REPORT ON

Limited FCC CFR 47: Part 22 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Symbol MC9062 Mobile Computer

COMMERCIAL-IN-CONFIDENCE

FCC ID: H9PMC9062A

Report No OR611524/03 Issue 1 March 2004

TÜV PRODUCT SERVICE

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REPORT ON Limited FCC CFR 47: Parts 15 and 22 Testing in support of an Application for Grant of Equipment Authorisation Of a Symbol MC9062 Mobile Computer

FCC ID: H9PMC9062A

Report No OR611524/03 Issue 1

March 2004

PREPARED FOR
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C Gould
EMC Signatory

DATED 05-03-04

DISTRIBUTION

Symbol Technologies	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: Part 22. 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: Parts 15 and 22 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Symbol MC9062 Mobile Computer

1.1 STATUS

EQUIPMENT UNDER TEST	MC9062 Mobile Computer
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	MC9062
PART NUMBER	MC9062-SHAH9AEA721
SERIAL NUMBER	ALP75716
HARDWARE VERSION	Rev 8 (To be released as Rev A)
DECLARED VARIANTS	None
TEST SPECIFICATION / ISSUE / DATE	FCC CFR 47: Part 15, Subpart B, August 2002, and FCC CFR 47: Part 22, Subpart H, January 2001
NUMBER OF ITEMS TESTED	Two
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE	Declaration of Build Status
DATE	26th January 2004
DISPOSAL	Held pending disposal
REFERENCE NUMBER	Not Applicable
DATE	Not Applicable
ORDER NUMBER	EMEA 13602
DATE	3rd November 2003
START OF TEST	10th February 2004
FINISH OF TEST	17th 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.

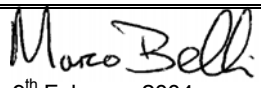
1.2 INTRODUCTION

The information contained within this report is intended to show limited verification of compliance of the Symbol Technologies Inc MC9062 Mobile Computer to the requirements of FCC Specification Parts 15 and 22.

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

1.2.1 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	Mobile Computer		
MANUFACTURER	Symbol Technologies Inc.		
COUNTRY OF ORIGIN	USA		
TYPE	MC9062		
PART NUMBER	MC9062-SHAH9AEA721		
SERIAL NUMBER	ALP75716, ALP75718, ALP75714, ALP75715, ALP75716, ALP75772, ALP75794, ALP75904, ALP75801, ALP75815		
HARDWARE VERSION	Rev 8 (Manufactured as Rev A)		
FCC ID	H9PMC9062A		
INDUSTRY CANADA ID	1549D-MC9062A		
RADIO MODULES INTEGRATED	RLAN, (21-64436) and Bluetooth, (21-64381), GSM/GPRS 850/1800/1900, (MC46)		
TECHNICAL DESCRIPTION	The unit supplied for testing is a Symbol MC9062 Mobile Computer, which offers Tri-Band GSM/GPRS 850/1800/1900, 2.4GHz 802.11b Wireless LAN and Bluetooth connectivity with the following options: SE824 Scan Engine; Colour (touch) display; 128/32 memory option; 28 Key Keyboard; PPC2003; Audio; Bluetooth		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	Lithium Battery		
MANUFACTURER	Symbol Technologies Inc.		
COUNTRY OF ORIGIN	USA		
TYPE	N/A		
PART NUMBER	21-62960-01		
VOLTAGE	7.2V		
UK AGENT	Symbol Technologies Ltd		
RADIO MODULES			
MANUFACTURING DESCRIPTION	Main Terminal Module with Embedded RLAN Radio	Bluetooth Module	GPRS/GSM Tri-Band Radio Module
MANUFACTURER	Symbol Technologies Inc	Symbol Technologies Inc	Siemens AG
COUNTRY OF ORIGIN	USA	USA	Germany
TYPE	21-64436	21-64381	MC46
POWER	7 - 16V	3.3V	3.2 – 4.5V
TRANSMITTER OPERATING RANGE	2400 – 2483.5MHz	2400 – 2483.5MHz	824-849 / 1710-1785 / 1900-1910
TRANSMITTER POWER	100mW (+20dBm)	100mW (+20dBm)	2W (GSM850) 1W (GSM1800/1900)
RECEIVER OPERATING RANGE	2400 – 2483.5MHz	2400 – 2483.5MHz	869-894 / 1805-1880 / 1930-1990
INTERMEDIATE FREQUENCIES	374MHz	Direct Conversion	Receiver: 0; Transmitter: 80MHz
EMISSION DESIGNATOR	11M0F1D	1M00F1D	*GXW*
DHSS/FHSS/COMBINED	DSSS	FHSS	GSM
FCC ID	H9P2164436	H9P2164381	QIPMC46
INDUSTRY CANADA ID	1549D-2164436	1549D-2164381	267W-MC46
ANCILLARIES			
MANUFACTURING DESCRIPTION	Headset		
MANUFACTURER	VXI Corporation		
TYPE	VXI 61-SYB		
PART NUMBER	50-11300-050		
SERIAL NUMBER	Not Serialised		
HARDWARE VERSION	Rev A		
COUNTRY OF ORIGIN	USA		
UK AGENT	Symbol Technologies Inc		

Signature 

Date 9th February 2004

D of B S Serial No OR611524

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 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	Test Sample Serial No ALP75716
2.2	22.913	Effective Radiated Power	Pass	Test Sample Serial No ALP75815
2.3	22.917	Radiated Emissions	Pass	Test Sample Serial No ALP75716

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 unit supplied for testing is a Symbol MC9062 Mobile Computer, which offers Tri-Band GSM/GPRS 850/1800/1900, 2.4GHz 802.11b Wireless LAN and Bluetooth connectivity with the following options:
SE824 Scan Engine; Colour (touch) display; 128/32 memory option; 28 Key Keyboard; PPC2003; Audio; Bluetooth

The terminal utilizes the approved Siemens AG MC46 GSM/GPRS 850/1800/1900 Module, Symbol 21-64436 Main Terminal Module with embedded RLAN Radio and the Symbol 21-64381 Bluetooth Module. FCC ID numbers are detailed in Section 1.2.1 “Declaration of Build Status”.

1.5.2 Modes of Operation

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

The Client has declared that the Symbol 21-64436 and the Symbol 21-64381 Modules are Co-Located, but that they are not capable of Simultaneously Transmitting. The Symbol 21-64436 and the Symbol 21-64381 Modules are both capable of Simultaneously Transmitting with the Tri-Band GSM/GPRS 850/1800/1900 Module individually. Testing for this mode of operation is covered in BABT Test Report Reference Number OR611528/04 Issue 1, dated March 2004.

1.5.3 Test Configuration

Test Configuration – GSM 850 Mode 1

GSM 850MHz
Transmitting on the following channels and frequencies;
Channel 128: 824.20MHz
Channel 189: 836.40MHz
Channel 251: 848.8MHz

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 MC9062 Mobile Computer was powered by its own internal battery and fitted with a headset.

Testing in this report pertains only to the item tested and detailed in Section 1.2.

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.

1.7 DEVIATIONS FROM THE STANDARD

No deviations from the standard were made.

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 and 22 Testing in support of an
Application for Grant of Equipment Authorisation
Of a Symbol MC9062 Mobile Computer

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

MC9062 Mobile Computer

2.1.3 Date of Test

23rd 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

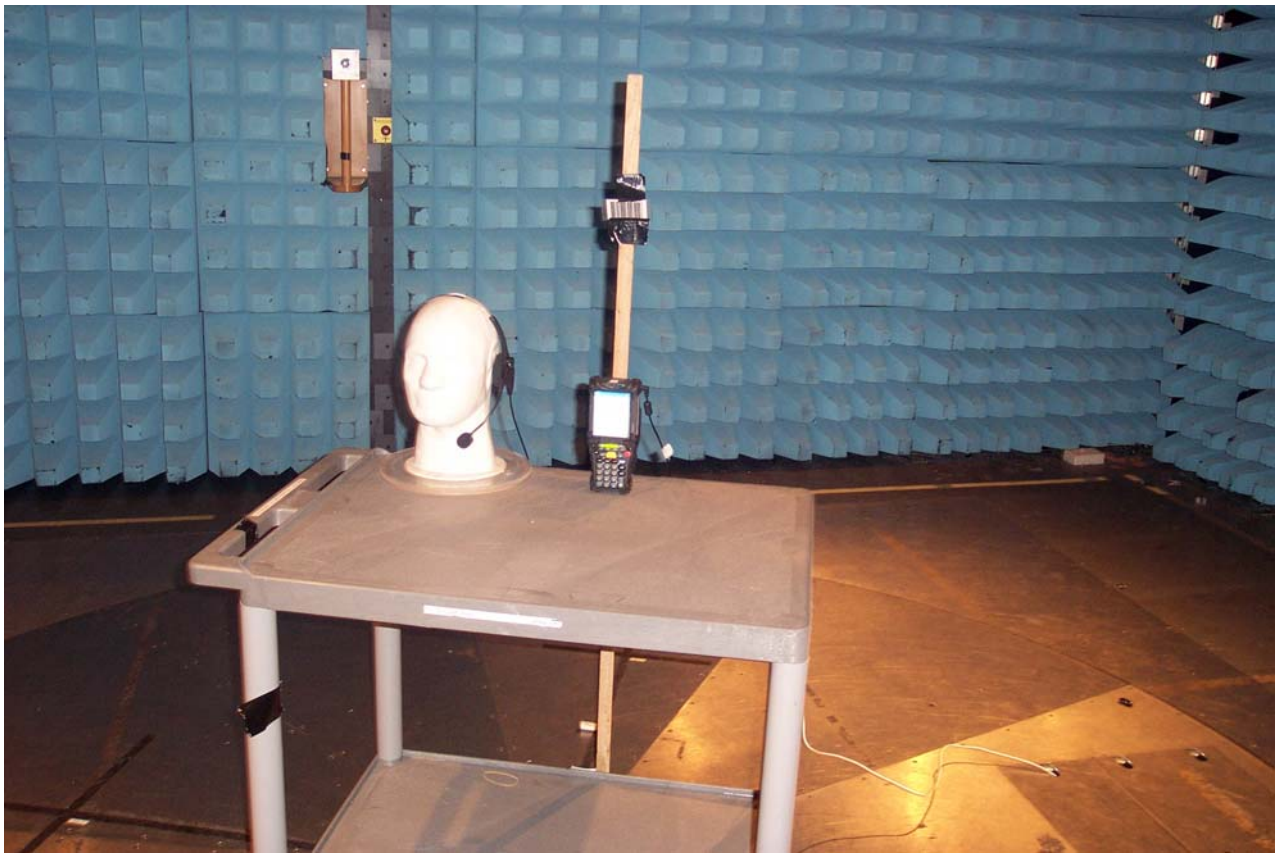
Measurements were made with the EUT in Mode 1.

The levels of the 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
210.1	V	100	320	25.9	20.0	43.5	150.0
527.2	V	120	300	31.0	35.5	46.0	200.0
623.1	H	120	116	31.6	38.0	46.0	200.0

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.7 Set Up Photograph



Set Up Photograph for Radiated Emissions and Effective Radiated Power

2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 22.913

2.2.2 Equipment Under Test

MC9062 Mobile Computer

2.2.3 Date of Test

24th February 2004

2.2.4 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 5.1.

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

2.2 EFFECTIVE RADIATED POWER - continued

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 22 Subpart H, Section 22.913 for Effective Radiated Power.

Measurements were made with the EUT in Mode 1

Frequency (MHz)	Raw Result (dBm)	Substitution Level (dBm)	Substitution Antenna Gain (dB)	Result ERP (dBm)	Result ERP (mW)
824.20	-3.45	26.0	2.5	28.5	707.9
836.40	-4.07	25.0	3.2	28.2	660.7
848.80	-4.87	24.5	4.0	28.5	707.9

2.3 RADIATED EMISSIONS

2.3.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 22.917

2.1.2 Equipment Under Test

MC9062 Mobile Computer

2.3.3 Date of Test

18th February 2004 & 20th 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 5.1.

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, middle 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 – 9GHz 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

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 Declared Transmitter Power in Watts

Carrier Frequency GHz	Carrier Field Strength dBµV/m	Power W	Limit for Spurious Emissions dBµV/m
824.2	128.5	2.0	82.5
836.4	128.6	2.0	82.6
848.8	128.5	2.0	82.5

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

2.3 RADIATED EMISSIONS - continued

2.3.6 Test Results - continued

30MHz – 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 22, Subpart H, 22.917 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Bottom Channel (824.20MHz)

Measurements were made with the EUT in Mode 1

No emissions attributable to the EUT were detected with in 42dB of the specification limit.

EUT Tx on Middle Channel (836.40MHz)

Measurements were made with the EUT in Mode 1

No emissions attributable to the EUT were detected with in 42dB of the specification limit.

EUT Tx on Top Channel (848.80MHz)

Measurements were made with the EUT in Mode 1.

No emissions attributable to the EUT were detected with in 42dB of the specification limit.

2.3 RADIATED EMISSIONS - continued

2.3.6 Test Results - continued

1GHz – 9GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 22, Subpart H, 22.917 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Bottom Channel (824.20MHz)

Measurements were made with the EUT in Mode 1

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dBµV/m	dBµV/m
1.648	H	107	169	64.8	82.5
4.120	V	100	208	53.5	82.5
6.954	H	100	222	61.0	82.5
7.050	H	100	241	59.8	82.5
7.147	H	100	184	63.5	82.5
7.232	H	100	143	64.8	82.5

EUT Tx on Middle Channel (836.40MHz)

Measurements were made with the EUT in Mode 1

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dBµV/m	dBµV/m
1.672	H	124	156	56.8	82.6
4.182	H	100	193	54.7	82.6
4.902	H	118	136	49.8	82.6
7.050	H	119	241	60.2	82.6
7.147	H	100	224	62.9	82.6

2.3 RADIATED EMISSIONS - continued

2.3.6 Test Results - continued

1GHz – 9GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 22, Subpart H, 22.917 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Top Channel (848.80MHz)

Measurements were made with the EUT in Mode 1

Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dBµV/m	dBµV/m
1.697	V	128	156	55.7	82.5
4.244	H	147	186	47.7	82.5
4.803	H	113	144	49.7	82.5
7.052	H	100	229	60.0	82.5
7.147	H	142	225	63.4	82.5

ABBREVIATIONS FOR ABOVE TABLES

H Horizontal Polarisation V Vertical Polarisation

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

Item	Instrument	Manufacturer	Type No	Serial No	EMC / INV No	Cal. Due
Section 2.1						
1	Turntable Controller	HD Gmbh	HD 050	050/396	2528	TU
2	Antenna Mast	Emco	2070	-	-	TU
3	Antenna Mast Controller	Emco	2090	-	-	TU
4	Screened Room 5	Siemens	EAC54300	NA	2533	TU
5	Spectrum Analyser	Hewlett Packard	8542E	3617A00165_00154	2286	09/12/2004
6	Bilog Antenna	Chase	CBL6143		2860	11/04/2004
7	Hygrometer	Rotronic	A1	-	3155	28/08/2004
8	MS Base Station	Rohde & Schwarz	CMU200	-	4937	13/11/2004
Section 2.2						
17	Turntable Controller	HD Gmbh	HD 050	050/396	2528	TU
18	Antenna Mast	Emco	2070	-	-	TU
19	Antenna Mast Controller	Emco	2090	-	-	TU
20	Screened Room 5	Siemens	EAC54300	NA	2533	TU
21	Spectrum Analyser	Hewlett Packard	8542E	3617A00165_00154	2286	09/12/2004
22	Bilog Antenna	Chase	CBL6143		2860	11/04/2004
23	Hygrometer	Rotronic	A1	-	3155	28/08/2004
24	MS Base Station	Rohde & Schwarz	CMU200	-	4937	13/11/2004
Section 2.3						
	Turntable Controller	HD Gmbh	HD 050	050/396	2528	TU
	Antenna Mast	Emco	2070	-	-	TU
	Antenna Mast Controller	Emco	2090	-	-	TU
	Screened Room 5	Siemens	EAC54300	NA	2533	TU
	Spectrum Analyser	Hewlett Packard	8542E	3617A00165_00154	2286	09/12/2004
	Bilog Antenna	Chase	CBL6143		2860	11/04/2004
	Hygrometer	Rotronic	A1	-	3155	28/08/2004
	MS Base Station	Rohde & Schwarz	CMU200	-	4937	13/11/2004

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 taken in Zero Span using the Hewlett Packard EMI Receiver and Bilog Antenna	$\pm 2 \times 10^{-7}$ x Centre Frequency	5.15dB calculated in accordance with CISPR 16-4
IN THE FREQUENCY RANGE 1GHz TO 9GHz		
TEST	**FREQUENCY**	**AMPLITUDE**
For Spurious Radiated Emissions measurements	$\pm 2 \times 10^{-7}$ x Centre Frequency	±3.4dB
For Effective Radiated Power (ERP) measurements	Not Applicable	±1.45dBm

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

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