
REPORT ON

Simultaneous Transmitters: Limited FCC Parts 15 C and 24 E Testing in support of an
Application for Grant of Equipment Authorisation
of a Handheld D9500 (Co-Located Operation)

COMMERCIAL-IN-CONFIDENCE

FCC ID: HD5595009

Report No OR611654/06 Issue 1

March 2004

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DATED

25th March 2004


DISTRIBUTION

| | |
|----------------------|--------|
| Handheld Products | Copy 1 |
| BABT Product Service | Copy 2 |
| Copy No | |

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15 C and 24 E. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;


S Hartley


A Guy


G Lawler



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SECTION 1

REPORT SUMMARY

Simultaneous Transmitters: Limited FCC Part 15 C and 24 E Testing in support of an
Application for Grant of Equipment Authorisation
of a Handheld Products D9500 (Co-Located Operation)



1.1 STATUS

| | |
|-----------------------------------|--|
| EQUIPMENT UNDER TEST | D9500 |
| OBJECTIVE | To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification. |
| NAME AND ADDRESS OF CLIENT | Handheld Products 700 Visions Drive PO Box 208 Skaneateles Falls NY 13153-0208 |
| TYPE NUMBER | D9500 |
| PART NUMBER | D9500-09 |
| SERIAL NUMBER | 000001869 |
| HARDWARE VERSION | Rev. 2 |
| DECLARED VARIANTS | None |
| TEST SPECIFICATION / ISSUE / DATE | FCC CFR 47: Part 15, Subpart C, August 2002 & Part 24, Subpart E, January 2001 |
| NUMBER OF ITEMS TESTED | One |
| SECURITY CLASSIFICATION OF EUT | Commercial In Confidence |
| INCOMING RELEASE DATE | Declaration of Build Status 22 nd March 2004 |
| DISPOSAL REFERENCE NUMBER DATE | Held pending disposal Not Applicable Not Applicable |
| ORDER NUMBER DATE | DO93486-00 1 st September 2003 |
| START OF TEST | 4 th February 2004 |
| FINISH OF TEST | 6 th February 2004 |
| RELATED DOCUMENTS | ANSI C63.4 2001. Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. |



1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Handheld Products D9500 to the requirements of FCC Specification Parts 15 C and 24, for Simultaneous Transmission of Co-Located Transmitters.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of Handheld Products.

The purpose of this Test Report is to show compliance for Simultaneous Radio Operation of GSM/GPRS 1900 with Bluetooth.

Although testing is carried out against both FCC Specification Parts 15 C and 24, it is only a requirement for the EUT to comply with the least stringent limit when both Radios are transmitting. Therefore in this report only the limits for Part 24 have been applied.



1.2.1 DECLARATION OF BUILD STATUS

| MAIN EUT | | | |
|-----------------------------|--|---------------------------|------------------------|
| MANUFACTURING DESCRIPTION | Mobile Computer | | |
| MANUFACTURER | Hand Held Products Inc. | | |
| COUNTRY OF ORIGIN | USA | | |
| TYPE | Dolphin 9500 | | |
| PART NUMBER | D9500-09 | | |
| SERIAL NUMBER | 000001869 | | |
| HARDWARE VERSION | Revision 2 | | |
| FCC ID | HD55950009 | | |
| INDUSTRY CANADA ID | 1693B9509 | | |
| RADIO MODULES INTEGRATED | GSM/GPRS 900/1800/1900, 802.11b, Bluetooth | | |
| TECHNICAL DESCRIPTION | Hand held computer with 3 radios | | |
| BATTERY/POWER SUPPLY | | | |
| MANUFACTURING DESCRIPTION | Rechargeable battery | | |
| MANUFACTURER | Hand Held Products Inc. | | |
| COUNTRY OF ORIGIN | USA | | |
| TYPE | Li-ion | | |
| PART NUMBER | 20000591-01 | | |
| VOLTAGE | 7.4V | | |
| UK AGENT | N/A | | |
| RADIO MODULES | | | |
| MANUFACTURING DESCRIPTION | GPRS/GSM Tri-Band Radio Module | 802.11b WLAN Radio Module | Bluetooth Radio Module |
| MANUFACTURER | Siemens AG | Sychip | Socket Communications |
| COUNTRY OF ORIGIN | Germany | Not known | Japan |
| TYPE | MC45 | WLAN6060EB | BC01 |
| POWER | 3.2 – 4.5V | 3.0 – 3.6V | 2.7 – 3.3V |
| TRANSMITTER OPERATING RANGE | 880-915 / 1710-1785 / 1850-1910 | 2412MHz to 2462MHz | 2402MHz to 2480MHz |
| TRANSMITTER POWER | 2W (GSM900) / 1W (GSM1800/1900) | 14.5dBm typical | 2bBm typical |
| RECEIVER OPERATING RANGE | 925-960 / 1805-1880 / 1930-1990 | 2414MHz to 2484MHz | 2402MHz to 2480MHz |
| INTERMEDIATE FREQUENCIES | Receiver: 0; Transmitter: 80MHz | Direct Conversion | Not known |
| EMISSION DESIGNATOR | GXW | 11MOF9W | Not known |
| DHSS/FHSS/COMBINED OR OTHER | GSM | DSSS | FHSS |
| FCC ID | QIPMC45 | QPUWLAN6060EBK | LUBBTM-1 |
| INDUSTRY CANADA ID | | | |
| ANCILLARIES | | | |
| MANUFACTURING DESCRIPTION | None | | |
| MANUFACTURER | | | |
| TYPE | | | |
| PART NUMBER | | | |
| SERIAL NUMBER | | | |
| HARDWARE VERSION | | | |
| COUNTRY OF ORIGIN | | | |
| UK AGENT | | | |

Signature

Date

22nd March 2004



1.3 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

| Test | Spec Clause | Test Description | Result | Levels/Comments |
|------|-------------|--------------------|--------|-----------------|
| 2.1 | 24.238 | Radiated Emissions | Pass | |



1.4 OPINIONS AND INTERPRETATIONS

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.



1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The Equipment Under Test (EUT) was a D9500, which offers 2.4GHz 802.11b Wireless LAN, Bluetooth A, GSM 900, DCS 1800 and PCS 1900 Functionality connectivity.

The terminal utilises the approved HHP Compact Flash 802.11b RLAN radio card, the Socket Communications Bluetooth Module. FCC ID numbers are detailed in Section 1.2.1 Declaration of Build Status.

The radios integrated in this terminal are not designed to operate simultaneously and are therefore tested co-located.

1.5.2 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Applicable testing was carried out with the EUT transmitting at maximum power or receiving as detailed in Section 1.5.3 "Test Configuration".

1.5.3 Test Configuration

1.5.3.1 Test Configuration 1– PCS 1900 with Bluetooth (Co-Located)

Measurements were made with the EUT transmitting on the following frequencies.

| | |
|-------------------------|-----------------|
| PCS 1900 (Bottom) | Bluetooth (Top) |
| Channel 512 (1.8502GHz) | 2.480GHz |

The Output Power level (controlled by application software) was set to maximum

1.5.3.2 Test Configuration 2 - PCS 1900 with Bluetooth (Co-Located)

Measurements were made with the EUT transmitting on the following frequencies.

| | |
|-------------------------|--------------------|
| PCS 1900 (Top) | Bluetooth (Bottom) |
| Channel 810 (1.9098GHz) | 2.402GHz |

The Output Power level (controlled by application software) was set to maximum.

1.6 TEST CONDITIONS

For all tests, the Handheld D9500 was powered by its own internal battery.

1.7 DEVIATIONS FROM THE STANDARD

Not Applicable

1.8 MODIFICATION RECORD

| Modification State | Description of Modification still fitted to EUT | Modification Fitted By | Date Modification Fitted |
|--------------------|---|------------------------|--------------------------|
| 0 | As supplied by the customer | N/A | N/A |



SECTION 2

TEST DETAILS

Simultaneous Transmitters: Limited FCC Part 15 C and 24 E Testing in support of an
Application for Grant of Equipment Authorisation
of a Handheld Products D9500 (Co-Located Operation)



2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238

2.1.2 Equipment Under Test

D9500

2.1.3 Date of Test

4th to 6th March 2004

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as Section 2.1 within the Test Equipment Used table shown in Section 3.1.

2.1.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within a semi-anechoic chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisation. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT. The list of emissions was then confirmed or updated under Alternative Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

Emissions identified within the range 30MHz – 1GHz were then formally measured using a CISPR Quasi-Peak detector.

Emissions identified within the range 1GHz – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

The measurements were performed at a 3m distance unless otherwise stated.

The limits for Spurious Emissions have been calculated, as shown in the table below using the following formula:

Field Strength of Carrier $-(43 + 10\log(P))$

Where:

Field Strength is measured in dB μ V/m

P is Declared Transmitter Power in Watts

| Test Mode | Carrier Frequency MHz | Carrier Field Strength dB μ V/m | Declared Power MW | Limit for Spurious Emissions dB μ V/m |
|----------------|-----------------------|-------------------------------------|-------------------|---|
| Bottom Channel | 1850.2 | 126.1 | 724.44 | 89.5 |
| Top Channel | 1909.8 | 125.5 | 933.25 | 82.8 |

These limits have been used to determine Pass or Fail for the harmonics measured and detailed in the following tables.



2.2.6 Test Results

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 for Radiated Emissions (30MHz – 1GHz).

Co-Located. PCS 1900 Tx on Bottom Channel (1850.2MHz) with Bluetooth on Top Channel (2480MHz)

Measurements were made with the EUT in Configuration 1.

No emissions within 40dB of the specification limit were detected.

Co-Located. PCS 1900 EUT Tx on Top Channel (1909.8MHz) with Bluetooth on Bottom Channel (2402MHz)

Measurements were made with the EUT in Configuration 2.

No emissions within 40dB of the specification limit were detected.



2.2 RADIATED EMISSIONS - continued

2.2.6 Test Results - continued

1GHz – 20GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC Part 24.238 for Radiated Emissions (1GHz - 20GHz).

Co-Located. PCS 1900 Tx on Bottom Channel (1850.2MHz) with Bluetooth on Top Channel (2480MHz)

Measurements were made with the EUT in Configuration 1.

| Frequency | Antenna Polarisation | Height | Azimuth | Peak Field Strength | Peak Limit |
|-----------|----------------------|--------|---------|---------------------|------------|
| MHz | H/V | cm | deg | dBµV/m | dBµV/m |
| 5.550 | V | 109 | 357 | 53.1 | 84.5 |
| 5.550 | H | 100 | 249 | 54.5 | 84.5 |
| 11.100 | V | 100 | 021 | 61.5 | 84.5 |
| 11.100 | H | 182 | 270 | 62.8 | 84.5 |

Co-Located. PCS 1900 EUT Tx on Top Channel (1909.8MHz) with Bluetooth on Bottom Channel (2402MHz)

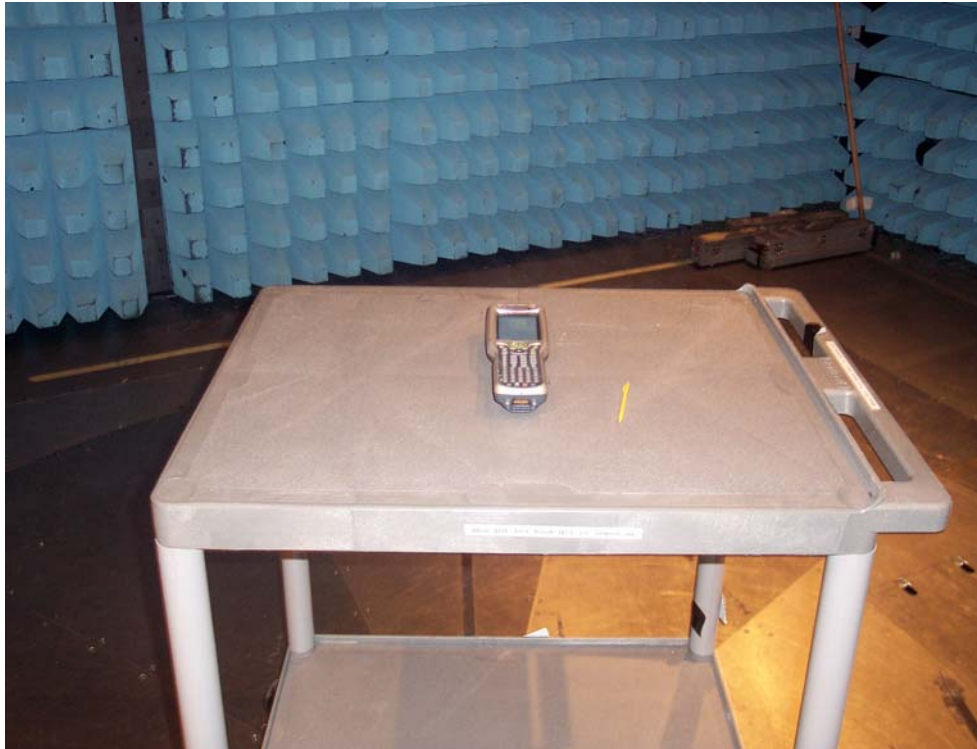
Measurements were made with the EUT in Configuration 2.

| Frequency | Antenna Polarisation | Height | Azimuth | Peak Field Strength | Average Field Strength |
|-----------|----------------------|--------|---------|---------------------|------------------------|
| MHz | H/V | cm | Deg | dBµV/m | dBµV/m |
| 4.804 | V | 122 | 183 | 63.1 | 82.8 |
| 4.804 | H | 100 | 120 | 62.6 | 82.8 |
| 5.727 | H | 100 | 248 | 59.4 | 82.8 |
| 5.727 | V | 100 | 196 | 59.3 | 82.8 |
| 9.608 | V | 100 | 007 | 56.5 | 82.8 |
| 9.608 | H | 122 | 294 | 53.9 | 82.8 |
| 11.458 | H | 128 | 348 | 62.3 | 82.8 |
| 11.458 | V | 158 | 285 | 68.7 | 82.8 |



2.2 RADIATED EMISSIONS - continued

2.2.7 Set Up Photograph



Radiated Emissions Set Up Photograph



SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

| Item | Instrument | Manufacturer | Type No | EMC / INV No | Cal. Due |
|-------------|----------------------------|-----------------|----------------------|--------------|----------|
| Section 2.2 | | | | | |
| 1 | Turntable & Controller | HD Gmbh | HD 050 | 2528 | TU |
| 2 | Antenna Mast | EMCO | 2070 | - | TU |
| 3 | Antenna Mast Controller | EMCO | 2090 | - | TU |
| 4 | Bilog antenna | Chase | CBL6143 | 2860 | 11-4-04 |
| 5 | Spectrum Analyser | Rhode & Schwarz | ESIB40 | 2917 | 11-2-05 |
| 6 | Horn | EMCO | 3115 | 2397 | 4-7-04 |
| 7 | Signal Generator | Hewlett Packard | 8673B | 954 | 14-6-04 |
| 8 | Low Noise Amplifier 1-8GHz | Miteq | AMF-3D-001080-18-13P | 2457 | TU |
| 9 | Amplifier 8-18GHz | Avantek | AWT 18036 | 1081 | 26-6-04 |
| 10 | Amplifier 18-26GHz | Avantek | AMT 26177-33 | 2072 | 26-6-04 |
| 11 | Hydrometer | Rotronic | A1 | INV3155 | 28-8-04 |
| 12 | Antenna | FMI | 18-40Ghz | 1396 | TU |

TU: Traceability Unscheduled



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

| IN THE FREQUENCY RANGE 30MHz TO 1000MHz | | |
|--|---|--------------------|
| TEST | FREQUENCY | AMPLITUDE |
| For Radiated Emissions, Quasi-Peak Measurements using the ESVP Test Receiver and Bilog Antenna | $\pm 5\text{ppm} + 500\text{Hz}$ | $\pm 4.1\text{dB}$ |
| IN THE FREQUENCY RANGE 1GHz TO 26GHz | | |
| TEST | FREQUENCY | AMPLITUDE |
| For Spurious Radiated Emissions measurements | $\pm 2 \times 10^{-7} \times \text{Centre Frequency}$ | $\pm 3.4\text{dB}$ |



SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

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APPENDIX A

TITCHFIELD FCC SITE COMPLIANCE LETTER



FEDERAL COMMUNICATIONS COMMISSION

**Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046**

October 18, 2002

Registration Number: 90987

TUV Product Service Ltd
Segensworth Road
Titchfield
Fareham, Hampshire, PO15 5RH
United Kingdom
Attention: Kevan Adsetts

Re: Measurement facility located at Titchfield
Anechoic chamber (3 meters) and 3 & 10 meter OATS
Date of Listing: October 18, 2002

Gentlemen:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,

Thomas W Phillips
Electronics Engineer