

## SUPPLEMENTARY TEST REPORT FROM RADIO FREQUENCY INVESTIGATION LTD.

Test of: Intel Corporation. Pro/Wireless GPRS 3110 PC Card

To: OET Bulletin 65 Supplement C: (2001-01)

Supplementary Test Report Serial No: RFI/SARB1/SUP70438JD19A

This Supplementary Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director:	Checked By:
Richard Jackin	Richard Jackin
Tested By:	Release Version No: PDF)1
fatt Milamo	
Issue Date: 24 January 2003	Test Dates: 21 January 2003

Note: This supplementary test report is issued as an addendum to RFI Test Report Serial No: RFI/SARB2/RP70438JD10A. It has been issued to include additional information requested by the FCC.

# It should be noted that the standard, OET Bulletin 65 Supplement C: (2001-01) is not listed on RFIs current UKAS schedule and is therefore "not UKAS accredited".

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## **1. Client Information**

#### 1.1. Client Details

Company Name:	Intel Corporation.		
Address:	1357 Garden of the Gods Road Colorado Springs CO 80907 USA		
Contact Name:	Mr. K. Rice		

#### 1.2. Test Laboratory

Company Name:	Radio Frequency Investigation Ltd.
Address:	Ewhurst Park Ramsdell Basingstoke Hampshire RG26 5RQ.
Contact Name:	Mr. J. Lomako

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## 2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

## 2.1. Identification Of Equipment Under Test (EUT)

Brand Name	Intel	
Model Name or Number	Pro/Wireless GPRS 3110 PC Card	
Unique Type Identification	1G 3110	
Serial Number (IMEI)	299	
Battery Serial Number	Not applicable	
FCC Identification	PUKIG3110	
Country Of Manufacture	Malaysia	
Date Of Receipt	21 January 2003	

Brand Name	Plantronics		
Model Name or Number	PHF (Personal Hands Free)		
Unique Type Identification	None stated by client		
Serial Number	None stated by client		
Country Of Manufacture	None stated by client		
Date Of Receipt	21 January 2003		

### 2.2. Modifications Incorporated In EUT

The client has stated that the EUT has not been modified from what is described by the Model Name and Unique Type Identification stated above.

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#### 2.3. Additional Information Related to the EUT

Equipment Class:	PCMCIA Card				
FCC Rule Part(s):	OET Bulletin 65 Supplement C				
Application Type:	Certification				
Transmitter Frequency Range	1850 MHz to 1910 MHz				
1900 MHz Band (MHz):					
Receiver Frequency Range	1930 MHz to 1990 MHz				
1900 MHz Band (MHz):					
Transmit Frequency Allocation Of EUT When Under Test (Channels):	Bottom Channel – 512 Centre Channel – 660 Top Channel – 810				
Modulation(s):	GSM 1900				
Modulation Scheme (Crest Factor)	GPRS (Crest Factor 4)				
Equipment Type	Portable				
Measured Output Power (Max Conducted):	28.62 dBm				
Battery Type(s):	Not Applicable. The EUT is powered by the host support equipment.				
Antenna Length and Type:	External				
Number Of Antenna Positions	2 (Antenna up/down)				
Intended Operating Environment:	Residential, Commercial, Light Industry				
Weight:	Approx. 72 g				
Dimensions (without Antenna) mm:	Approx. 115 x 54 x 10 mm				
Power Supply Requirement:					
DC Supply (Volts/Amps)	3 V via supplied laptop				
AC Supply (Volts/Amps)	Not applicable				
Internal Battery (Volts/Amps)	Not applicable				
Port(s):	Enclosure Card Slot to PC				

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## 2.4. Support Equipment

Description:	Laptop
Brand Name:	IBM
Model Name or Number:	Thinkpad T20
Serial Number:	78-B2873
Battery Serial Number (IMEI):	1Z10D0360P4
Connected to Port:	PCMCIA

Description:	Laptop
Brand Name: Toshiba	
Model Name or Number: Satellite S221	
Serial Number: 72102021P	
Battery Serial Number (IMEI):	2710230221SA
Connected to Port:	PCMCIA

Description:	Laptop	
Brand Name:	DELL	
Model Name or Number:	Latitude C600/C500	
Serial Number:	TW-09C748-12800-17Q-6510	
Battery Serial Number (IMEI):	JP036519420111748963	
Connected to Port:	PCMCIA	

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## 3. Test Results For Specific Absorption Rate - 1900 MHz

#### 3.1. Specific Absorption Rate - 1900 MHz Band - EUT connected to IBM Laptop

#### **Environmental Conditions**

Temperature Variation in Lab (°C):	21.5 to 22.0
Temperature Variation in Liquid (°C):	18.8 to 18.9

Position	Side of Head	Frequency Channel No	Distance from antenna to phantom (mm)	SAR Level (W/kg) 1g	SAR Limit (W/kg) 1g	Margin (W/kg) 1g	Result
0 Degrees to Phantom with Antenna Up	Flat	512	10	0.924	1.6	0.676	Complied
90 Degrees to Phantom with Antenna Up	Flat	512	15	0.467	1.6	1.133	Complied
90 Degrees to Phantom with Antenna Down	Flat	512	15	0.473	1.6	1.127	Complied

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## 4. Test Results For Specific Absorption Rate - 1900 MHz

#### 4.1. Specific Absorption Rate - 1900 MHz Band - EUT connected to Toshiba Laptop

#### **Environmental Conditions**

Temperature Variation in Lab (°C):	21.5 to 22.0
Temperature Variation in Liquid (°C):	18.8 to 18.9

Position	Side of Head	Frequency Channel No	Distance from antenna to phantom (mm)	SAR Level (W/kg) 1g	SAR Limit (W/kg) 1g	Margin (W/kg) 1g	Result
0 Degrees to Phantom with Antenna Up	Flat	512	13	0.825	1.6	0.775	Complied
90 Degrees to Phantom with Antenna Up	Flat	512	15	0.409	1.6	1.191	Complied
90 Degrees to Phantom with Antenna Down	Flat	512	15	0.439	1.6	1.161	Complied

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## 5. Test Results For Specific Absorption Rate - 1900 MHz

#### 5.1. Specific Absorption Rate - 1900 MHz Band - EUT connected to Dell Laptop

#### **Environmental Conditions**

Temperature Variation in Lab (°C):	21.5 to 21.5
Temperature Variation in Liquid (°C):	19.6 to 19.8

Position	Side of Head	Frequency Channel No	Distance from antenna to phantom (mm)	SAR Level (W/kg) 1g	SAR Limit (W/kg) 1g	Margin (W/kg) 1g	Result
0 Degrees to Phantom with Antenna Up	Flat	512	15	0.800	1.6	0.800	Complied
90 Degrees to Phantom with Antenna Up	Flat	512	15	0.584	1.6	1.016	Complied
90 Degrees to Phantom with Antenna Down	Flat	512	15	0.734	1.6	0.866	Complied

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## **Appendix 1. Measurement Methods**

#### **Conducted Power Output.**

Before and after each test case, the antenna was removed from the EUT and a direct coaxial cable was connected. The conducted output power was then measured. Once the measurements were complete, the coaxial cable was removed and the antenna replaced. The EUT was then re-assembled.

The conducted power output of the EUT's are as follows:-

#### IBM Laptop

Position	Side of Head	ARFCN	Tx Power Before test	Tx Power After test
T <sub>C39-41</sub>	Flat	512	28.96	28.87

#### Toshiba Laptop

Position	Side of Head	ARFCN	Tx Power Before test	Tx Power After test
T <sub>C45-47</sub>	Flat	512	28.98	28.97

#### DELL Laptop

Position	Side of Head	ARFCN	Tx Power Before test	Tx Power After test
T <sub>C42-44</sub>	Flat	512	29.08	28.90

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RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A034	Narda 20W Termination	Narda	374BNM	8706
A1174	Dielectric Probe Kit	Agilent Technologies	85070C	Us99360072
A1184	Data Acquisition Electronics	Schmid & Partners	DAE	394
A1188	Probe	Schmid & Partners	H3 DV6	None
A1225	Low noise Amplifier	Mini Circuits	ZHL-42	E022601
A1228	High Voltage Hi-Impedance probe	Radio Frequency Investigation Ltd	HV2001HIP	RH30042001
A1237	1900MHz Validation Dipole	Schmid & Partners	D1900V2	540
A1238	SAM Phantom	Schmid & Partners	001	001
A1306	N-Type Connector	Narda	370 BNM	0210
A215	20 dB Attenuator	Narda	766-20	9402
C1024	Rosenberger Cable	Rosenberger	FA210A-1- 020m	FA00B 7565
C1052	Cable	Utiflex	FA210A003 0M3030	001
C1053	Cable	Utiflex	FA210A000 3M3030	001
C1054	Cable	Utiflex	FA210A000 1M3050A	001
G046	Signal Generator	Gigatronics	7100/.01-20	749474
G0528	Robot Power Supply	Schmid & Partner	Dasy3	None
G088	PSU	Thurlby Thandar	CPX200	100700
M010	NRV Power Meter	Rohde & Schwarz	NRV	882 317/065
M033	RF Insertion Unit	Rohde & Schwarz	URY-Z2	891 259/053
M094	URY Power Meter	Rohde & Schwarz	URY	891 647/080
M1015	Network Analyser	Agilent Technologies	8753ES	US39172406
M1047	Robot Arm	Staubli	RX908 L	F00/SD89A1/A/01
M1069	Diode Power Sensor	Rohde & Schwarz	NRV-Z2	838824/010
M1093	Will tek	Will tek	4202S	0513018
M292	Baro/Hygro/Thermo meter	Oregon Scientific	BA888	M292-05081999
M509	Thermometer	Testo	110	40378800433
S256	Site	RFI	-	-

## Appendix 2. Test Equipment Used

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## **Appendix 3. SAR Distribution Scans**

This appendix contains the SAR Distribution Scans.

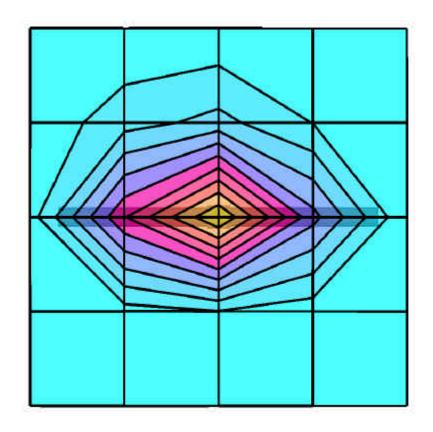
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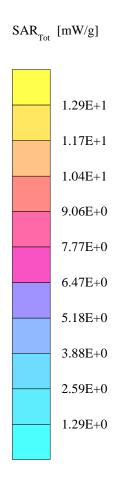
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# $\begin{array}{c} \label{eq:constraint} Dipole \ 1900 \ MHz \\ Validation \\ SAM \ Phantom; \ Flat \\ Probe: \ ET3DV6 - \ SN1529; \ ConvF(5.20,5.20,5.20); \\ Crest \ factor: \ 1.0; \ Brain \ 1900 \ MHz: \ \sigma = 1.52 \ mho/m \ \epsilon_r = 36.1 \ \rho = 1.00 \ g/cm^3 \\ Lab \ Temperature \ 22.0 \ deg \ C, \ Fluid \ Temperature \ 18.9 \ deg \ C \\ 01/21/03 \end{array}$

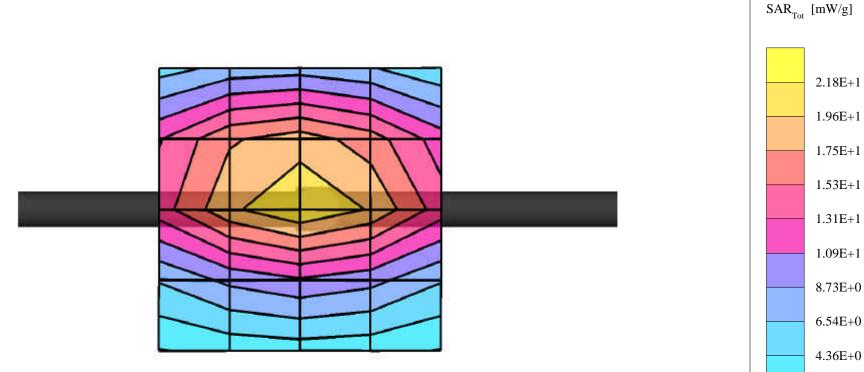




#### Dipole 1900 MHz Validation SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(5.20,5.20,5.20); Crest factor: 1.0; Brain 1900MHz: $\sigma = 1.52$ mho/m $\varepsilon_r = 36.1 \ \rho = 1.00$ g/cm<sup>3</sup>

Peak: 21.6 mW/g  $\pm$  0.16 dB,SAR (1g): 10.8 mW/g  $\pm$  0.18 dB Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C

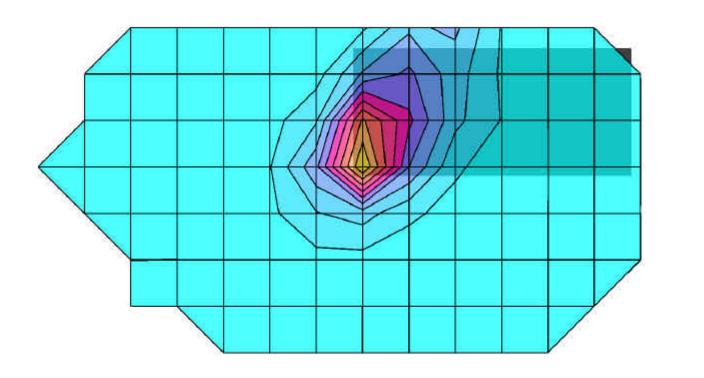
01/21/03

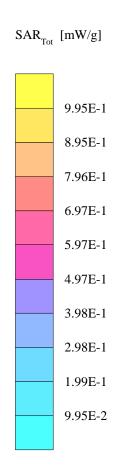




2.18E+0

 $\begin{array}{c} GPRS \ 2 \ Slot \ Uplink \ \text{--} \ IBM \\ 0 \ \text{Degrees to Phantom with Antenna Up Bottom Channel (512)} \\ SAM \ Phantom; \ Flat \\ Probe: \ ET3DV6 \ \text{--} \ SN1529; \ ConvF(4.70,4.70,4.70); \\ Crest \ factor: \ 4.0; \ Body \ 1900MHz \ FCC: \ \sigma = 1.58 \ mho/m \ \epsilon_r = 52.8 \ \rho = 1.00 \ g/cm^3 \\ Lab \ Temperature \ 22.0 \ deg \ C, \ Fluid \ Temperature \ 18.9 \ deg \ C \\ SAR \ Drift \ 0.21\% \\ 01/21/03 \end{array}$ 

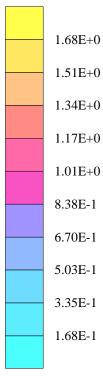




0 Degrees to Phantom with Antenna Up Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\varepsilon_r = 52.8 \rho = 1.00$  g/cm<sup>3</sup> Peak: 1.69 mW/g,SAR (1g): 0.924 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 0.21% 01/21/03

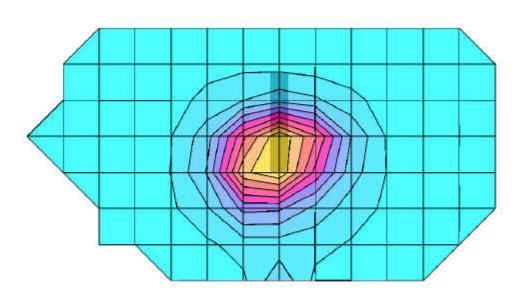


SAR<sub>Tot</sub> [mW/g]



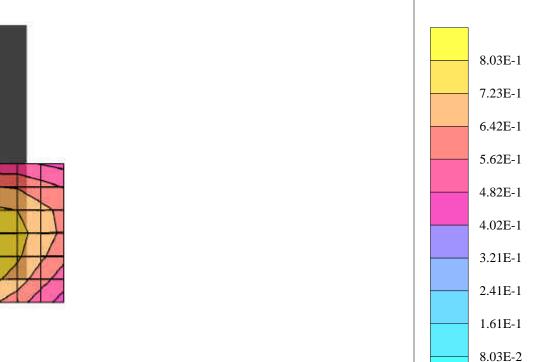
90 Degrees to Phantom with Antenna Up Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70) Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\epsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup>

> Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 3.19% 01/21/03

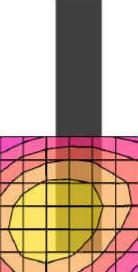




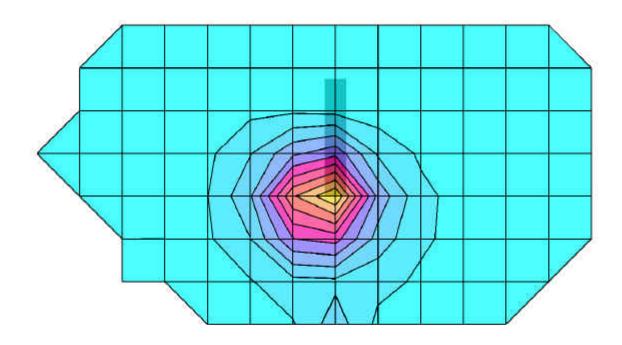
90 Degrees to Phantom with Antenna Up Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70) Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58 \text{ mho/m} \epsilon_r = 52.8 \rho = 1.00 \text{ g/cm}^3$ Peak: 0.812 mW/g, SAR (1g): 0.467 mW/g, SAR (10g): 0.283 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 3.19% 01/21/03

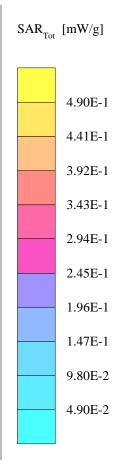


 $SAR_{Tot} [mW/g]$ 



 $\begin{array}{c} GPRS\ 2\ Slot\ Uplink\ -\ IBM\\ 90\ Degrees\ to\ Phantom\ with\ Antenna\ Down\ Bottom\ Channel\ (512)\\ SAM\ Phantom;\ Flat\\ Probe:\ ET3DV6\ -\ SN1529;\ ConvF(4.70,4.70,4.70);\\ Crest\ factor:\ 4.0;\ Body\ 1900MHz\ FCC:\ \sigma=1.58\ mho/m\ \epsilon_r=52.8\ \rho=1.00\ g/cm^3\\ Lab\ Temperature\ 22.0\ deg\ C,\ Fluid\ Temperature\ 18.9\ deg\ C\\ SAR\ Drift\ 0.80\%\\ 01/21/03\end{array}$ 

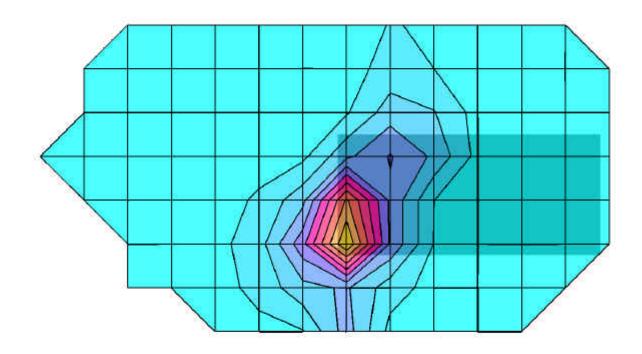


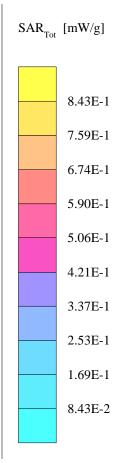


90 Degrees to Phantom with Antenna Down Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\epsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Peak: 0.842 mW/g,SAR (1g): 0.473 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 0.80% 01/21/03



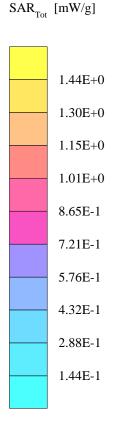
 $\begin{array}{c} GPRS \ 2 \ Slot \ Uplink \ \text{-} \ DELL \\ 0 \ \text{Degrees to Phantom with Antenna Up Bottom Channel (512)} \\ SAM \ Phantom; \ Flat \\ Probe: \ ET3DV6 \ \text{-} \ SN1529; \ ConvF(4.70,4.70,4.70); \\ Crest \ factor: \ 4.0; \ Body \ 1900MHz \ FCC: \ \sigma = 1.58 \ mho/m \ \epsilon_r = 52.8 \ \rho = 1.00 \ g/cm^3 \\ Lab \ Temperature \ 22.0 \ deg \ C, \ Fluid \ Temperature \ 18.9 \ deg \ C \\ SAR \ Drift \ 9.78\% \\ 01/21/03 \end{array}$ 



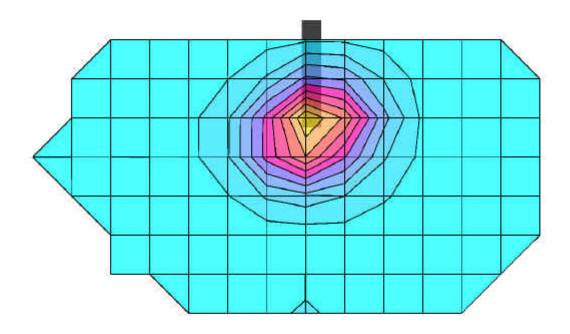


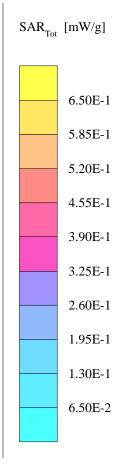
0 Degrees to Phantom with Antenna Up Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\epsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Peak: 1.45 mW/g,SAR (1g): 0.800 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 9.78% 01/21/03





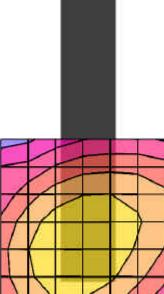
90 Degrees to Phantom with Antenna Up Bottom Channel (660) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\epsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 1.28% 01/21/03

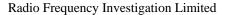




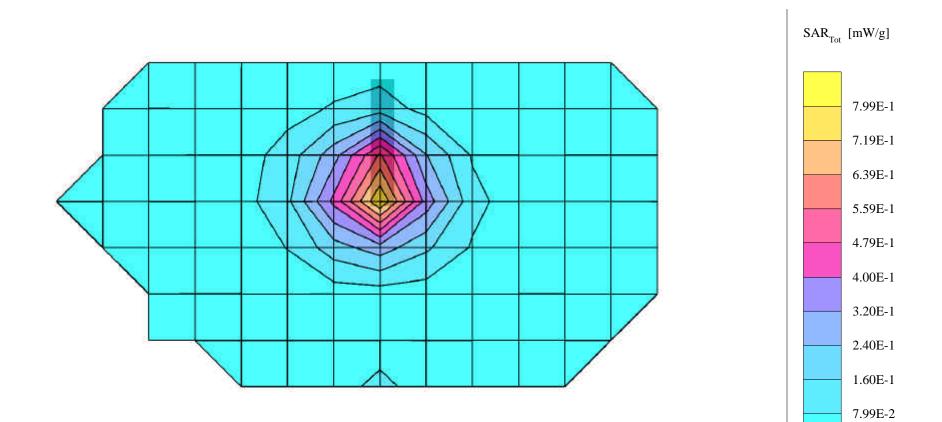
90 Degrees to Phantom with Antenna Up Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\varepsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Peak: 1.01 mW/g,SAR (1g): 0.584 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 1.28% 01/21/03



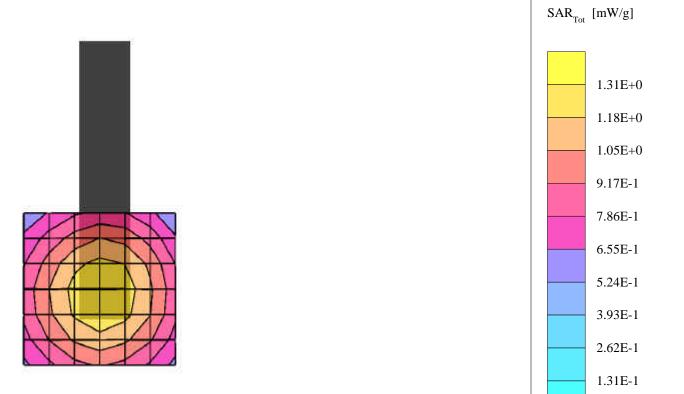




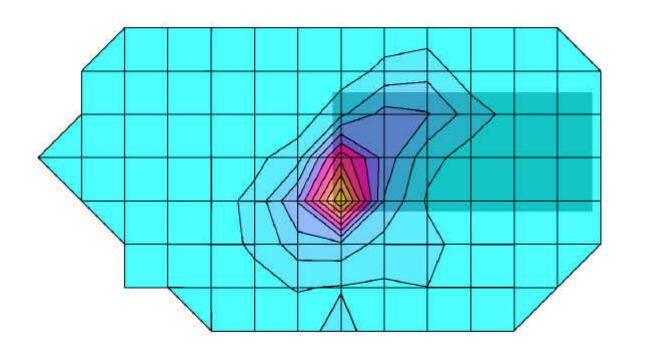
 $\begin{array}{c} GPRS\ 2\ Slot\ Uplink\ -\ DELL\\ 90\ Degrees\ to\ Phantom\ with\ Antenna\ Down\ Bottom\ Channel\ (512)\\ SAM\ Phantom;\ Flat\\ Probe:\ ET3DV6\ -\ SN1529;\ ConvF(4.70,4.70,4.70);\\ Crest\ factor:\ 4.0;\ Body\ 1900MHz\ FCC:\ \sigma=1.58\ mho/m\ \epsilon_r=52.8\ \rho=1.00\ g/cm^3\\ Lab\ Temperature\ 22.0\ deg\ C,\ Fluid\ Temperature\ 18.9\ deg\ C\\ SAR\ Drift\ 0.49\%\\ 01/21/03\end{array}$ 

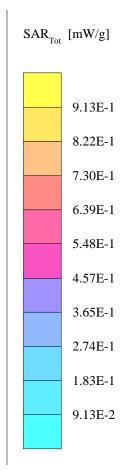


90 Degrees to Phantom with Antenna Down Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\epsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Peak: 1.32 mW/g,SAR (1g): 0.734 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 0.49% 01/21/03



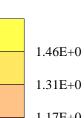
 $\begin{array}{c} GPRS\ 2\ Slot\ Uplink\ -\ Toshiba\\ 0\ Degrees\ mto\ Phantom\ with\ Antenna\ Up\ Bottom\ Channel\ (512)\\ SAM\ Phantom;\ Flat\\ Probe:\ ET3DV6\ -\ SN1529;\ ConvF(4.70,4.70,4.70);\\ Crest\ factor:\ 4.0;\ Body\ 1900MHz\ FCC:\ \sigma=1.58\ mho/m\ \epsilon_r=52.8\ \rho=1.00\ g/cm^3\\ Lab\ Temperature\ 22.0\ deg\ C,\ Fluid\ Temperature\ 18.9\ deg\ C\\ SAR\ Drift\ 1.39\%\\ 01/21/03\end{array}$ 



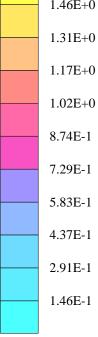


GPRS 2 Slot Uplink - Toshiba 0 Degrees to Phantom with Antenna Up Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\varepsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Peak: 1.48 mW/g,SAR (1g): 0.825 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 1.39% 01/21/03





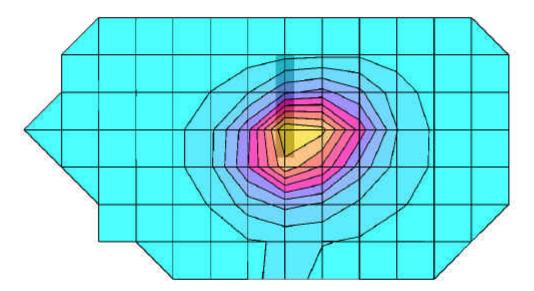
 $SAR_{Tot} [mW/g]$ 

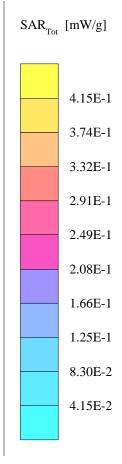


 $\begin{array}{c} GPRS \ 2 \ Slot \ Uplink \ \text{-} \ Toshiba \\ 90 \ \text{Degrees to Phantom with Antenna Up Bottom Channel (660)} \\ SAM \ Phantom; \ Flat \\ Probe: \ ET3DV6 \ \text{-} \ SN1529; \ ConvF(4.70,4.70,4.70); \\ Crest \ factor: \ 4.0; \ Body \ 1900MHz \ FCC: \ \sigma = 1.58 \ mho/m \ \epsilon_r = 52.8 \ \rho = 1.00 \ g/cm^3 \end{array}$ 

Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C

SAR Drift 3.09% 01/21/03

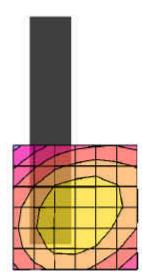


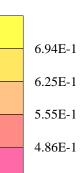


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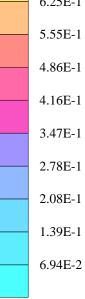
## GPRS 2 Slot Uplink - Toshiba

90 Degrees to Phantom with Antenna Up Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\varepsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Peak: 0.697 mW/g,SAR (1g): 0.409 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 3.09% 01/21/03

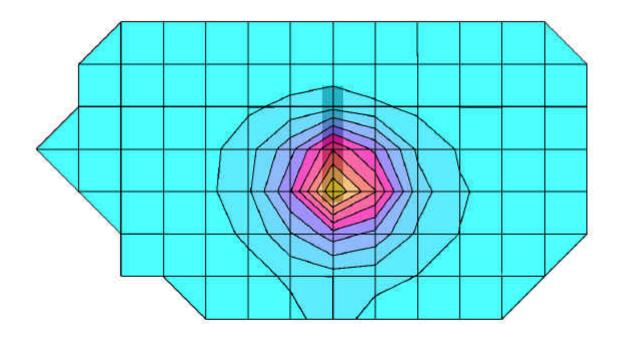


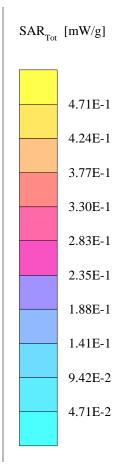


 $SAR_{Tot} [mW/g]$ 



 $\begin{array}{c} \label{eq:GPRS 2 Slot Uplink - Toshiba} \\ 90 \mbox{ Degrees to Phantom with Antenna Down Bottom Channel (512)} \\ SAM \mbox{ Phantom; Flat} \\ Probe: ET3DV6 - SN1529; \mbox{ ConvF}(4.70,4.70,4.70); \\ \mbox{ Crest factor: 4.0; Body 1900MHz FCC: $\sigma$ = 1.58 mho/m $\epsilon_r$ = 52.8 $\rho$ = 1.00 g/cm^3 \\ Lab \mbox{ Temperature 22.0 deg C, Fluid Temperature 18.9 deg C} \\ SAR \mbox{ Drift 0.14\%} \\ 01/21/03 \end{array}$ 





## GPRS 2 Slot Uplink - Toshiba

90 Degrees to Phantom with Antenna Down Bottom Channel (512) SAM Phantom; Flat Probe: ET3DV6 - SN1529; ConvF(4.70,4.70,4.70); Crest factor: 4.0; Body 1900MHz FCC:  $\sigma = 1.58$  mho/m  $\varepsilon_r = 52.8 \ \rho = 1.00$  g/cm<sup>3</sup> Peak: 0.774 mW/g,SAR (1g): 0.439 mW/g Lab Temperature 22.0 deg C, Fluid Temperature 18.9 deg C SAR Drift 0.14% 01/21/03

