REPORT ON

Limited FCC CFR 47: Parts 15 and 24 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Symbol 4121GPRS Hand Held Data Terminal

FCC ID: H9P4121GPRS

Report No OR612329/03 Issue 2 August 2004

TÜV PRODUCT SERVICE

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FCC ID: H9P4121GPRS

Report No OR612329/03 Issue 2

August 2004

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DATED 31-08-04

DISTRIBUTION

Symbol	Copy 1
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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

UKAS TESTING 0141 Group

CONTENTS

SECTION 1

REPORT SUMMARY

Limited FCC CFR 47: Part 15 and Part 24 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Symbol 4121GPRS Hand Held Data Terminal

1.1 STATUS

EQUIPMENT UNDER TEST	Hand Held Data Terminal
OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
NAME AND ADDRESS OF CLIENT	Symbol Technologies Inc One Symbol Plaza Holtsville 11742-1300, New York United States of America
TYPE NUMBER	4121GPRS
PART NUMBER	4121GPRS1
SERIAL NUMBER	FCC 2 Samp 0001
HARDWARE VERSION	Rev 1 (To be released as Rev A)
DECLARED VARIANTS	41210000
TEST SPECIFICATION/ISSUE/DATE	FCC CFR 47: Part 15, Subparts B and C, October 2003, and Part 24, Subpart E, October 2003
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE DATE	Declaration of Build Status 14th July 2004
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER	EMEA 14281, dated 27th May 2004
START OF TEST	29th June 2004
FINISH OF TEST	26th August 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

This report is Issue 2 and has been produced to cover several typing errors in the original test report, plus the addition of Conducted Emissions testing which was omitted from the original; this report supersedes the previous report OR612329/03 Issue 1.

The information contained within this report is intended to show limited verification of compliance of the Symbol Technologies Inc 4121GPRS Hand Held Data Terminal to the requirements of FCC Specification Part 24.

Testing was carried out in support of an application for Grant of Equipment Authorisation in the name of Symbol Technologies Inc.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The unit supplied for testing was a 4121GPRS hand held data terminal, which offers Tri Band GSM/GPRS, 2.4GHz 802.11b Wireless LAN and Bluetooth connectivity.

The terminal utilizes the Motorola G18 GSM/GPRS module to offer GSM GPRS data connectivity. Also included in the terminal is the approved LA-4137 Symbol Compact Flash 802.11b RLAN radio card and the 21-64381 Symbol Bluetooth module. FCC ID numbers are detailed in Section 1.3.4 “Declaration of Build Status”.

41210000 Sub-equipped version (RLAN and Bluetooth only)
A sub-equipped version of the 4121GPRS Hand Held Data Terminal is also available; this version will offer 802.11b RLAN and Bluetooth connectivity only, as the Motorola GSM GPRS module is not included.

1.3.2 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 1.3.3 “Test Configuration”.

The client has declared that the Symbol 21-64436 (RLAN) and the Symbol 21-64381 (Bluetooth) Modules are co-located, but that they are not capable of simultaneously transmitting.

The client has declared that the Symbol 21-64436 (RLAN) and the Motorola GSM GPRS modules are co-located, but that they are not capable of simultaneously transmitting.

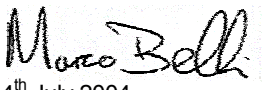
The Symbol 21-64381 Bluetooth module is capable of simultaneously transmitting with the Motorola GSM GPRS module. Testing for this mode of operation is covered in BABT Test Report Reference Number OR612329/04.

1.3.3 GPRS 1900 Mode

The EUT was running the program Symbol GSM/DCS/PCS Test Tool GSMDEMO.exe, which enabled the test engineer to select transmit or receive on the following channels and frequencies;
Bottom Channel 512: 1850.2MHz
Middle Channel 661: 1880.0MHz
Top Channel 810: 1909.8MHz

1.3.4 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	Hand Held Terminal		
MANUFACTURER	Symbol Technologies Inc		
TYPE	4121GPRS		
PART NUMBER	4121GPRS1		
SERIAL NUMBER	SAMP0000 & SAMP0008		
HARDWARE VERSION	Rev 1 (to be released as Rev A)		
FCC ID	H9P4121GPRS		
INDUSTRY CANADA ID	1549D-4121GPRS		
TECHNICAL DESCRIPTION	The unit supplied for testing was a 4121GPRS hand held data terminal, which offers GPRS functionality, 2.4GHz 802.11b Wireless LAN and Bluetooth connectivity. The terminal utilizes the approved Motorola g18 module to offer GPRS functionality. Also included in the terminal is the approved LA-4137 Symbol Compact Flash 802.11b RLAN radio card and the 21-64831 Symbol Bluetooth module.		
BATTERY/POWER SUPPLY			
CHEMISTRY	Li Ion		
PART NUMBER	21-59510-02		
VOLTAGE	7.2v		
MODULES			
MANUFACTURING DESCRIPTION	RLAN Module	Bluetooth Marlin Module	GPRS Module
MANUFACTURER	Symbol Technologies Inc	Symbol Technologies Inc	Motorola
TYPE	LA4137	21-64381	G18
TRANSMITTER OPERATING BAND	2400-2483.5 MHz	2400-2483.5 MHz	GSM 900/1800/1900
RECEIVER OPERATING BAND	2400-2483.5 MHz	2400-2483.5 MHz	GSM 900/1800/1900
ITU DESIGNATION OF EMISSION	11M0F1D	1M00F1D	250KG7W
POWER	100mW	100mW (restricted in this terminal integration to 1 mW)	900 2W 1800/ 1900 1W
DHSS/FHSS/COMBINED OR OTHER	DSSS	FHSS	GMSK/ TDMA
FCC ID	H9PLA4137	H9P2164381	IHDT6AC1

Signature 

Date 14th July 2004

D of B S Serial No OS612329

The unit used for the internal photographs in this report was not the EUT, but was supplied as an identical unit for photographs only. It is declared as being the same build status as the EUT.

BABT 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.

1.4 BRIEF SUMMARY OF RESULTS

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

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	15.207	Conducted Emissions on the Power Lines	Pass	
2.3	24.232	Maximum Peak Output Power	Pass	
2.4	24.238	Radiated Emissions	Pass	

1.5 OPINIONS AND INTERPRETATIONS

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

1.6 TEST CONDITIONS

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site identified in Appendix A and tested in accordance with the applicable specification.

For all tests, the Symbol 4121GPRS Hand Held Data Terminal was powered by its own internal battery.

1.7 DEVIATIONS FROM THE STANDARD

Not Applicable

1.8 MODIFICATION RECORD

Not Applicable

1.9 ALTERNATIVE TEST SITE

No alternative test site was used

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 Symbol 4121GPRS Hand Held Data Terminal

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

4121GPRS Hand Held Data Terminal

2.1.3 Date of Test

2nd July 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).

Measurements were made with the EUT in GPRS 1900 Mode (see Section 1.3.3 for details).

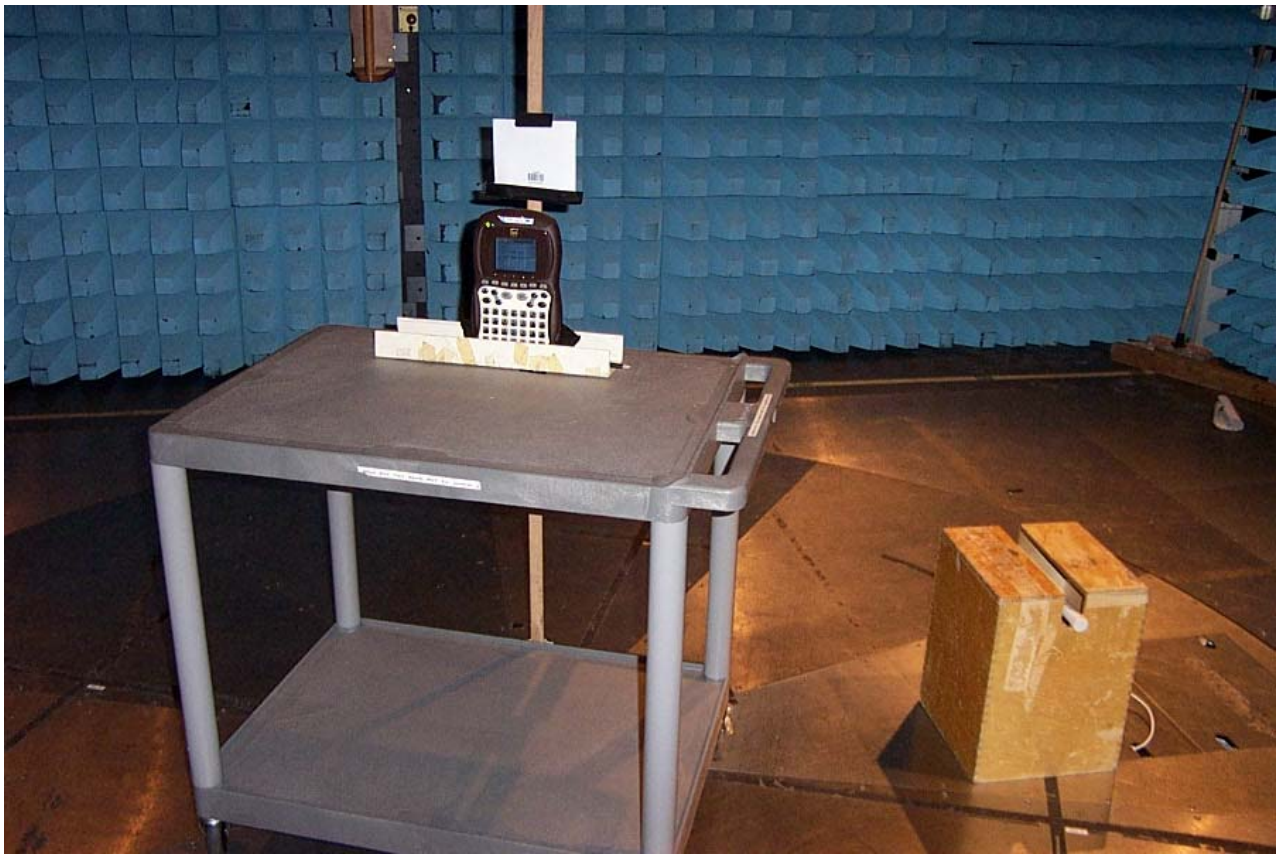
EUT Rx on Middle Channel

The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Polarisation	Height	Azimuth	Field Strength		Limit	
MHz	Horizontal/ Vertical	cm	degree	dBµV/m	µV/m	dBµV/m	µV/m
335.4	V	150	201	32.3	41.2	46.0	200.0
431.3	V	122	179	31.4	37.2	46.0	200.0
497.7	V	100	196	28.7	27.2	46.0	200.0
527.2	V	100	179	36.6	67.6	46.0	200.0
575.0	V	100	163	28.1	25.4	46.0	200.0
623.0	V	100	180	26.7	21.6	46.0	200.0

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.7 Set Up Photograph



Set Up Photograph

2.2 CONDUCTED EMISSIONS ON POWER LINES

2.2.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.207

2.2.2 Equipment Under Test

4121GPRS Hand Held Data Terminal

2.2.3 Date of Test

26th August 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.

Conducted Emission Measurements were undertaken within the semi-anechoic chamber. Emissions were measured on the Live and Neutral Lines in turn.

Emissions were formally measured using a Quasi-Peak and Average Detectors, which meet the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in Tables 2.2.1 – 2.2.6 respectively.

The EUT was supplied via the Charger from a 120V, 60Hz supply.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.6 Test Results

The EUT met the Class B requirements of FCC CFR 47: Part 15 Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

Measurements were made with the EUT in RLAN Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (1850.2MHz) – Live Line

Emission Frequency (MHz)	Average Level (dBµV)	Quasi-Peak Level (dBµV)	Average Limit (dBµV)	Quasi-Peak Limit (dBµV)
0.2136	34.0	43.1	53.1	63.1
0.2143	34.1	43.2	53.0	63.0
0.2489	32.7	39.2	51.8	61.8
2.5970	31.6	33.2	46.0	56.0
3.2369	28.4	33.4	46.0	56.0
20.4614	30.4	35.4	50.0	60.0

The margin between the specification requirements and all other emissions were 24.6dB or more below the specified Quasi-Peak limit and 19.6dB or more below the Average limit.

EUT Tx on Bottom Channel (1850.2MHz) – Neutral Line

Emission Frequency (MHz)	Average Level (dBµV)	Quasi-Peak Level (dBµV)	Average Limit (dBµV)	Quasi-Peak Limit (dBµV)
0.1774	39.8	49.6	54.6	64.6
0.2130	35.3	44.6	53.0	63.0
0.2839	32.6	39.3	51.8	61.8
2.4145	30.3	34.2	46.0	56.0
2.6633	29.9	34.3	46.0	56.0
20.3413	33.5	37.7	50.0	60.0

The margin between the specification requirements and all other emissions were 22.2dB or more below the specified Quasi-peak limit and 18.0dB or more below the specified Average limit.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.6 Test Results - continued

EUT Tx on Middle Channel (1880.0MHz) – Live Line

Emission Frequency (MHz)	Average Level (dBµV)	Quasi-Peak Level (dBµV)	Average Limit (dBµV)	Quasi-Peak Limit (dBµV)
0.1781	36.4	46.7	54.6	64.6
0.2135	33.0	41.4	53.0	63.0
0.2493	32.8	39.6	51.8	61.8
2.5273	29.1	32.8	46.0	56.0
2.6698	28.3	33.4	46.0	56.0
20.9486	29.0	33.6	50.0	60.0

The margin between the specification requirements and all other emissions were 26.4dB or more below the specified Quasi-Peak limit and 21.0dB or more below the Average limit.

EUT Tx on Middle Channel (1880.0MHz) – Neutral Line

Emission Frequency (MHz)	Average Level (dBµV)	Quasi-Peak Level (dBµV)	Average Limit (dBµV)	Quasi-Peak Limit (dBµV)
0.2492	33.0	38.6	51.8	61.8
0.2849	31.4	37.5	50.7	60.7
2.5985	27.9	32.5	46.0	56.0
3.3472	30.1	33.0	46.0	56.0
3.3469	29.4	32.8	46.0	56.0
20.2219	30.2	34.6	50.0	60.0

The margin between the specification requirements and all other emissions were 25.4dB or more below the specified Quasi-Peak limit and 19.8dB or more below the Average limit.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.6 Test Results - continued

EUT Tx on Top Channel (1909.8MHz) – Live Line

Emission Frequency (MHz)	Average Level (dBµV)	Quasi-Peak Level (dBµV)	Average Limit (dBµV)	Quasi-Peak Limit (dBµV)
0.1781	35.6	46.5	54.6	64.6
0.2135	32.2	41.1	53.0	63.0
0.2492	29.6	38.0	51.8	61.8
0.2847	32.8	36.0	50.7	60.7
2.5987	28.1	33.1	46.0	56.0
20.4686	28.7	33.1	50.0	60.0

The margin between the specification requirements and all other emissions were 26.9dB or more below the specified Quasi-Peak limit and 21.3dB or more below the Average limit.

EUT Tx on Top Channel (1909.8MHz) – Neutral Line

Emission Frequency (MHz)	Average Level (dBµV)	Quasi-Peak Level (dBµV)	Average Limit (dBµV)	Quasi-Peak Limit (dBµV)
0.2136	32.8	41.1	53.0	63.0
0.2493	31.2	38.7	51.8	61.8
0.2849	31.2	35.9	50.7	60.7
2.6343	29.7	33.1	46.0	56.0
2.9185	31.2	35.2	46.0	56.0
20.5776	29.9	34.2	50.0	60.0

The margin between the specification requirements and all other emissions were 25.8dB or more below the specified Quasi-peak limit and 20.5dB or more below the specified Average limit.

2.2 CONDUCTED EMISSIONS ON POWER LINES - continued

2.2.7 Set Up Photographs -

Conducted Emissions Set Up Photograph

2.3 MAXIMUM PEAK OUTPUT POWER

2.3.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.232

2.3.2 Equipment Under Test

4121GPRS Hand Held Data Terminal

2.3.3 Date of Test

29th June 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.

The EUT contains an integral antenna and therefore the Maximum Peak Output Power was made using the EIRP method.

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, who’s input signal level into the antenna was adjusted until the received level matched that of the previously detected emission.

2.3 MAXIMUM PEAK OUTPUT POWER - continued

2.3.6 Test Results

Measurements were made with the EUT in GPRS 1900 Mode (see Section 1.3.3 for details).

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 EIRP (dBm)	Result EIRP (W)	Limit EIRP (dBm)	Limit EIRP (W)
1850.2	-10.34	23.52	8.87	32.4	1.74	33.0	2.00
1880.0	-11.57	21.99	8.87	30.9	1.23	33.0	2.00
1909.8	-12.34	21.40	8.87	30.3	1.07	33.0	2.00

2.4 RADIATED EMISSIONS

2.4.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238

2.4.2 Equipment Under Test

4121GPRS Hand Held Data Terminal

2.4.3 Date of Test

2nd July 2004 and 4th July 2004

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.4” within the Test Equipment Used table shown in Section 3.1.

2.4.5 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.

2.4 RADIATED EMISSIONS - continued

2.4.5 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 + 10Log (P))

Where:
Field Strength is measured in dBµV/m
P is Measured Transmitter Power in Watts

Test Mode	Carrier Frequency GHz	Carrier Field Strength dBµV/m	Measured Power W	Limit for Spurious Emissions dBµV/m
Mode 1 (1900)	1850.2	130.2	1.74	84.8
Mode 1 (1900)	1880.0	129.2	1.23	85.3
Mode 1 (1900)	1909.8	128.5	1.07	85.2

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

2.4 RADIATED EMISSIONS - continued

2.4.6 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).

Measurements were made with the EUT in GPRS 1900 Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (1850.2MHz)

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
335.4	V	138	203	32.7	84.8
431.3	V	125	174	31.4	84.8
497.7	V	100	184	28.7	84.8
527.2	V	100	185	36.3	84.8
575.1	V	100	169	28.2	84.8
623.0	V	100	166	36.9	84.8

EUT Tx on Middle Channel (1880.0MHz)

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
335.5	V	148	208	32.8	85.3
431.3	V	112	183	31.3	85.3
498.1	V	100	198	28.4	85.3
527.2	V	100	185	27.0	85.3
575.1	V	100	168	28.4	85.3
622.9	V	100	184	36.7	85.3

2.4 RADIATED EMISSIONS - continued

2.4.6 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).

Measurements were made with the EUT in GPRS 1900 Mode (see Section 1.3.3 for details).

EUT Tx on Top Channel (1909.8MHz)

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
335.4	V	144	209	32.1	85.2
431.3	V	113	184	30.9	85.2
497.6	V	100	191	29.7	85.2
527.1	V	100	179	36.9	85.2
575.1	V	100	170	28.4	85.2
623.0	V	100	186	37.1	85.2

2.4 RADIATED EMISSIONS - continued

2.4.6 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).

Measurements were made with the EUT in GPRS 1900 Mode (see Section 1.3.3 for details).

EUT Tx on Bottom Channel (1850.2MHz)

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
3.7004	V	100	0	51.1	84.8
5.5506	H	136	241	62.1	84.8
7.4008	H	135	243	58.5	84.8
9.2510	V	111	142	60.7	84.8
11.1012	H	146	239	63.1	84.8

EUT Tx on Middle Channel (1880.0MHz)

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
3.7600	H	100	269	56.7	85.3
5.6400	H	127	113	61.1	85.3
7.5200	H	100	211	60.8	85.3
9.4000	V	100	139	58.4	85.3
11.2800	H	145	242	65.0	85.3

2.4 RADIATED EMISSIONS - continued

2.4.6 Test Results - continued

1GHz – 20GHz Frequency Range

EUT Tx on Top Channel (1909.8MHz)

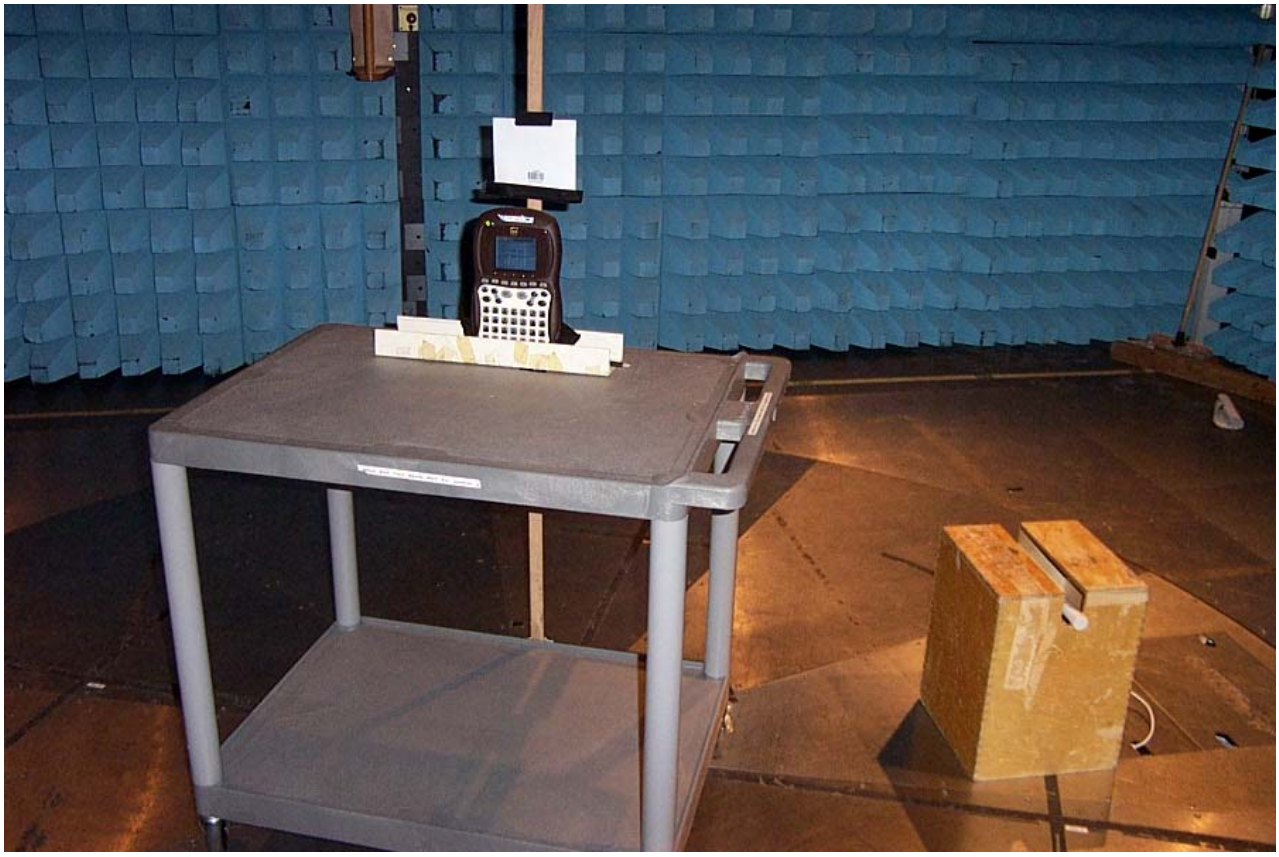
Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
3.820	H	100	19	56.1	85.2
5.730	H	100	246	54.0	85.2
7.639	H	138	248	58.2	85.2

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation

2.4 **RADIATED EMISSIONS** - continued

2.4.7 Set Up Photograph



Radiated Emissions Set Up Photograph

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

Instrument	Manufacturer	Type No	EMC / INV No	Cal. Due
Section 2.1				
Spectrum Analyser	Hewlett Packard	8542E	2286	18/05/2005
Bilog Antenna	Schaffner	CBL6143	2965	12/09/2004
Turntable Controller	H-D	HD 050	2528	TU
Antenna Mast 6m	Emco	1051-2	2182	TU
Digital Barometer	Oregon Scientific	BAA913HG	Room 5	TU
Screened Room 5	Siemens	EAC54300	2533	TU
Section 2.2				
Spectrum Monitor	Rohde & Schwarz	EZM	1416	TU
Three Phase LISN	Rohde & Schwarz	ESH2-Z5	1584	02/10/2004
Screened Room 5	Siemens	EAC54300	2533	TU
Test Receiver	Rohde & Schwarz	ESH3	1020	16/09/2004
Section 2.3				
Turntable Controller	HD Gmbh	HD 050	2528	TU
Antenna Mast	Emco	1051	2182	TU
Antenna Mast Controller	Emco	2090	-	TU
Screened Room 5	Siemens	EAC54300	2533	TU
Test Receiver	Rohde & Schwarz	ESIB40	2917	11/02/2005
Antenna	Emco	3115	2297	07/07/2005
Antenna	Emco	3115	2397	07/07/2005
Attenuator Fixed	Narda	4768-3	2961	TU
Signal Generator	Marconi	2031	1979	30/10/2004
Digital Barometer	Oregon Scientific	BAA913HG	Room 5	TU
Attenuator	JFW	50FHC-020-20	2971	21/10/2004
Attenuator	Weinschel	46-10-43	1985	26/01/2005
Attenuator	Marconi	6534/3	1494	TU
Section 2.4				
Turntable Controller	HD Gmbh	HD 050	2528	TU
Antenna Mast	Emco	1051-2	2182	TU
Screened Room 5	Siemens	EAC54300	2533	TU
Test Receiver	Rohde & Schwarz	ESIB40	2917	11/02/2005
Low Noise Amplifier	Miteq Corp	AMF-3d-001080-18-13P	2457	TU
Solid State Amplifier	Avanteck	AWT-18036	1081	26/06/2005
Antenna	Emco	3115	2397	07/07/2005
Attenuator	Marconi	6534/3	1494	TU
Signal Generator	Hewlett Packard	8672A	411	02/03/2005
Attenuator Fixed	Narda	4768-3	2961	TU
Digital Barometer	Oregon Scientific	BAA913HG	Room 5	TU
Signal Generator	Marconi	2031	1979	30/10/2004
Antenna	Flann	2024-20	1396	TU

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB

Worst case error for both Time and Frequency measurement 12 parts in 10^6.

* In accordance with CISPR 16-4

SECTION 4

EUT PHOTOGRAPH

EUT PHOTOGRAPH

Front View

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 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

FCC 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