
#17
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1880 MHz
Probe: ET3DV5 - SN1333; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1880 MHz: σ = 1.65 mho/m ε_r = 52.2 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g) 1.00 mW/g, SAR (10g): 0.521 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.04 dB
07/26/01
Intertek Testing Services

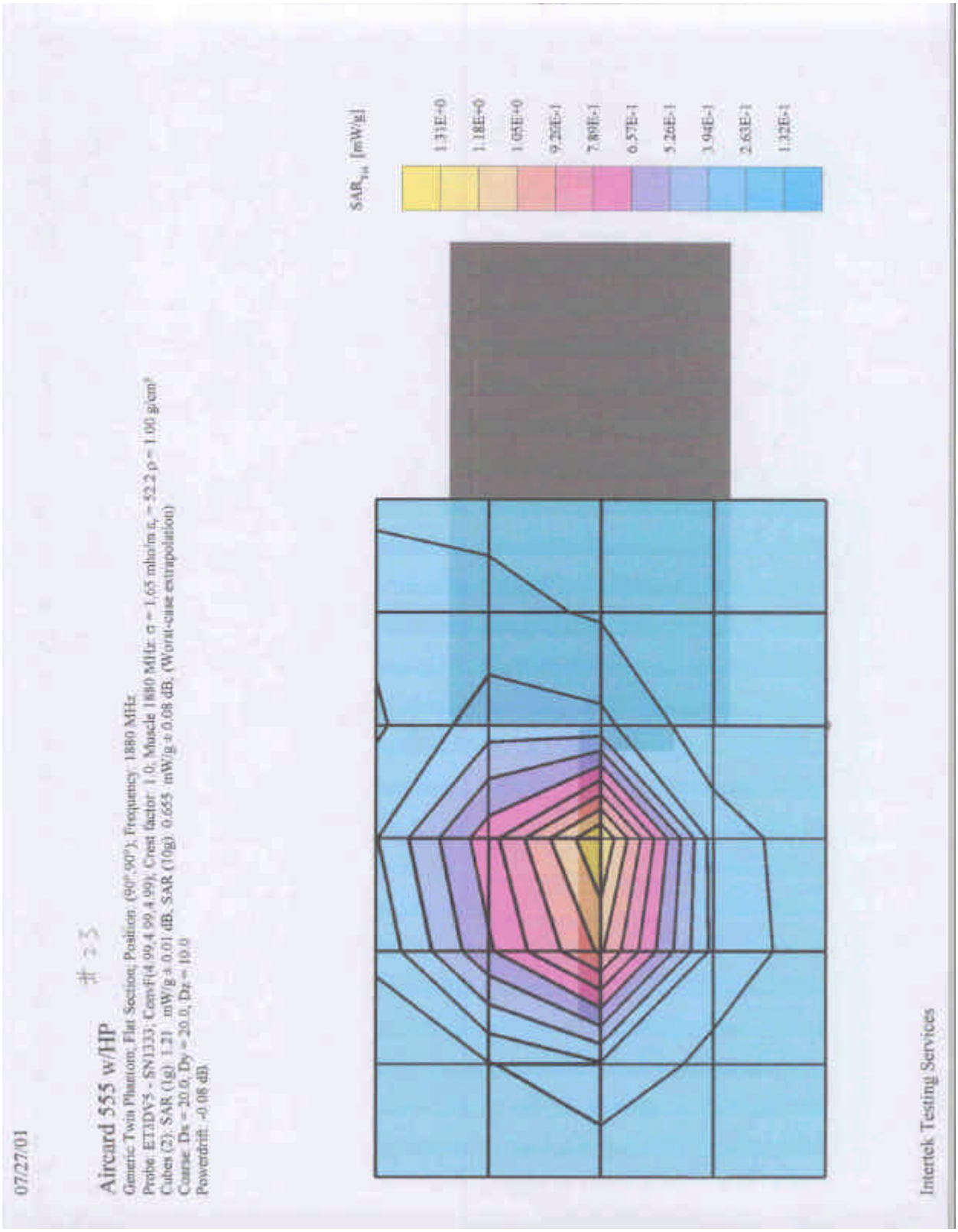

07/26/01
#18
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1910 MHz
Probe: ET1DV5 - SN1333, ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1900 MHz: σ = 1.69 mho/m ε_r = 52.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 0.851 mW/g, SAR (10g): 0.436 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.18 dB
SAR_Tot [mW/g]
8.17E-1
7.35E-1
6.54E-1
5.72E-1
4.90E-1
4.08E-1
3.27E-1
2.45E-1
1.63E-1
8.17E-2
Intertek Testing Services

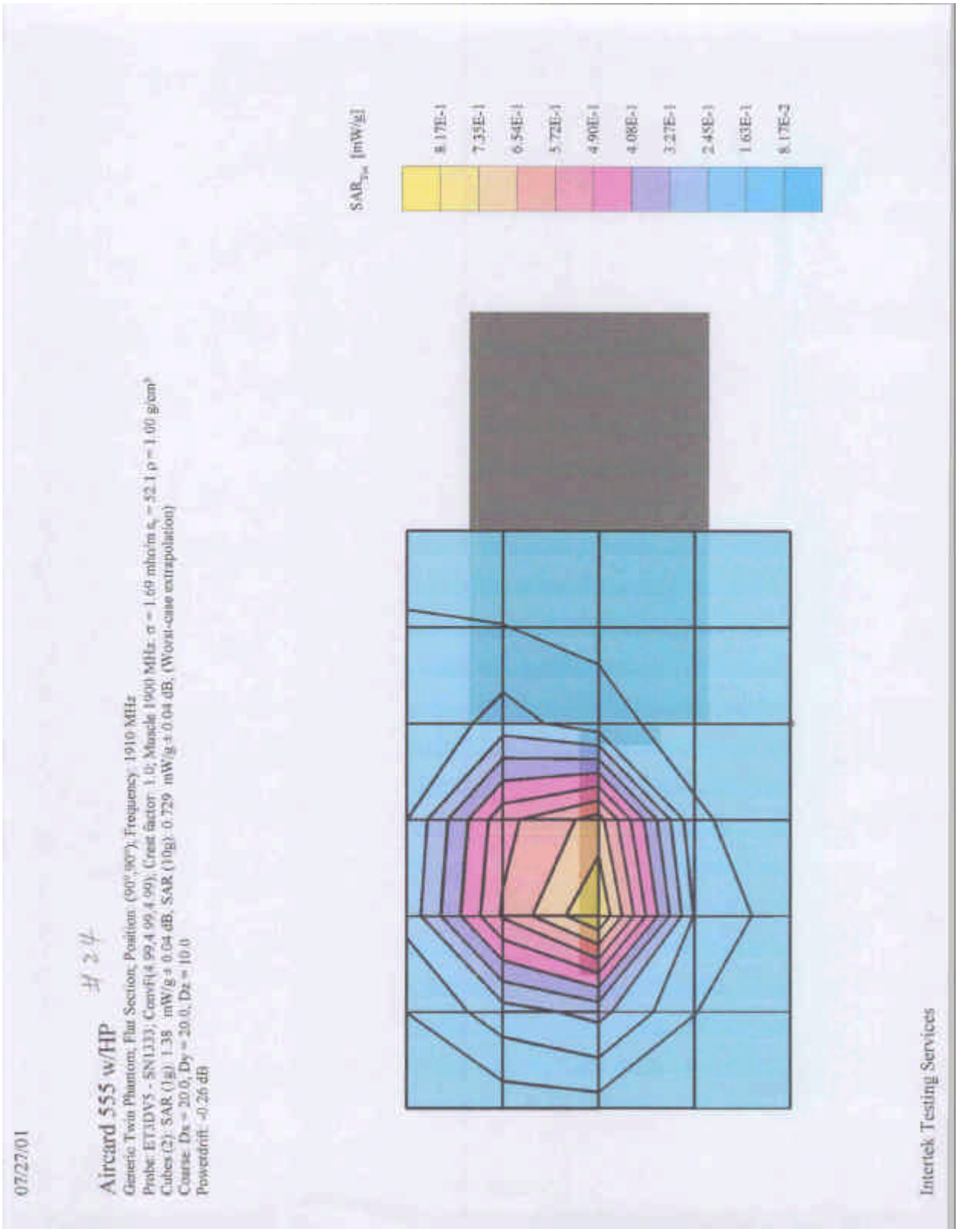

SAR1g [mW/g]
1.45E+0
1.31E+0
1.16E+0
1.02E+0
8.72E-1
7.27E-1
5.82E-1
4.36E-1
2.91E-1
1.45E-1
07/26/01
#19
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1850 MHz
Probe: ET3DV5 - SN1333; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1850 MHz: σ = 1.61 mho/m εr = 52.5 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.43 mW/g, SAR (10g): 0.776 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.03 dB
Intertek Testing Services


SAR1g [mW/g]
1.75E+0
1.57E+0
1.40E+0
1.22E+0
1.05E+0
8.74E-1
6.99E-1
5.24E-1
3.49E-1
1.75E-1
07/26/01
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1880 MHz
Probe: ET3DV5 - SN1337; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle (880 MHz: σ = 1.65 mho/m εr = 52.2 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.48 mW/g, SAR (10g): 0.807 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.29 dB
Intertek Testing Services


SAR1g [mW/g]
1.21E+0
1.09E+0
9.71E-1
8.50E-1
7.28E-1
6.07E-1
4.86E-1
3.64E-1
2.43E-1
1.21E-1
07/26/01
Aircard 555 w/HP #2
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1910 MHz
Probe: ET3DV5 - SN1333; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1900 MHz: σ = 1.69 mho/m ε_r = 52.1 ρ = 1.00 g/cm³
Cube 5x5x7: SAR (1g): 1.21 mW/g, SAR (10g): 0.650 mW/g, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.02 dB
Intertek Testing Services


07/27/01
#: 2 c
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1850 MHz
Probe: ET3DV5 - SN1333; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1850 MHz: σ = 1.61 mho/m, ε_r = 52.5, ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.47 mW/g ± 0.03 dB, SAR (10g): 0.798 mW/g ± 0.00 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: 0.11 dB
SAR_tot [mW/g]
1.05E+0
9.41E-1
8.37E-1
7.32E-1
6.28E-1
5.23E-1
4.18E-1
3.14E-1
2.09E-1
1.05E-1
Intertek Testing Services


07/27/01
#23
Aircard 555 w/HP
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 1880 MHz
Probe: ET3DV5 - SN1333; ConvF(4.99,4.99,4.99); Crest factor: 1.0; Muscle 1880 MHz: σ = 1.65 mho/m, ε_r = 52.2 ρ = 1.00 g/cm³
Cubes (2): SAR (1g): 1.21 mW/g ± 0.01 dB, SAR (10g): 0.655 mW/g ± 0.08 dB, (Worst-case extrapolation)
Coarse: Dx = 20.0, Dy = 20.0, Dz = 10.0
Powerdrift: -0.08 dB
SAR_1g [mW/g]
1.31E+0
1.18E+0
1.05E+0
9.20E-1
7.89E-1
6.57E-1
5.26E-1
3.94E-1
2.63E-1
1.32E-1
Intertek Testing Services


SAR1g [mW/g]
8.17E-1
7.35E-1
6.54E-1
5.72E-1
4.90E-1
4.08E-1
3.27E-1
2.45E-1
1.63E-1
8.17E-2
07/27/01
Aircard 555 w/HP
Intertek Testing Services

APPENDIX B - E-Field Probe Calibration Data

See attached pages.

Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland, Phone +41 1 245 97 00, Fax +41 1 245 97 79

Calibration Certificate

Dosimetric E-Field Probe

Type:	**ET3DV5**
Serial Number:	**1333**
Place of Calibration:	**Zurich**
Date of Calibration:	**April 23, 2001**
Calibration Interval:	**12 months**

Schmid & Partner Engineering AG hereby certifies, that this device has been calibrated on the date indicated above. The calibration was performed in accordance with specifications and procedures of Schmid & Partner Engineering AG.

Wherever applicable, the standards used in the calibration process are traceable to international standards. In all other cases the standards of the Laboratory for EMF and Microwave Electronics at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland have been applied.

Calibrated by:	Nikolai Nesiana
Approved by:	Jusic Katja

Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland, Telephone +41 1 245 97 00, Fax +41 1 245 97 79

Probe ET3DV5

SN:1333

Manufactured:	December 20, 1997
Last calibration:	April 10, 2000
Recalibrated:	April 23, 2001

Calibrated for System DASY3

ET3DV5 SN:1333

DASY3 - Parameters of Probe: ET3DV5 SN:1333

Sensitivity in Free Space

NormX	2.37 $\mu V/(V/m)^2$
NormY	2.38 $\mu V/(V/m)^2$
NormZ	2.33 $\mu V/(V/m)^2$

Diode Compression

DCP X	100 mV
DCP Y	100 mV
DCP Z	100 mV

Sensitivity in Tissue Simulating Liquid

Head 450 MHz ε_r = 43.5 ± 5% σ = 0.87 ± 10% mho/m

ConvF X	6.25 extrapolated	Boundary effect:	
ConvF Y	6.25 extrapolated	Alpha	0.19
ConvF Z	6.25 extrapolated	Depth	3.06

Head 900 MHz ε_r = 42 ± 5% σ = 0.97 ± 10% mho/m

ConvF X	5.83 ± 7% (k=2)	Boundary effect:	
ConvF Y	5.83 ± 7% (k=2)	Alpha	0.38
ConvF Z	5.83 ± 7% (k=2)	Depth	2.70

Brain 1500 MHz ε_r = 41 ± 5% σ = 1.32 ± 10% mho/m

ConvF X	5.27 interpolated	Boundary effect:	
ConvF Y	5.27 interpolated	Alpha	0.63
ConvF Z	5.27 interpolated	Depth	2.23

Brain 1800 MHz ε_r = 41 ± 5% σ = 1.69 ± 10% mho/m

ConvF X	4.99 ± 7% (k=2)	Boundary effect:	
ConvF Y	4.99 ± 7% (k=2)	Alpha	0.75
ConvF Z	4.99 ± 7% (k=2)	Depth	1.99

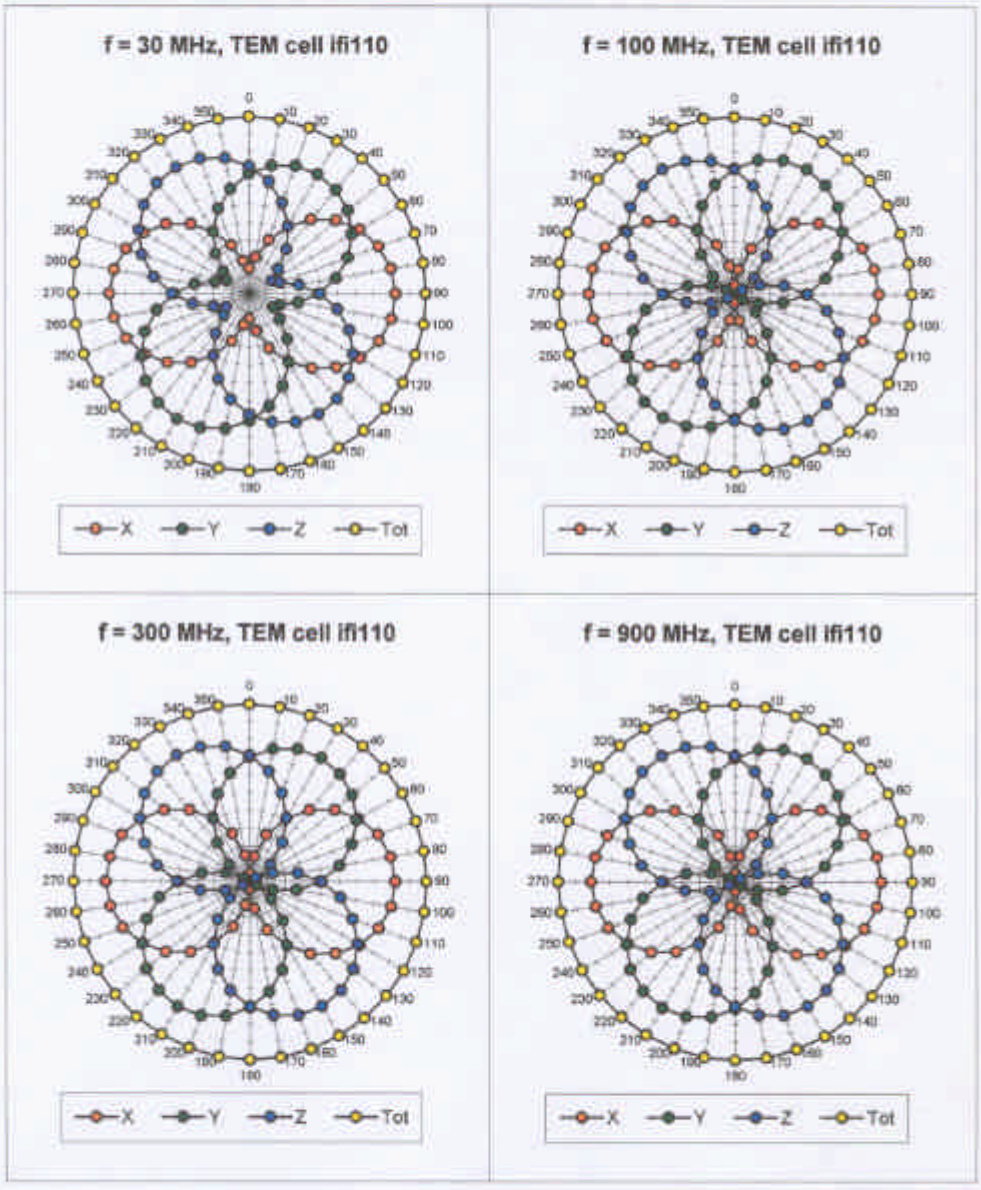
Sensor Offset

Probe Tip to Sensor Center	2.7	mm
Optical Surface Detection	1.6 ± 0.2	mm

Page 2 of 7

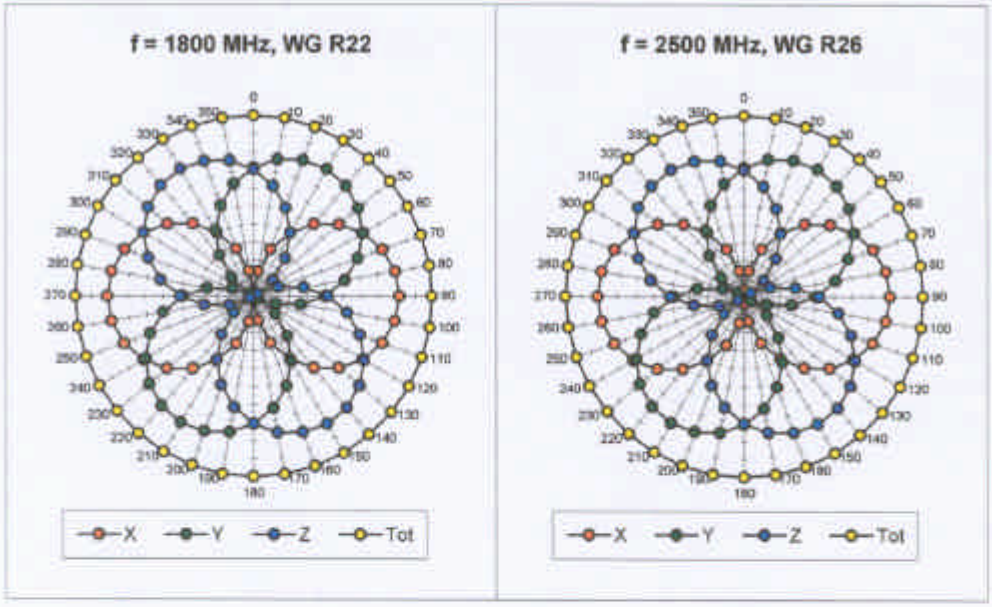
ET3DV5 SN:1333

Receiving Pattern (ϕ), θ = 0°

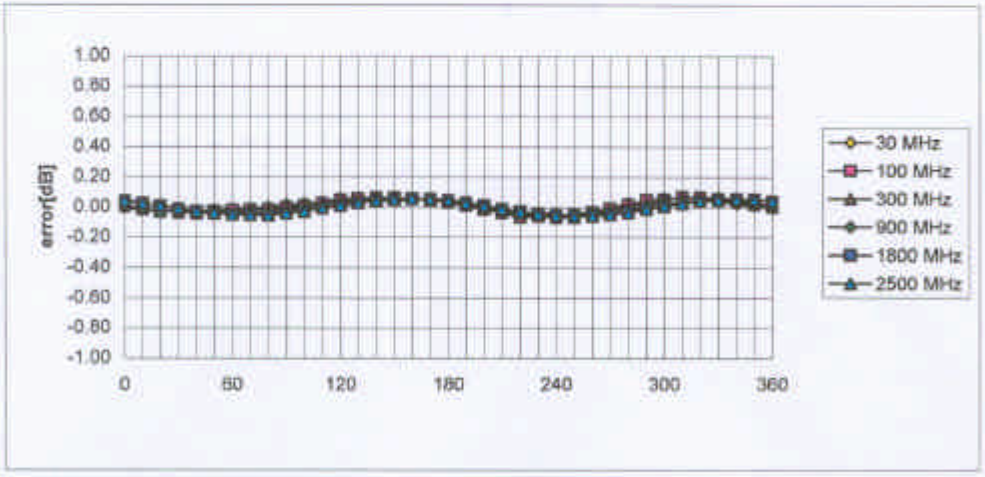


Page 3 of 7

ET3DV5 SN:1333



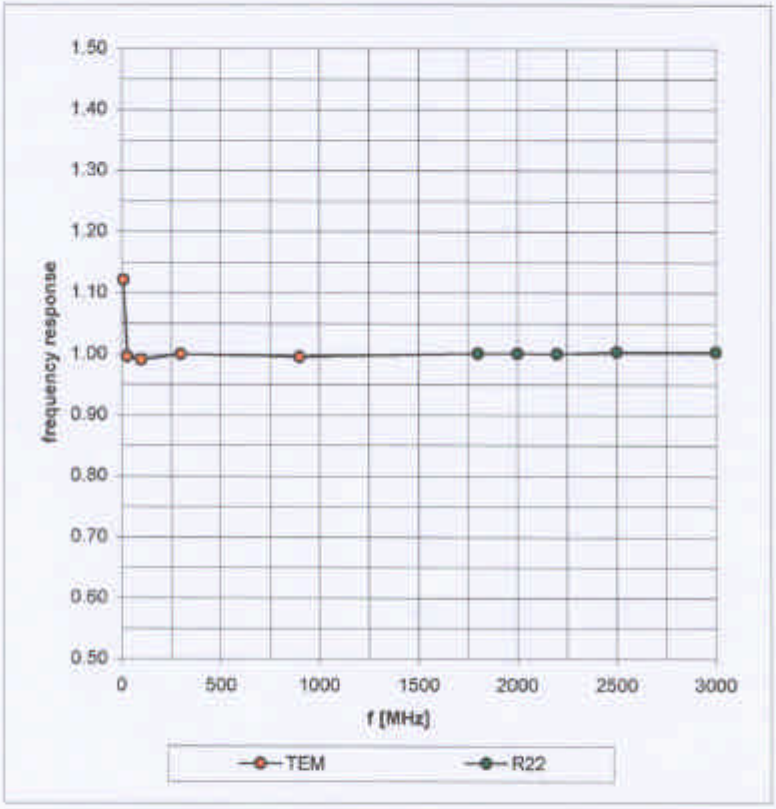
Isotropy Error (ϕ), θ = 0°



ET3DV5 SN:1333

Frequency Response of E-Field

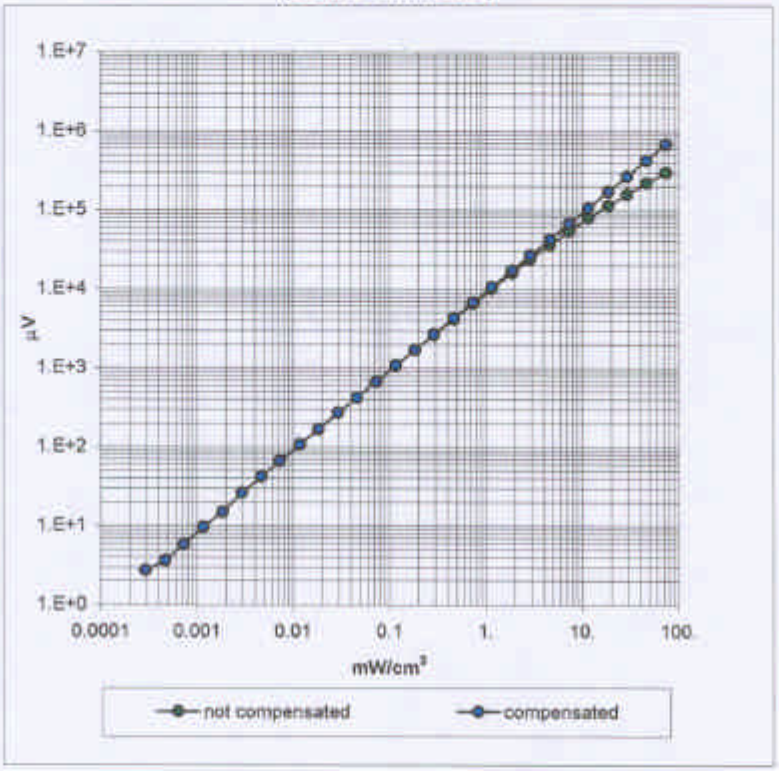
(TEM-Cell:ifi110, Waveguide R22)

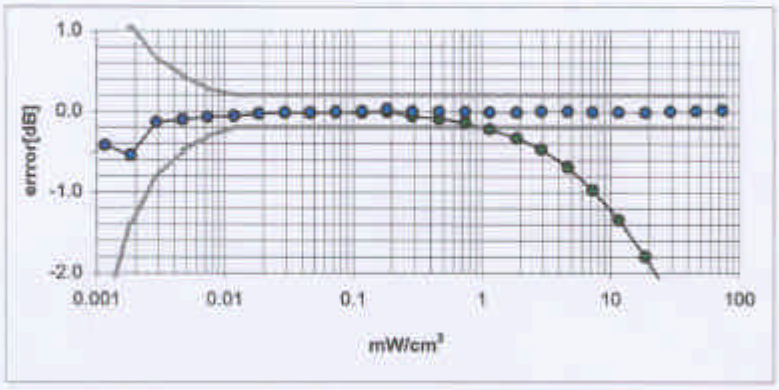


ET3DV5 SN:1333

Dynamic Range f(SAR_{brain})

(TEM-Cell:ifi110)

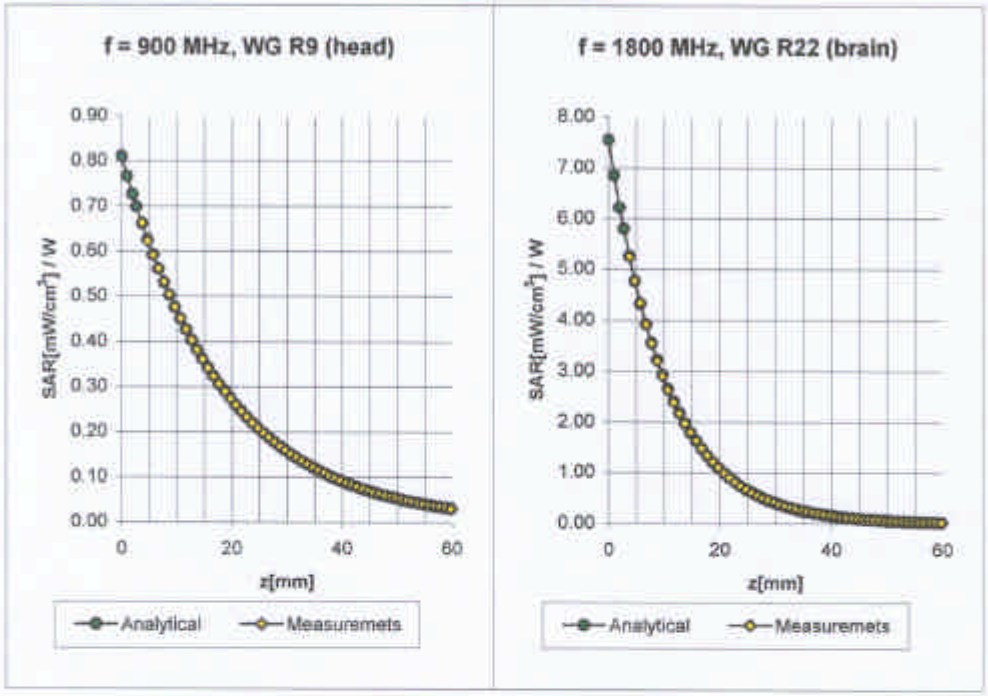




Page 6 of 7

ET3DV5 SN:1333

Conversion Factor Assessment



Head **900 MHz** $\varepsilon_r = 42 \pm 5\%$ $\sigma = 0.97 \pm 10\%$ mho/m

ConvF X	**5.83** ± 7% (k=2)	Boundary effect:	
ConvF Y	**5.83** ± 7% (k=2)	Alpha	**0.38**
ConvF Z	**5.83** ± 7% (k=2)	Depth	**2.70**

Brain **1800 MHz** $\varepsilon_r = 41 \pm 5\%$ $\sigma = 1.69 \pm 10\%$ mho/m

ConvF X	**4.99** ± 7% (k=2)	Boundary effect:	
ConvF Y	**4.99** ± 7% (k=2)	Alpha	**0.75**
ConvF Z	**4.99** ± 7% (k=2)	Depth	**1.99**

Page 7 of 7