
REPORT ON

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Handheld D9500

COMMERCIAL-IN-CONFIDENCE

FCC ID: HD5595009

Report No OR611654/04 Issue 1

March 2004



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 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Handheld D9500

FCC ID: HD5595009

Report No OR611654/04 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 Engineer

APPROVED BY


J Adams
EMC Signatory

DATED

25th March 2004

DISTRIBUTION

Hand Held Products

Copy 1

BABT

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 and 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;


S Hartley


A Guy


G Lawler





CONTENTS

Section	Page No
1	REPORT SUMMARY
1.1	Status..... 4
1.2	Introduction..... 5
1.3	Brief Summary of Results (and Observations)..... 7
1.4	Opinions and Interpretations 8
1.5	Product information 9
2	TEST DETAILS
2.1	Spurious Radiated Emissions 11
2.2	Maximum Peak Output Power..... 14
2.3	Radiated Emissions..... 17
3	TEST EQUIPMENT USED
3.1	Table of Test Equipment Used..... 24
3.2	Measurement Uncertainty 25
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT
4.1	Accreditation, Disclaimers And Copyright 27
APPENDICES	
A	Titchfield FCC Site Compliance Letter 29



SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Handheld D9500



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 B, August 2002, and Part 24, Subpart D, 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 FINISH OF TEST	25 th February 2004 26 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 D9500 to limited requirements of the FCC Specification Parts 15 and 24.

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



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

Naveen Velagapudi

Date

22nd March 2004

TÜV Product Service Limited formally certifies that the manufacturer's declaration as reproduced in this report, is a true and accurate record of the original received from the applicant.



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	15.109	Radiated Emissions (Unintentional Radiator)	Pass	
2.2	24.232	Maximum Peak Output Power	Pass	
2.3	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 independently, but are 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 Mode 1: PCS 1900MHz Transmitting on the following channels and frequencies;

Bottom Channel 512: 1850.2MHz
 Middle Channel 661: 1880.0MHz
 Top Channel 810: 1909.8MHz

The Output Power level was set to level 0 (30dBm)

1.5.3.2 Test Mode 2: PCS 1900MHz Idle on the following Channel and Frequency;

Middle Channel 661: 1880.0MHz

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

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Handheld D9500



2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart B, Section 15.109

2.1.2 Equipment Under Test

D9500

2.1.3 Date of Test

26th February 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.

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



2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results

Equipment Designation: Unintentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15 Subpart B, Section 15.109 for Spurious Radiated Emissions (30MHz – 1GHz).

EUT Rx on Middle Channel

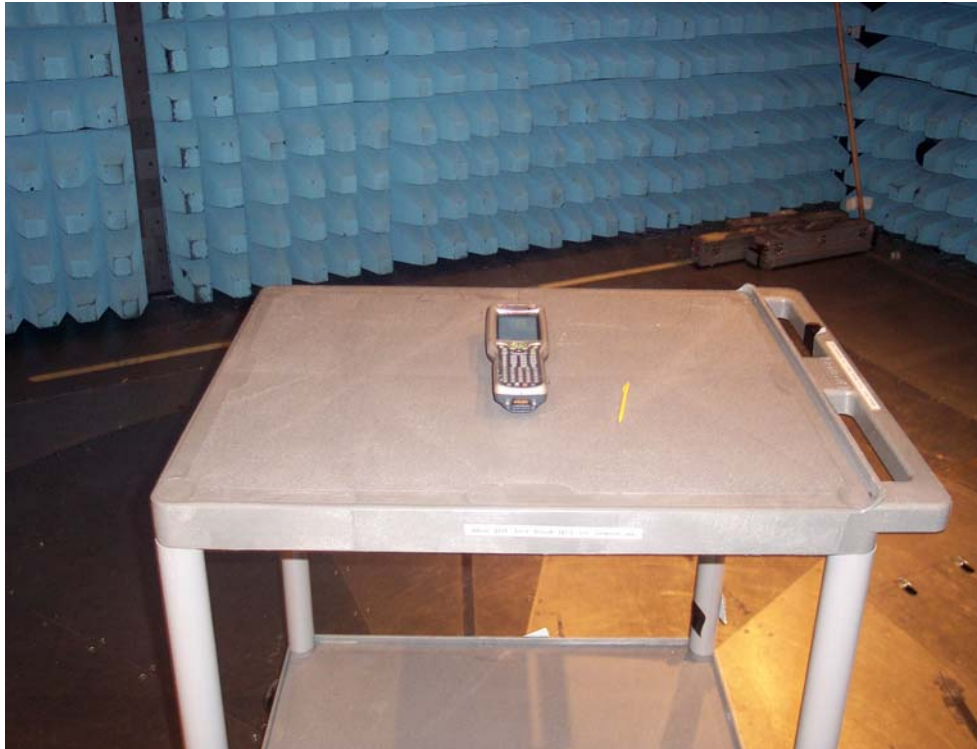
Measurements were made with the EUT in Mode 2.

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dB μ V/m	μ V/m	dB μ V/m	μ V/m
423.0	H	100	260	28.2	25.7	46.0	200.0
447.9	H	251	265	30.6	33.9	46.0	200.0
697.5	H	133	087	28.1	25.4	46.0	200.0
709.2	V	100	024	26.7	21.6	46.0	200.0
721.6	H	100	357	25.1	18.0	46.0	200.0
796.2	H	117	069	31.8	38.9	46.0	200.0



2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.7 Set Up Photograph



Set Up Photograph



2.2 MAXIMUM PEAK OUTPUT POWER

2.2.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.232

2.2.2 Equipment Under Test

D9500

2.2.3 Date of Test

25th February 2004

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as "Section 2.2" within the Test Equipment Used table shown in Section 3.1.

2.2.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

The Spectrum Analyser was tuned to the test frequency. The device Output Power setting was controlled as specified in the Product Information, Section 1.5 of this document. The device was then rotated through 360 degrees until the highest power level was observed in both horizontal and vertical polarisation. The device was then replaced with a substitution antenna, whose input signal the antenna was adjusted until the received level matched that of the previously detected emission.



2.2 MAXIMUM PEAK OUTPUT POWER - continued

2.2.6 Test Results

Measurements were made with the EUT in Mode 1.

The EUT met the requirements of FCC Part 24, Section 24.232, Power and Antenna Height Limits.

Frequency (MHz)	Raw Result (dBm)	Substitution Level (dBm)	Substitution Antenna Gain (dB)	Result ERP (dBm)	Result ERP (mW)
1850.2	-14.5	19.7	8.9	28.6	724.44
1880.0	-15.7	19.8	8.9	28.7	741.31
1909.8	-15.1	20.8	8.9	29.7	933.25



2.2 MAXIMUM PEAK OUTPUT POWER - continued

2.2.7 Set Up Photograph



Maximum Peak Output Power Set Up Photograph



2.3 RADIATED EMISSIONS

2.3.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238

2.3.2 Equipment Under Test

D9500

2.3.3 Date of Test

26th February 2004

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.3” within the Test Equipment Used table shown in Section 3.1.

2.3.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

In order to determine the Radiated Emission Limits, measurements of transmitter power (P) were first carried out on the top and bottom channels using a peak detector, and the results are shown in the following table.

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 – 20GHz were then formally measured using Peak and Average Detectors, as appropriate.

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



2.3 RADIATED EMISSIONS - continued

2.3.5 Test Procedure - continued

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

Field Strength of Carrier $-(43 + 10\text{Log}(P))$

Where:

Field Strength is measured in dB μ V/m

P is Measured Transmitter Power in Watts

2.3.6 Mode 1 Test Results

Test Mode	Carrier Frequency GHz	Carrier Field Strength dB μ V/m	Measured Power mW	Limit for Spurious Emissions dB μ V/m
Bottom Channel	1850.2	126.1	724.44	84.5
Middle Channel	1880.0	124.9	741.31	83.2
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.



2.3.6 Test Results - continued

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

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

EUT Tx on Bottom Channel (1850.2MHz)

Measurements were made with the EUT in Mode 1. (1900).

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

EUT Tx on Middle Channel (1880.0MHz)

Measurements were made with the EUT in Mode 1. (1900).

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

EUT Tx on Top Channel (1909.8MHz)

Measurements were made with the EUT in Mode 1. (1900).

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



2.3 RADIATED EMISSIONS - continued

2.3.6 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).

EUT Tx on Bottom Channel (1850.2MHz)

Measurements were made with the EUT in Mode 1. (1900)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Peak Limit
MHz	H/V	cm	deg	dBµV/m	dBµV/m
5.550	H	113	237	55.6	84.5
5.550	V	100	278	56.6	84.5
11.100	H	172	267	64.2	84.5
11.100	V	100	219	65.4	84.5

EUT Tx on Middle Channel (1880.0MHz)

Measurements were made with the EUT in Mode 1. (1900)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz	H/V	Cm	deg	dBµV/m	dBµV/m
5.639	H	100	240	62.5	83.2
5.639	V	103	241	62.1	83.2
11.280	H	148	242	69.5	83.2
11.280	V	174	259	63.5	83.2



2.3 RADIATED EMISSIONS - continued

2.3.6 Test Results - continued

1GHz – 25GHz Frequency Range

Equipment Designation: Intentional Radiator.

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

EUT Tx on Top Channel (1909.8MHz)

Measurements were made with the EUT in Mode 1. (1900)

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
MHz	H/V	cm	deg	dBμV/m	dBμV/m
5.730	H	100	242	58.4	82.8
5.730	V	100	241	57.8	82.8
11.459	H	160	239	67.9	82.8
11.459	V	124	242	71.9	82.8

ABBREVIATIONS FOR ABOVE TABLES

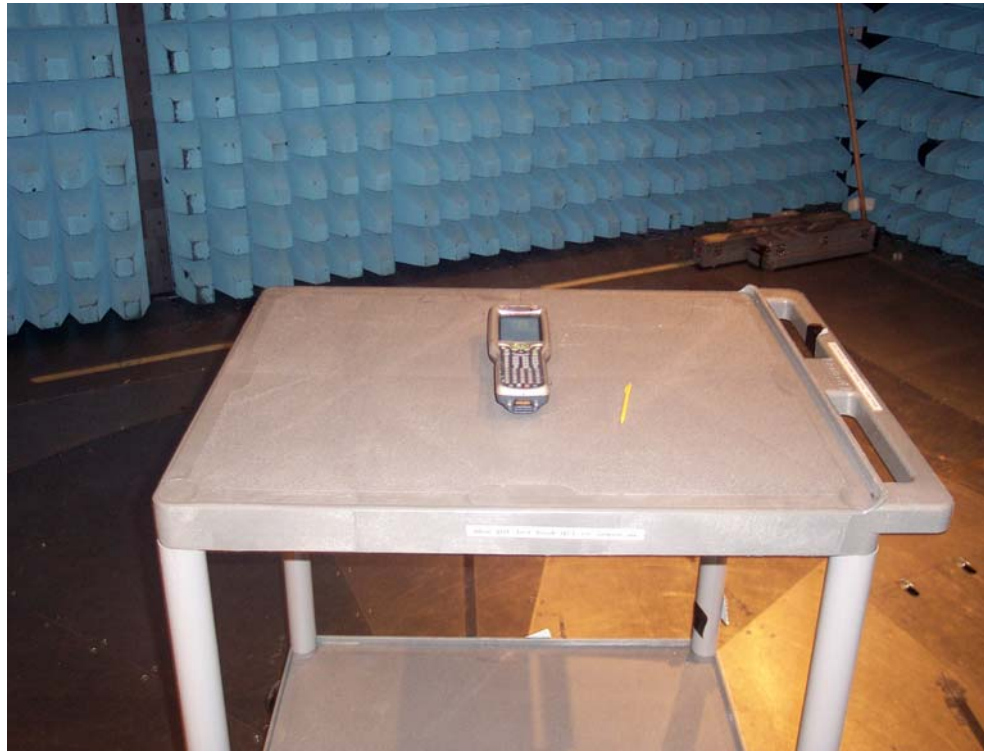
H Horizontal Polarisation

V Vertical Polarisation



2.3 RADIATED EMISSIONS - continued

2.3.7 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 2.1					
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	Bilog antenna	Chase	CBL6143	2860	11-4-04
6	Hydrometer	Rotronic	A1	INV3155	28-8-04
Section 2.2					
7	Peak Power Analyser	Hewlett Packard	8990A	1670	14-8-04
8	Horn	EMCO	3115	2397	4-7-04
9	Horn	EMCO	3115	2297	4-7-04
10	Spectrum Analyser	Rhode & Schwarz	ESIB40	2917	11-2-05
Section 2.3					
11	Turntable & Controller	HD Gmbh	HD 050	2528	TU
12	Antenna Mast	EMCO	2070	-	TU
13	Antenna Mast Controller	EMCO	2090	--	TU
14	Spectrum Analyser	Rhode & Schwarz	ESIB40	2917	11-2-05
15	Horn	EMCO	3115	2397	4-7-04
16	Signal Generator	Hewlett Packard	8673B	954	14-6-04
17	Low Noise Amplifier 1-8GHz	Miteq	AMF-3D-001080-18-13P	2457	TU
18	Amplifier 8-18GHz	Avantek	AWT 18036	1081	26-6-04
19	Amplifier 18-26GHz	Avantek	AMT 26177-33	2072	26-6-04
20	Hydrometer	Rotronic	A1	INV3155	28-8-04
21	Antenna	FMI	2024-20	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 Maximum Output Power	Not Applicable	±0.5dB
For Radiated Emissions, Quasi-Peak Measurements taken in Zero Span using the Hewlett Packard EMI Receiver and Bilog Antenna	$\pm 2 \times 10^{-7} \times \text{Centre Frequency}$	5.15dB calculated in accordance with CISPR 16-4
IN THE FREQUENCY RANGE 1GHz TO 26GHz		
TEST	FREQUENCY	AMPLITUDE
For Spurious Radiated Emissions measurements	$\pm 2 \times 10^{-7} \times \text{Centre Frequency}$	±3.4dB
For Effective Radiated Power (ERP) measurements	Not Applicable	±1.45dBm



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).

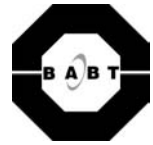
This report must not be reproduced without the written permission of TÜV Product Service Limited

© 2004 TÜV Product Service Limited



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