Technology Centre
Research Group E561
Measurement Report

T-Nova

SAR measurement for DECT printer and terminal

Model	Höft & Wessel, Printer HW90195/US, FCC ID PGMHW901950001 and Terminal HW90196/US, FCC ID PGMHW901960001
Date of measurement:	08/13/01 to 08/17/01
Measurement report:	08/23/01

Contract awarder:	ETS Dr. Genz GmbH
Contract acceptor:	T-Nova GmbH
Direction:	Dr.-Ing. B. Marx, E561a
Measurement:	Dipl.-Ing. J. Buhl, E561g
Report:	Dipl.-Ing. J. Buhl, E561g

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I. Information on test device and exposure categories

The devices have been tested following the manufacturers instructions for test mode setup. We can´t give further information about test mode and device characteristics.

The measured SAR values are compliant with FCC limits for occupational/controlled exposure as well as for general population/uncontrolled exposure.

II. Specific information for SAR measurements

1. Measurement system and site description

The used measurement system is the Dosimetric Assessment System DASY 3 from ETH Zürich by Prof. N. Kuster.

2. Electric field probe

The electric field probe is an ET3DV4, SN 1108 from the measerument system manufacturer with the following technical data.

Tip diameter	7 mm
Probe tip to sensor center	2.7 mm
Isotropy error	± 0.2 dB
Last calibrated at	10/06/1999
Dynamic range	0.003 W/kg up to 100 W/kg for an error less than 0.1 dB
Conversion Factor	4.29

The probe calibration is valid up to 3 GHz, whereas the probe conversion factor is specified by the manufacturer only up to 2 GHz. Therefore the used conversion factor is calculated by extrapolation. To calculate with the worst case, the conversion factor can´t be lower than 1.

3. SAR measurement system verification

The validation has been performed with the measurement system manufacturers orginal system validation dipole, type D900V2, only at 900 MHz.

4. Phantom description

The used phantom is the flat phantom part of the „Generic Twin Phantom V3.0“ from ETH Zürich with a dimension of about 24cm x 35 cm. The phantom shell of fibre glass has a thicknessof 2 ±0.1 mm.

5. Tissue dielectric property

The used tissue simulating liquid contains 18.5 l of water, 21 kg sugar. The following electrical characteristics have been measured with dielectric probe kit HP85070A.

εr = 37.5

σ = 2.49

As they are lower in dielectric constant and of higher conductivity than the prescribed values, this will lead to SAR overestimation.

During the whole measurement, the ambient temperature changed between 74.3 and 77 degrees Fahrenheit, the medium temperature between 75 and 76.4 Fahrenheit.

6. Device positioning

The tested devices have been positioned touching the phantom with their case backside near the antennas.

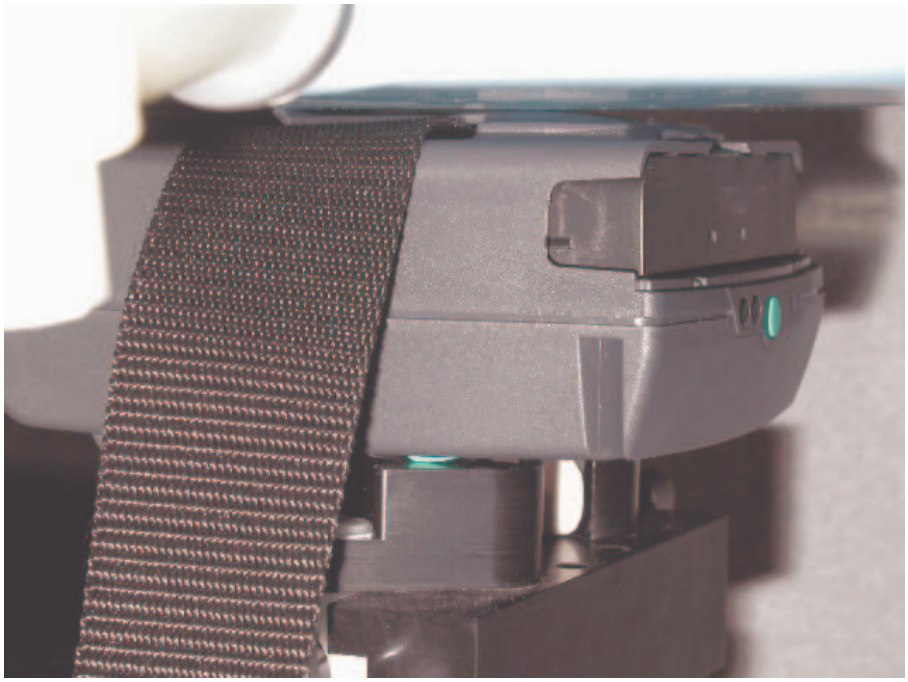


Fig. 1. Measurement of printer

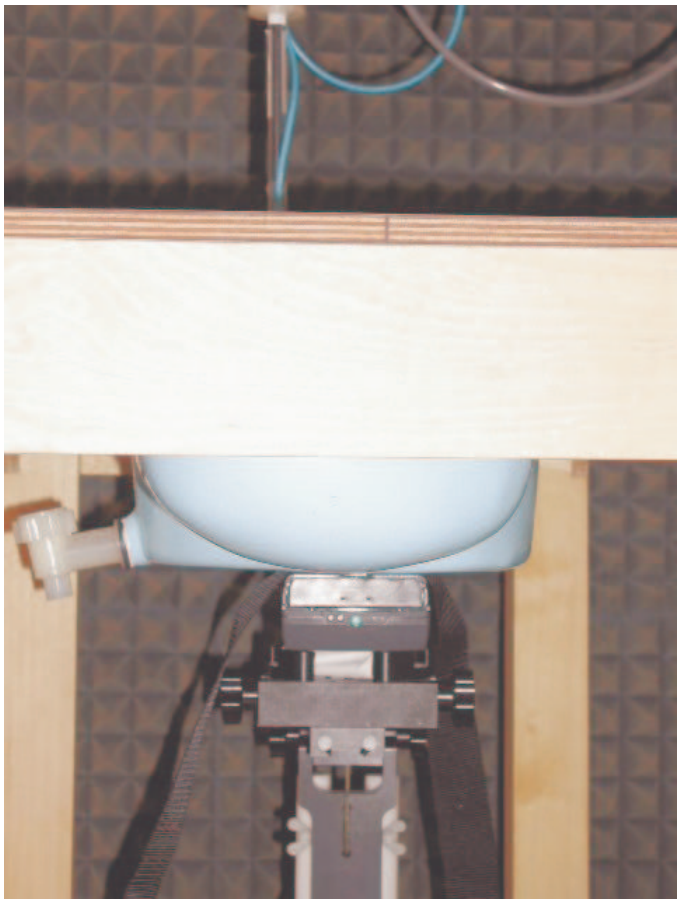


Fig. 2. Measurement of printer

Fig. 3. Measurement of terminal

With the HW90196 display turned towards the user, the measurement values were very low (0.0069 W/kg for 1g), so that they had been affected by noise distortion. Therefor the measurements have been performed with the backside towards the user.

The graphical representation of the devices under test in the scan plots correspond to the position in the photographs below.

Fig. 4. Position of printer towards the phantom

Fig. 5. Position of terminal towards the phantom

7. Peak SAR locations

The coarse scans have been performed with a scan resolution of 12 mm, as shown in the graphical representation attached to this document.

8. One-gram averaged SAR

The one gram averaged SAR was measured by a cube scan with a horizontal resolution of 8 mm and a vertical resolution of 5 mm. All cube scans of the various frequencies have been positioned above the same peak SAR location, detected with the coarse scan measured at the center frequency (channel 23). The unmeasurable SAR values below a height of 3.7 mm above the surface have been calculated from DASY 3 software by numerical extrapolation.

9. Total measurement uncertainty

The total measurement uncertainty assessed by DASY combined with the Generic Twin Phantom is specified by the manufacturer[1] as less than 30%.

10. Test results for determining SAR compliance

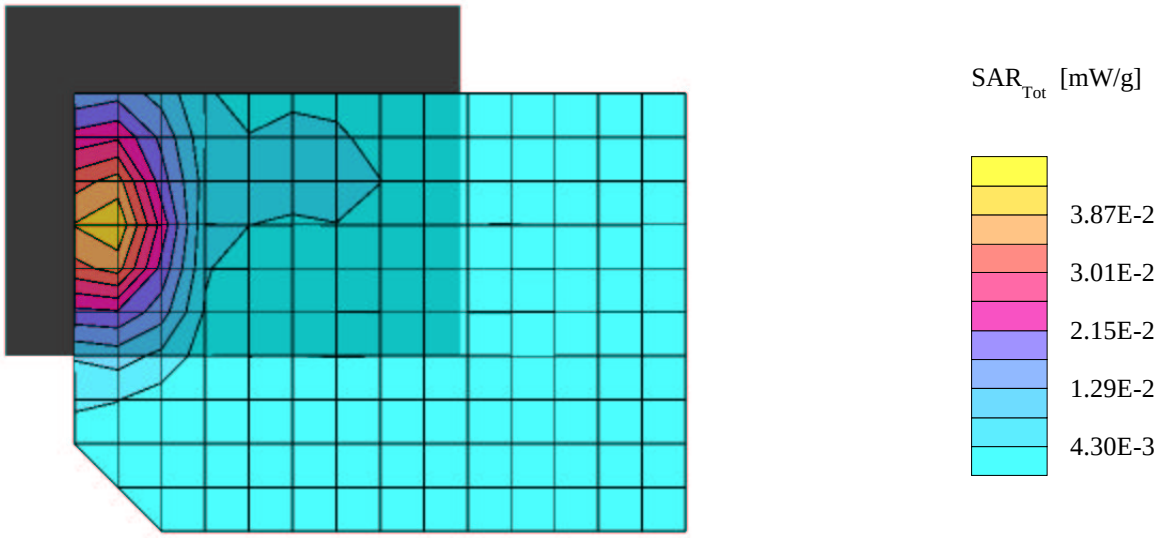
Tested device	antenna	2400 MHz		2440 MHz		2480 MHz	
		SAR 1g	SAR 10g	SAR 1g	SAR 10g	SAR 1g	SAR 10g
HW 90195	0	0.036	0.0196	0.0389	0.0203	0.0424	0.0205
HW 90195	1			0.0107	0.006		
HW 90196	0	0.158	0.0815	0.183	0.094	0.172	0.0868
HW 90196	1			0.0416	0.0217		
all SAR values in mW/g							

Calculating with a worst case conversion factor of 1, the highest measured 1 g SAR value of 0.183 W/kg would reach up to 0.785 W/kg.

[1] Ralf Kästle, Thomas Schmid, Niels Kuster: Generic Twin Phantom, Zürich 1996

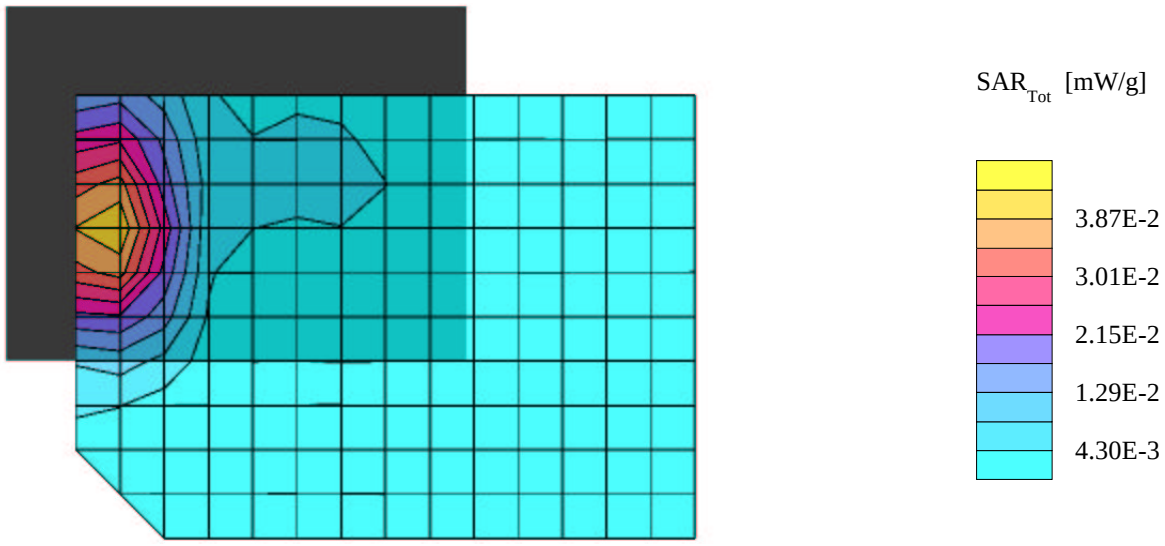
Höft&Wessel HW90195

Antenna 0, Channel 0
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2400 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.0360 mW/g, SAR (10g): 0.0196 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.92 dB



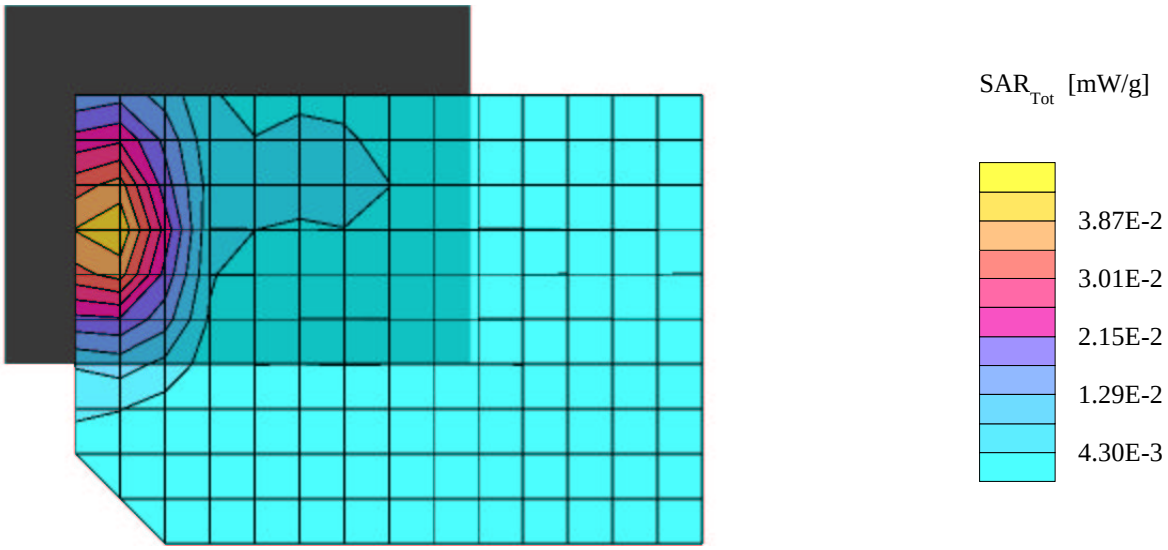
Höft&Wessel HW90195

Antenna 0, Channel 23
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2440 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.0389 mW/g, SAR (10g): 0.0203 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.92 dB



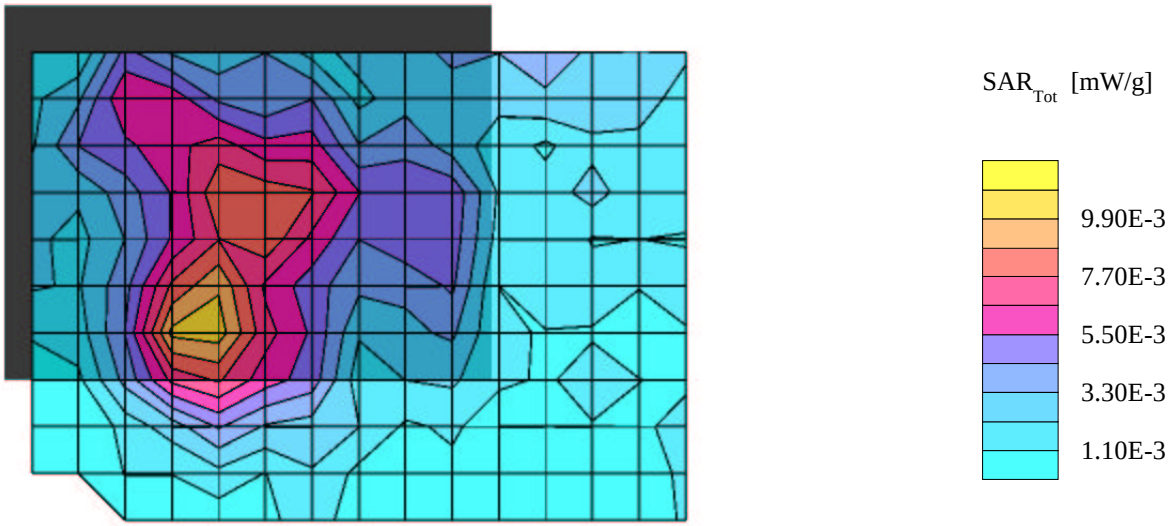
Höft&Wessel HW90195

Antenna 0, Channel 45
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2480 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.0424 mW/g, SAR (10g): 0.0205 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.92 dB



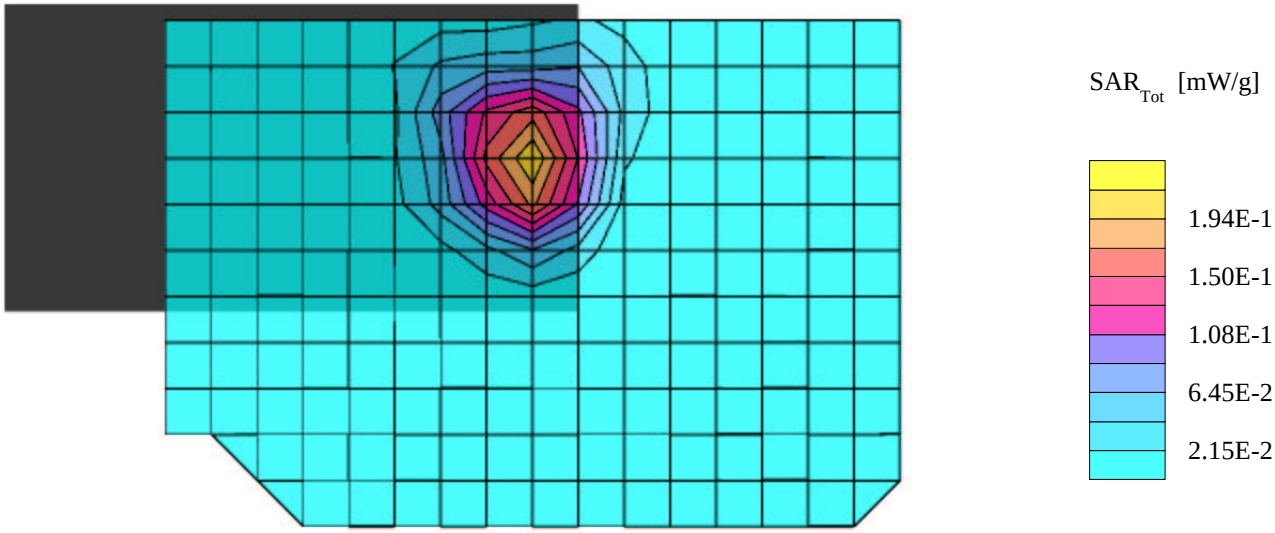
Höft&Wessel HW90195

Antenna 1, Channel 23
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2440 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.0107 mW/g, SAR (10g): 0.0060 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.44 dB



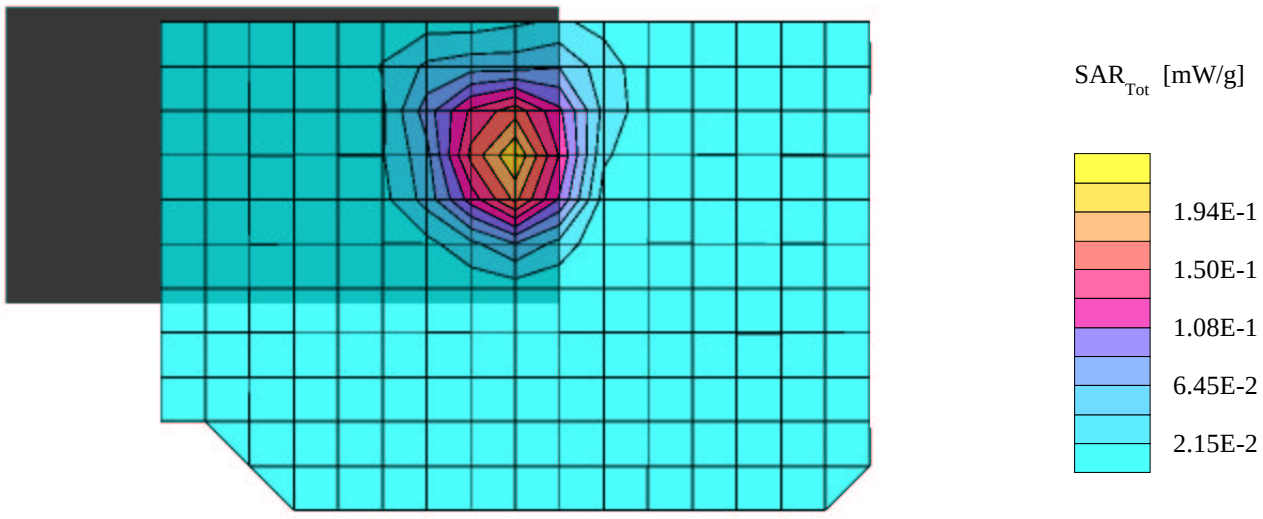
Höft&Wessel HW90196

Antenna 0, Channel 0
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2400 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.158 mW/g, SAR (10g): 0.0815 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 0.00 dB



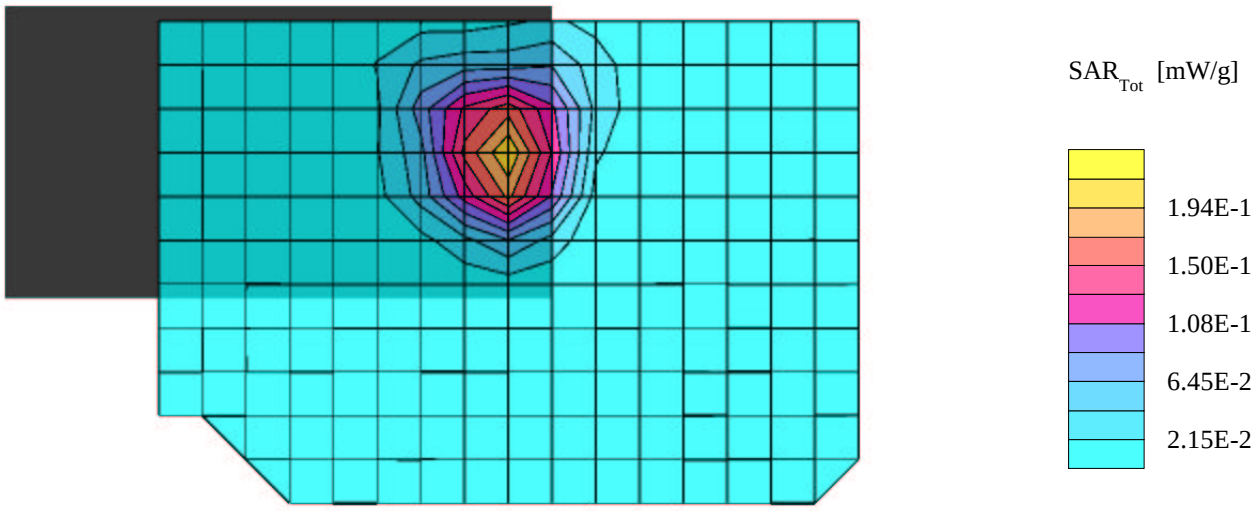
Höft&Wessel HW90196

Antenna 0, Channel 23
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2440 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.183 mW/g, SAR (10g): 0.0940 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 0.00 dB



Höft&Wessel HW90196

Antenna 0, Channel 45
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2480 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.172 mW/g, SAR (10g): 0.0868 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 0.00 dB



Höft&Wessel HW90196

Antenna 1, Channel 23
Generic Twin Phantom; Flat Section; Position: (90°,90°); Frequency: 2440 MHz;
Probe: ET3DV4 - 1108; ConvF(4.29,4.29,4.29); Crest factor: 27.0; Medium: σ = 2.49 mho/m ε_r = 37.5 ρ = 1.00 g/cm^3
Cube 5x5x7: SAR (1g): 0.0416 mW/g, SAR (10g): 0.0217 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: -0.39 dB