REPORT ON

Limited FCC CFR 47: Parts 15 C Testing (Co-located Transmitters) in support of an Application for Grant of Equipment Authorisation
Of a Handheld Products D9500 (Co-Located Operation)

COMMERCIAL-IN-CONFIDENCE

FCC ID: HD5595009

Report No OR611654/05 Issue 1 March 2004

TÜV PRODUCT SERVICE

BABT

TÜV Product Service Ltd, Segensworth Road,
Fareham, Hampshire, PO15 5RH, United Kingdom
Tel: +44 (0)1329 443300
Website: www.tuvps.co.uk

REPORT ON Limited FCC CFR 47: Parts 15 C Testing (Co Located Transmitters) in support of an Application for Grant of Equipment Authorisation Of a Handheld D9500 (Co-Located Operation)

FCC ID: HD5595009

Report No OR6211654/05 Issue 1

March 2004

PREPARED FOR

Handheld Products
700 Visions Drive
PO Box 208
Skaneateles Falls
NY
13153-0208
United States of America

PREPARED BY

V King
Principal EMC Engineer

APPROVED BY

J Adams
EMC Signatory

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: Part 15 C. The sample tested was found to comply with the requirements defined in the applied rules.
Test Engineers;

A Guy _____ G Lawler _____

CONTENTS

SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 15 C Testing in support of an
Application for Grant of Equipment Authorisation
Of a Handheld Products D9500 (Co-Located)

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	Hand held 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
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE DATE	Declaration of Build Status 22nd March 2004
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER DATE	DO93486-00 1st September 2003
START OF TEST	4th March 2004
FINISH OF TEST	6th March 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 Hand Held Products D9500 to the requirements of FCC Specification Part 15 C 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 RLAN and Bluetooth.

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	HD5950009		
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 Naveen Velagapudi

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	15.247(c)	Spurious 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– RLAN with Bluetooth (Co-Located)

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

RLAN (Bottom)	Bluetooth (Top)
2.412GHz	2.480GHz

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

1.5.3.2 Test Configuration 2 RLAN with Bluetooth (Co-Located)

RLAN (Top)	Bluetooth (Bottom)
2.462GHz	2.402GHz

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

1.6 TEST CONDITIONS

For all tests, the Hand held Products D9500 was powered by its own internal battery.

1.7 DEVIATIONS FROM THE STANDARD

Not Applicable

1.8 MODIFICATION RECORD

The table below details modifications made to the EUT during the test programme and applies to all configurations. All testing was performed with the EUT in Modification State 0 unless otherwise stated in Section 1.3 and on the appropriate test pages.

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

Limited FCC CFR 47: Parts 15 C Testing (Co-located transmitters) in support of an Application for Grant of Equipment Authorisation
Of a Handheld D9500 EUT

2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.247(c)

2.1.2 Equipment Under Test

D9500

2.1.3 Date of Test

4th March 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 Polarisations. 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 – 26GHz were then formally measured using Peak and Average Detectors, as appropriate.

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

Measurements were made with the RLAN and Bluetooth transmitting on the following frequencies.

	RLAN	Bluetooth
Configuration 1	2.412GHz	2.480GHz
Configuration 2	2.462GHz	2.402GHz

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c).

RLAN Tx on Bottom Channel (2412MHz) with Bluetooth Top Channel (2480MHz)

Measurements were made with the EUT in Configuration 1.

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	DBµV/m	µV/m	DBµV/m	µV/m
398.0	H	100	269	31.5	37.6	46.0	500
447.8	H	219	263	31.4	37.2	46.0	500
797.0	H	100	304	32.0	39.8	46.0	500
808.5	H	100	309	32.1	40.3	46.0	500
833.0	H	100	312	32.5	42.2	46.0	500

RLAN Tx on Top Channel (2462MHz) with Bluetooth on Bottom Channel (2402MHz).

Measurements were made with the EUT in Configuration 2.

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	DBµV/m	µV/m
401.2	H	100	067	31.5	37.6	46.0	500
447.9	H	257	292	33.0	44.7	46.0	500
797.0	H	100	317	31.2	36.3	46.0	500
808.5	H	100	317	32.6	42.7	46.0	500
833.1	H	100	310	31.1	35.9	46.0	500

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results - continued

1GHz - 26GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c), 15.205 and 15.209 for Radiated Emissions (1GHz – 26GHz).

RLAN Tx on Bottom Channel (2412MHz) with Bluetooth Top Channel (2480MHz)

Measurements were made with the EUT in Configuration 1.

No emissions were observed.

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results - continued

1GHz - 26GHz Frequency Range - continued

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(c).

RLAN Tx on Top Channel (2462MHz) with Bluetooth Tx on Bottom Channel (2402MHz).

Measurements were made with the EUT in Configuration 2.

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	Deg	DBµV/m	DBµV/m	dBµV/m	DBµV/m
4.804	V	107	164	61.9	74.0	27.3	54.0
4.804	H	100	142	60.8	74.0	28.7	54.0
4.924	H	100	295	53.7	74.0	43.6	54.0
4.924	V	105	146	52.4	74.0	41.4	54.0
7.206*	V	100	345	52.7	80.4	N/A	N/A
7.206*	H	100	119	53.1	80.4	N/A	N/A

*The emissions at 7.206GHz were outside of the restricted band.

In accordance with FCC Public Notice DA 00-705, Released 30th March 2000, Section 15.247(c) Spurious Radiated Emissions “If the dwell time per channel of the hopping signal is less than 100ms, then the reading obtained with the 10Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(dwell time/100ms), in an effort to demonstrate compliance with the 15.209 limit the following adjustment has been calculated for use with Average Measurements only;

Dwell Time = 5.81ms this is derived from;

Total slot time per time slot for DH5 packet 625µs x 5 = 3.125ms

Actual transmit time during this time slot is 2.905ms and the reply time slot after each DH5 packet is 625µs.

Total time slot length per channel 3.125 + 0.625 = 3.75ms.

Multiply Total time slot length per channel by 32 channels per hop sequence 32 x 3.75 = 120ms

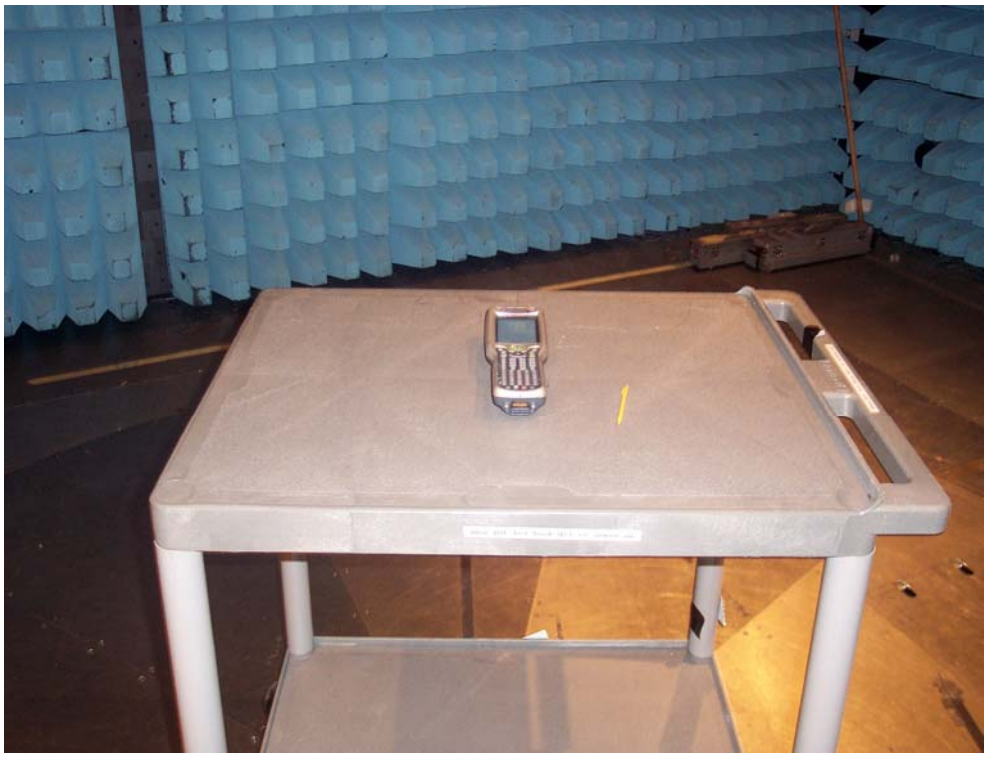
It is therefore possible to have a maximum of two hop sequences in any given 100ms period, a single channel could occur twice within any 100ms time window. 2 x 2.905 = 5.81ms

Therefore; the Bluetooth Duty Cycle Correction Factor for the EUT is 20 log (5.81/100) = -24.7dB

The average results obtained at 4.804GHz were adjusted by the Correction Factor.

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.7 Set Up Photograph



Set Up Photograph

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

Item	Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due
Section 2.1					
1	Turntable & Controller	HD Gmbh	HD 050	2528	TU
2	Antenna Mast	EMCO	2070	-	TU
3	Antenna Mast Controller	EMCO	2090	--	TU
4	Spectrum Analyser	Rhode & Schwarz	ESIB40	2917	11-2-05
5	Horn	EMCO	3115	2397	4-7-04
6	Signal Generator	Hewlett Packard	8673B	954	14-6-04
7	Low Noise Amplifier 1-8GHz	Miteq	AMF-3D-001080-18-13P	2457	TU
8	Amplifier 8-18GHz	Avantek	AWT 18036	1081	26-6-04
9	Amplifier 18-26GHz	Avantek	AMT 26177-33	2072	26-6-04
10	Hydrometer	Rotronic	A1	INV3155	28-8-04
11	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	±5ppm + 500Hz	±4.1dB
IN THE FREQUENCY RANGE 1GHz TO 26GHz		
TEST	**FREQUENCY**	**AMPLITUDE**
For Spurious Radiated Emissions measurements	$\pm 2 \times 10^{-7}$ x Centre Frequency	±3.4dB

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).

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

Thomas W Phillips
Electronics Engineer