Technology Centre
Research Group E561
Measurement Report

T · · Systems ·

SAR measurement
for DECT remote unit and headset

Model	GN Harrier, FCC ID: BCE GN9050
Date of measurement:	10/17/01
Measurement report:	02/26/02

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

Contents

I. Information on test device and exposure categories

The devices have been tested with test setup performed by the manufacturer. 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 measurement has been performed with the same probe and DASY system as the SAR measurement, but at a frequency of 900 MHz with the liquid parameters as specified by the manufacturer of the validation dipole. The coarse grid has been aligned with the probe.

The measurement parameters are:

Used dipole:	SPEAG D900V2, serial number 100
Dipole input power	250 mW ± 1.5 %
Measuring distance from dipole center to solution surface	15 mm

Coarse grid spacing	15 mm
Relative permittivity	$\varepsilon_r = 41.2$
Conductivity	0.95 mho/m
Validation result, averaged over 1g / 10g	2.85 / 1.83 mW/g
Manufacturer specification for validation	2.75 / 1.74 mW / g

Later on, the probe had been validated with the same liquid as used for the SAR measurements, but at 1800 MHz with a 1800 MHz validation dipole with the following measurement parameters:

Used dipole:	SPEAG D1800V2, serial number 292
Dipole input power	250 mW ± 1.5 %
Measuring distance from dipole center to solution surface	10 mm
Coarse grid spacing	12 mm
Relative permittivity	$\varepsilon_r = 40$
Conductivity	1.75 mho/m
Validation result, averaged over 1g / 10g	10.1 / 5.09 mW/g
Manufacturer specification for validation	10.1 / 5.18 mW / g

As the results of both validation measurements are close to the values specified by the manufacturer, a correct performance at 2.4 GHz can be assumed.

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. The headset has been tested at the left side head of this phantom.

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.

6. Device positioning

The tested devices have been positioned touching the flat phantom with their case backside. The headset has been measured touching the ear of the head phantom of the Generic Twin Phantom.

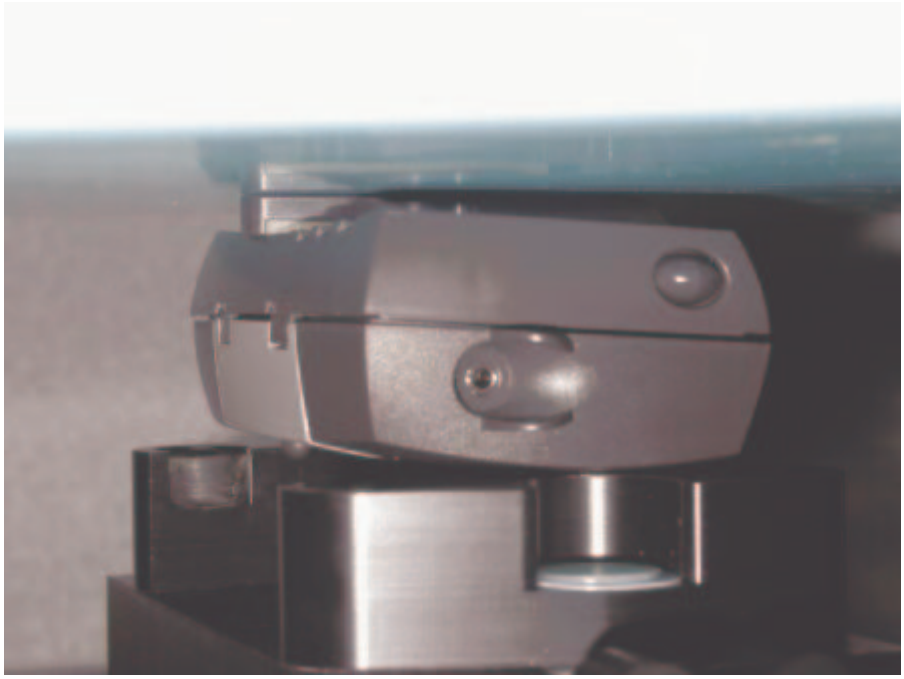


Fig. 1. Measurement of remote unit

Fig. 2. Measurement of headset

With the headset, the measurement values were lower than the noise distortionof the probe. Therefore, it wasn´t possible to obtain a certain location for SAR maximum.

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

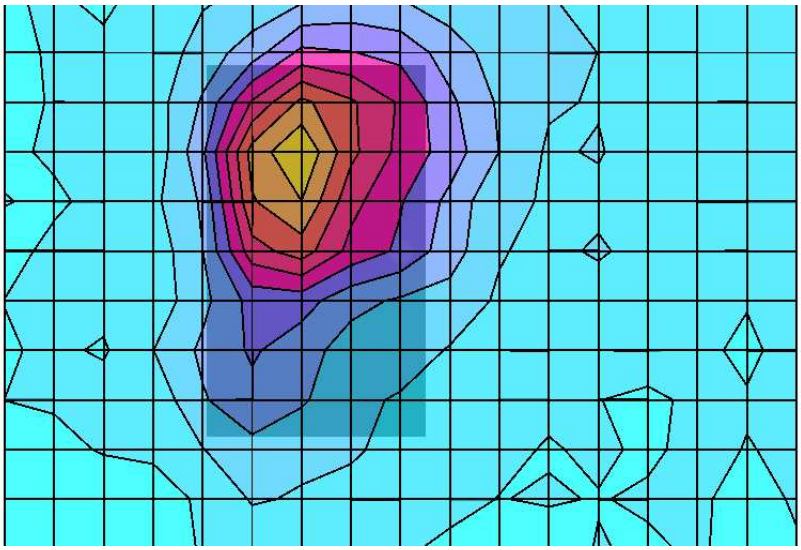
Tested device	2400 MHz		2440 MHz		2480 MHz	
	SAR 1g	SAR 10g	SAR 1g	SAR 10g	SAR 1g	SAR 10g
remote unit	0,0149	0,0103	0,0281	0,0166	0,043	0,024
headset	– -	- -	- -	- -	- -	- -
all SAR values in mW/g						

With the headset, the measurement values were lower than the noise distortionof the probe. Therefore, it wasn ´t possible to obtain a certain location for SAR maximum

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

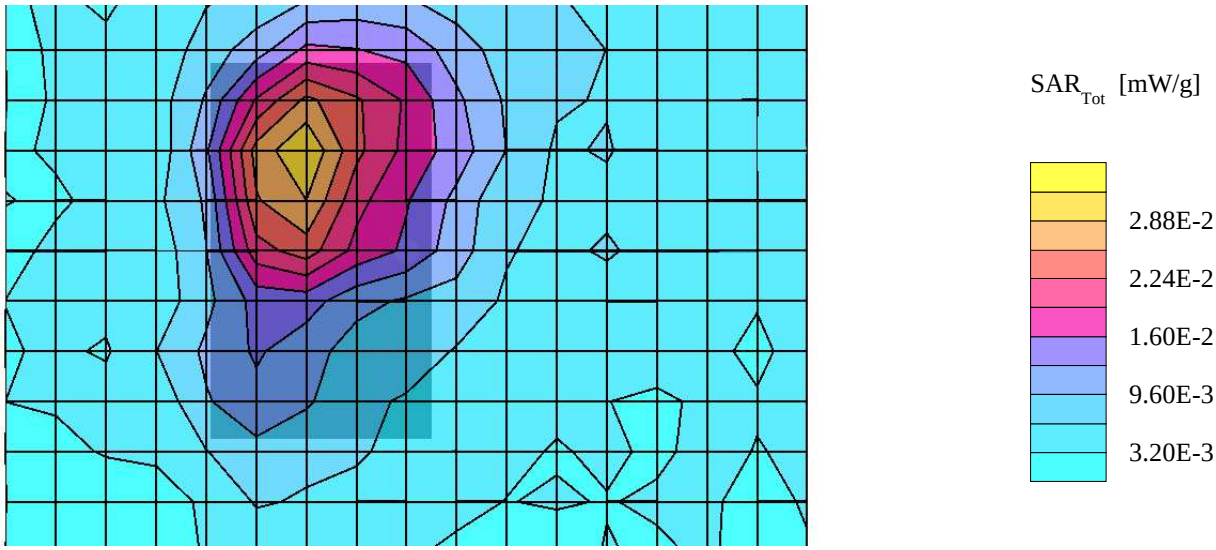
GN Harrier

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): 0.0149 mW/g, SAR (10g): 0.0103 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 1.21 dB



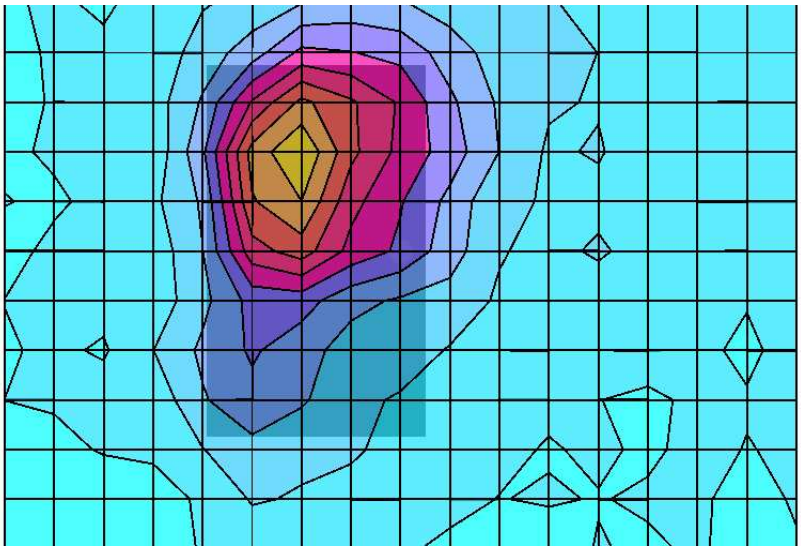
GN Harrier

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): 0.0281 mW/g, SAR (10g): 0.0166 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 1.21 dB



GN Harrier

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): 0.0430 mW/g, SAR (10g): 0.0240 mW/g, (Worst-case extrapolation)
Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0
Powerdrift: 1.21 dB



GN Harrier headset

Intended use

Generic Twin Phantom; Left Hand Section; Position: (80°,65°); 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): 0.0138 mW/g * , SAR (10g): 0.0115 mW/g * Max outside, (Worst-case extrapolation)

Coarse: Dx = 12.0, Dy = 12.0, Dz = 10.0

Powerdrift: 0.85 dB