
REPORT ON

RF Exposure Assessment
Datawind Mobile Internet Browser Model Number Pocket Surfer 2

COMMERCIAL-IN-CONFIDENCE

Doc Number 75902048 Report 08 Issue 1

November 2007



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PREPARED FOR

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ATTESTATION

The wireless device described within this report has been shown to be capable of compliance with the basic restrictions related to human exposure to electromagnetic fields (3KHz - 300 GHz) - General public. The calculations shown in this report were made in accordance the procedures specified in the applied test specification(s).

All reported calculations were carried out on a sample of equipment to demonstrate compliance with the applied test specification(s) the sample tested was found to comply with the requirements of the applied rules.

PREPARED BY

A Miller
Principal Engineer

APPROVED BY

M Jenkins
Authorised Signatory

DATED

16th November 2007



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SECTION 1

REPORT SUMMARY

GENERAL PUBLIC LIMITS

Antenna Gain (Numeric)	Peak Output Power (mW)	Calculated RF Exposure at 20.0 cm	Limit
0.550	2000.0	0.219 mW/cm ²	0.550 mW/cm ²
		(2.19 Wm ⁻²)	(5.50 Wm ⁻²)

The calculations have shown that they **meet** the General Public Exposure Levels described in the FCC 47 CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and ICNIRP Guidelines.

OCCUPATIONAL LIMITS

Antenna Gain (Numeric)	Peak Output Power (mW)	Calculated RF Exposure at 20.0 cm	Limit
0.550	2000.0	0.219 mW/cm ²	2.75 mW/cm ²
		(2.19 Wm ⁻²)	(27.5 Wm ⁻²)

The calculations have shown that they **meet** the Occupational Exposure Levels described in the FCC 47CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and ICNIRP Guidelines.



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1.1 STATUS

APPLICANT	Datawind
MANUFACTURING DESCRIPTION	Mobile Internet Browser
MODEL NUMBER	Pocket Surfer 2

1.2 TEST SPECIFICATIONS

1. OET Bulletin 65 Edition 97-01 August 1997 - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

1.3 REFERENCES

2. National Council on Radiation Protection and Measurements (NRP) - Report No. 86(1986) "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields".
3. FCC Guidelines for Evaluating exposure to RF Emissions - 47 CFR § 1.1310; 47 CFR § 1.1307(b) & 47 CFR § 80.83.
4. EN 50383:2002 - Basic standard for the calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz - 40 GHz).
5. IEEE Std C95.1-2005: IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3KHz to 300GHz.

1.4 SUMMARY

The equipment subject to the RF exposure assessment is a Mobile Internet Browser model number Pocket Surfer 2. The RF exposure assessment is based upon the following criteria:-

- The Mobile Internet Browser operates in the frequency range of
GSM 850: 824 – 849MHz / 869 - 894MHz
GSM 900: 880 – 915MHz / 925 – 960MHz
GSM1800: 1710 - 1785MHz / 1805 – 1880MHz
GSM1900: 1850 – 1910MHz / 1930 – 1990MHz
- For the purpose of this assessment the GSM850 & GSM1900 band frequencies were used. The frequency 824.200 MHz provided the maximum distance in reference to the point of investigation from the antenna.
- The numeric gain of the onboard antenna for the Mobile Internet Browser is 0.550 (gain).
- The length of the Mobile Internet Browser is 0.06 meters.
- Pocket Surfer 2 radio power is a maximum 2 Watt.
- The point of investigation is 20cm with a maximum antenna gain of -2.6 dBi.

1.5 REQUIRED MINIMUM SEPARATION DISTANCES

Power Density Field 'S'

The minimum separation distance based upon occupational limit level for the Power Density field 'S' is:

$$S = \frac{PG_{(\theta, \phi)}}{4\pi r^2} \quad \text{Transposed to find 'r' =} \quad r = \sqrt{\frac{PG_{(\theta, \phi)}}{4\pi S}}$$

$$P = 2000.0 \text{ mW}; G = 0.550; S = 2.747 \text{ mW/cm}^2$$

$$\text{Therefore 'r' = 5.642 cm}$$

The minimum separation distance based upon general public limit level for the Power Density field 'S' is:

$$S = \frac{PG_{(\theta, \phi)}}{4\pi r^2} \quad \text{Transposed to find 'r' =} \quad r = \sqrt{\frac{PG_{(\theta, \phi)}}{4\pi S}}$$

$$P = 2000.0 \text{ mW}; G = 0.550; S = 0.549 \text{ mW/cm}^2$$

$$\text{Therefore 'r' = 12.617 cm}$$



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SECTION 2

TEST DETAILS

2.1 RATIONALE FOR ASSESSMENT OF THE RF EXPOSURE

The aim of the assessment report is to evaluate the compliance boundary for a set of given input power(s) according to the basic restrictions (directly or indirectly via compliance with reference levels) related to human exposure to radio frequency electromagnetic fields.

The chosen assessment method to establish the compliance boundary in the far-field region is the reference method as defined in BS EN50383:2002 Clause 5.2; E-field or H-field calculation. The method of calculation used is defined in BS EN50383:2002; Clause 8.2.2, 8.2.3 and 8.2.4.

The calculated values have been compared with limits provided in the ICNIRP guidelines. Calculations can be made in three separate regions, based on distance from the antenna. These are called:-

- far-field region,
- radiating near-field region,
- reactive near-field region.

The theory that defines these regions is given in EN50383:2002 Annex A.

Far-field region

As shown in EN50383 Annex A, the far-field calculations are accurate when the distance, r , from an antenna of length D to a point of investigation is greater than

$$r = \frac{2D^2}{\lambda}$$

Where, r is the distance from the antenna to the point of investigation.

Radiating near-field region

The radiating near-field region of an antenna of length D as shown in EN50383 Annex A, this region is defined by

$$\frac{\lambda}{4} < r < \frac{2D^2}{\lambda}$$

Reactive near-field region

The reactive near-field region of an antenna as shown in EN50383 Annex A, this region is defined by

$$r \leq \frac{\lambda}{4}$$

Where, r is the distance from the antenna to the point of investigation.

Recommend $\lambda/4$ as the boundary between the radiated near-field and reactive near-field for RF exposure compliance assessment.

2.2 DEFINED LIMITS

Normative Reference: ICNIRP Advice on Limiting Exposure to Electromagnetic Fields (0-300GHz). Table A4, Reference Levels for General Public Exposure to Time Varying Electric & Magnetic Fields. Vol 15 No.2. 2004.

Reference levels for general public exposure to time-varying electric and magnetic fields (unperturbed rms values)

At 824.200 MHz

E-Field (Vm^{-1}) = 0.000

H-Field (Am^{-1}) = 0.000

Power density (mW/cm^2) = 2.747

Reference levels for occupational exposure to time-varying electric and magnetic fields (unperturbed rms values)

At 824.200MHz

E-Field (Vm^{-1}) = 0.000

H-Field (Am^{-1}) = 0.000

Power density (mW/cm^2) = 0.549

2.3 ESTABLISHING WAVELENGTH AND 1/4 WAVELENGTH

Frequency (MHz)	$\lambda = \frac{3 \times 10^8}{f}$		$\frac{\lambda}{4}$	
	m	cm	m	cm
848.800	0.3534	35.34	0.0884	8.84
836.400	0.3587	35.87	0.0897	8.97
824.200	0.3640	36.40	0.0910	9.10

2.4 FAR FIELD CALCULATIONS

The following calculations are based on: -2.6dBi gain antenna

$P = 2$ (Power (Watts)) or 2000.0 (Power milliwatts)

$G = 0.550$ (Numeric Gain)

$r = 0.2$ (Distance (meters)) or 20.000 (Distance (centimetres))

The power flux:

$$S = \frac{PG_{(\theta, \phi)}}{4\pi r^2} \quad S = 0.219 \text{ mW/cm}^2$$

The electric field strength

$$E = \frac{\sqrt{30PG_{(\theta, \phi)}}}{r} \quad E = 28.711 \text{ Eeff V/m}$$

The magnetic field strength

$$H = \frac{E}{\eta_0} \quad H = 0.076 \text{ A/m}$$

The calculations have shown that they **meet** the General Public Exposure Levels described in the FCC 47 CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and ICNIRP Guidelines.

The calculations have shown that they **meet** the Occupational Exposure Levels described in the FCC 47CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and ICNIRP Guidelines.

2.5 FIELD REPRESENTATIONS

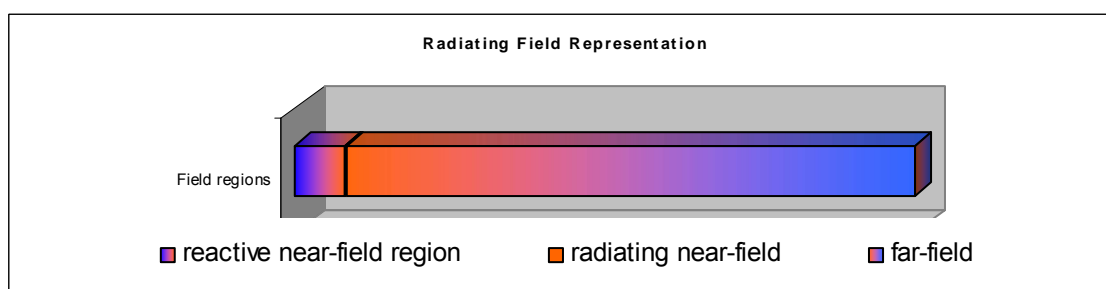


Figure 1 - This graph shows the radiating field representation and is not to scale

Worst case frequency 824.200 MHz

The Reactive near-field region (from antenna) is less than: 8.836 cm

The Radiating near-field region is greater than: 8.836 cm

The Radiating near-field region is less than: 0.254 cm

The Far-field region is greater than: 0.254 cm



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SECTION 3

FIGURES

3.1 FIELD REPRESENTATIONS

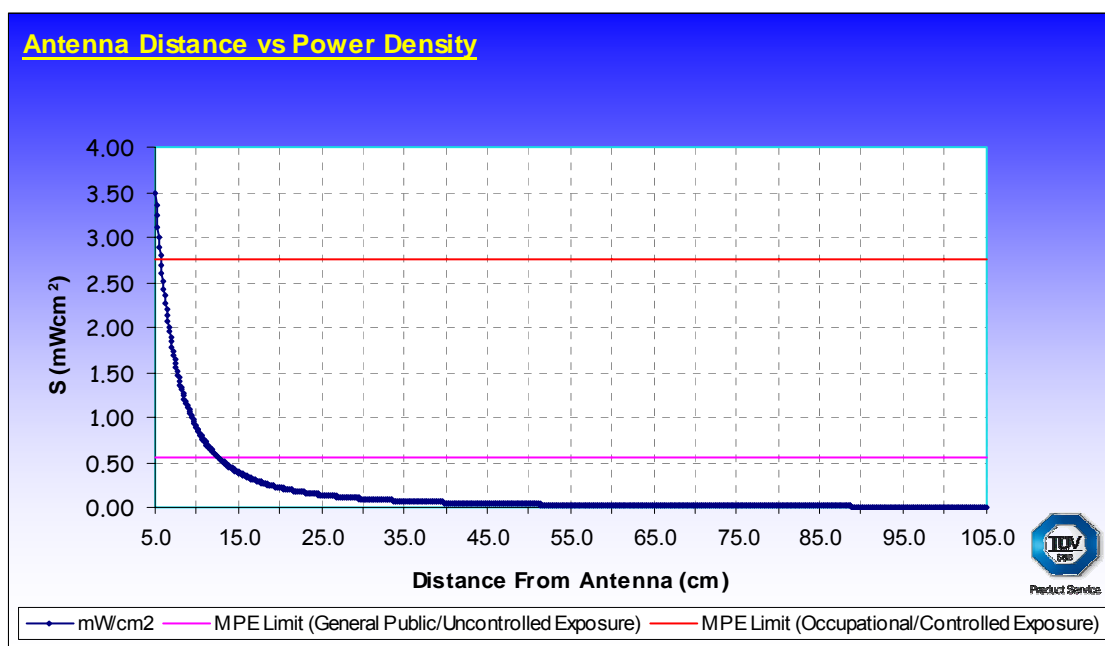


Figure 2 - This graph shows the S field (mW/cm²) strength value with regards to distance from the Antenna (cm)



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SECTION 4

DISCLAIMERS AND COPYRIGHT



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4.1 DISCLAIMERS AND COPYRIGHT

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