
REPORT ON

Limited FCC CFR 47: Part 15 C Testing in support of an
Application for Grant of Equipment Authorisation
Of a Symbol MC9062 Mobile Computer

COMMERCIAL-IN-CONFIDENCE

FCC ID: H9PMC9062B

Report No OR611528/02 Issue 1

March 2004

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support of an Application for Grant of Equipment Authorisation
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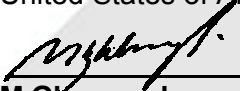
Report No OR611528/02 Issue 1

March 2004

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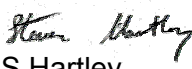
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ENGINEERING STATEMENT

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: Part 15 C. 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

Limited FCC CFR 47: Part 15 C 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-KKBHBEEA7WW
SERIAL NUMBER	ALP76133
HARDWARE VERSION	Rev 10 (To be released as Rev A)
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 26 th January 2004
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER DATE	EMEA 13602 3 rd November 2003
START OF TEST	5 th February 2004
FINISH OF TEST	16 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 Symbol Technologies Inc MC9062 Mobile Computer to the requirements of FCC Specification Part 15 C.

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-KKBHBEEA7WW		
SERIAL NUMBER	ALP75354, ALP75379, ALP75372, ALP75571, ALP75071, ALP75073, ALP75521, ALP75375, ALP75360, ALP76133		
HARDWARE VERSION	Rev 10 (Manufactured as Rev A)		
FCC ID	H9PMC9062B		
INDUSTRY CANADA ID	1549D-MC9062B		
RADIO MODULES INTEGRATED	RLAN, (21-64436) and Bluetooth, (21-64381), GSM/GPRS 900/1800/1900, (MC45)		
TECHNICAL DESCRIPTION	The unit supplied for testing is a Symbol MC9062 Mobile Computer, which offers Tri-Band GSM/GPRS 900/1800/1900, 2.4GHz 802.11b Wireless LAN and Bluetooth connectivity with the following options: Pico Imager; Colour (touch) display; 64/64 memory option; 53Keyboard; PPC2003; Audio; Bluetooth		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	Lithium Battery		
MANUFACTURER	Symbol Technologies Inc.		
COUNTRY OF ORIGIN	USA		
TYPE	N/A		
PART NUMBER	21-65587-01		
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	MC45
POWER	7 - 16V	3.3V	3.2 – 4.5V
TRANSMITTER OPERATING RANGE	2400 – 2483.5MHz	2400 – 2483.5MHz	880-915 / 1710-1785 / 1850-1910
TRANSMITTER POWER	100mW (+20dBm)	100mW (+20dBm)	2W (GSM900) / 1W (GSM1800/1900)
RECEIVER OPERATING RANGE	2400 – 2483.5MHz	2400 – 2483.5MHz	925-960 / 1805-1880 / 1930-1990
INTERMEDIATE FREQUENCIES	374MHz	Direct Conversion	Receiver: 0; Transmitter: 80MHz
EMISSION DESIGNATOR	11M0F1D	1M00F1D	GXW
DHSS/FHSS OR OTHER	DSSS	FHSS	GSM
FCC ID	H9P2164436	H9P2164381	QIPMC45
INDUSTRY CANADA ID	1549D-2164436	1549D-2164381	267W-MC45
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		

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.

Signature

Date

D of B S Serial No

Marco Belli

26th January 2004

OR611528

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
	15.109	Spurious Radiated Emissions	N/A	
2.1	15.205	Measurement at Band Edge	Pass	
	15.207	Conducted Emissions on Power Lines	N/A	
2.2	15.247(b)(3)	Maximum Peak Output Power	Pass	
	15.247(c)	Spurious Conducted Emissions on Antenna Port	N/A	
2.3	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 unit supplied for testing is a Symbol MC9062 Mobile Computer, which offers Tri-Band GSM/GPRS 900/1800/1900, 2.4GHz 802.11b Wireless LAN and Bluetooth connectivity with the following options:

Pico Imager; Colour (touch) display; 64/64 memory option; 53Keyboard; PPC2003; Audio; Bluetooth

The terminal utilizes the approved Siemens AG MC45 GSM/GPRS 900/1800/1900 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 900/1800/1900 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

1.5.3.1 Test Configuration – RLAN – Mode 1

Bottom Channel:	2412MHz
Middle Channel:	2437MHz
Top Channel:	2462MHz

1.5.3.2 Test Configuration – Bluetooth - Mode 2

Bottom Channel:	2402MHz
Middle Channel:	2441MHz
Top Channel:	2480MHz



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 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.

1.7 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: Part 15 C Testing in support of an
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Of a Symbol MC9062 Mobile Computer



2.1 MEASUREMENT AT THE BAND EDGE

2.1.1 Specification Reference

FCC CFR 47: Part 15 Subpart C, Section 15.205

2.1.2 Equipment Under Test

MC9062

2.1.3 Date of Test

11th and 13th 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.



2.1 MEASUREMENT AT THE BAND EDGE - continued

2.1.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.205 for Band Edge Measurements.

Measurements were made with the EUT in Mode 1 (RLAN)

Channel Frequency	Band Edge Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Limit Peak Field Strength	Average Field Strength	Limit Average Field Strength
MHz	MHz	H/V	cm	deg	dB μ V/m	dB μ V/m	dB μ V/m	dB μ V/m
2412.0	2390.0	V	129	79	59.0	74.0	46.8	54.0
2462.0	2483.5	V	102	85	59.3	74.0	49.4	54.0

Measurements were made with the EUT in Mode 2 (Bluetooth)

Channel Frequency	Band Edge Frequency	Antenna Polarisation	Height	Azimuth	Peak Field Strength	Limit Peak Field Strength	Average Field Strength	Limit Average Field Strength
MHz	MHz	H/V	cm	deg	dB μ V/m	dB μ V/m	dB μ V/m	dB μ V/m
2402.0	2390.0	V	142	54	62.5	74.0	35.6	54.0
2480.0	2483.5	V	135	51	59.2	74.0	45.6	54.0



2.1 MEASUREMENT AT THE BAND EDGE - continued

2.1.6 Test Results - continued



Photograph of Radiated Emissions, EIRP & Band Edge Measurement Test Set Up



2.2 MAXIMUM PEAK OUTPUT POWER (EIRP Method)

2.2.1 Specification Reference

FCC CFR 47: Part 15 Subpart C; Section 15.247(b)(3)

2.2.2 Equipment Under Test

MC9062

2.2.3 Date of Test

5th and 11th 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 FCC CFR 47: Part 15.247(b)(1).

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



2.2 MAXIMUM PEAK OUTPUT POWER (EIRP Method) - continued

2.2.6 Test Results

The EUT met the requirements of FCC CFR 47: Part 15 Subpart C, Section 15.247(b)(3) for Maximum Peak Output Power.

Measurements were made with the EUT in Mode 1 (RLAN)

Frequency (MHz)	Result EIRP (dBm)	Result EIRP (mW)
2412	16.3	42.7
2437	16.1	40.7
2462	16.0	39.8
Limit	<+36dBm or <4W	

Measurements were made with the EUT in Mode 2 (Bluetooth)

Frequency (MHz)	Result EIRP (dBm)	Result EIRP (mW)
2402	16.3	42.7
2441	14.9	28.2
2480	13.1	20.4
Limit	<+36dBm or <4W	



2.3 SPURIOUS RADIATED EMISSIONS

2.3.1 Specification Reference

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

2.3.2 Equipment Under Test

MC9062

2.3.3 Date of Test

11th – 16th February 2004

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified as “Section 2.6” within the Test Equipment Used table shown in Section 3.1.

2.3.5 Test Procedure

Test Performed in accordance with ANSI C63.4.

FCC CFR 47: Part 15 Subpart C, Section 15.247(c), for Radiated Emissions also requires Sections 15.205 and 15.209 to be applied.

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 – 25GHz were then formally measured using Peak and Average Detectors, as appropriate.

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



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.5 Test Procedure - Continued

The limits for Spurious Emissions Outside the Restricted Bands have been measured and calculated, as shown in the table below:

Test Mode	Carrier Frequency GHz	Carrier Field Strength dBμV/m	Limit for Spurious Outside Restricted Band (Carrier F S –20dB) dBμV/m
Mode 1 (RLAN)	2412	103.3	83.3
Mode 1 (RLAN)	2437	107.3	87.3
Mode 1 (RLAN)	2462	104.9	84.9
Mode 2 (Bluetooth)	2402	109.6	89.6
Mode 2 (Bluetooth)	2441	105.2	85.2
Mode 2 (Bluetooth)	2480	102.7	82.7

In accordance with FCC Public Notice DA 00-705, Released 30th March 2003, 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 $20\log(\text{dwell time}/100\text{ms})$, 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

$$625\mu\text{s} \times 5 = 3.125\text{ms}$$

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

$$3.125 + 0.625 = 3.75\text{ms}.$$

Multiply Total time slot length per channel by 32 channels per hop sequence $32 \times 3.75 = 120\text{ms}$

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. $2 \times 2.905 = 5.81\text{ms}$

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



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 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), 15.205 and 15.209 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Bottom Channel (2412MHz)

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

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBμV/m	μV/m	dBμV/m	μV/m
210.1	V	120	300	25.3	18.4	43.5	150
471.2	H	120	300	32.8	43.7	46.0	200
519.2	H	100	180	28.5	26.6	46.0	200

EUT Tx on Middle Channel (2437MHz)

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

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBμV/m	μV/m	dBμV/m	μV/m
210.1	V	100	340	24.8	17.4	43.5	150
471.2	V	100	360	31.9	39.4	46.0	200
519.2	H	100	360	28.5	26.6	46.0	200



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 Test Results

30MHz - 1GHz Frequency Range

EUT Tx on Top Channel (2462MHz)

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

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBμV/m	μV/m	dBμV/m	μV/m
84.3	V	100	80	19.0	8.9	40.0	100.0
210.1	H	100	360	24.3	16.4	43.5	150.0
217.5	V	100	360	26.3	20.7	46.0	200.0
471.2	V	100	360	31.7	38.5	46.0	200.0
495.2	H	100	0	28.0	25.1	46.0	200.0
519.2	H	100	80	31.8	38.9	46.0	200.0



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 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), 15.205 and 15.209 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Bottom Channel (2402MHz)

Measurements were made with the EUT in Mode 2. (Bluetooth)

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBμV/m	μV/m	dBμV/m	μV/m
500.0	V	100	347	30.0	31.6	46.0	200
519.0	V	100	11	29.7	30.5	46.0	200
550.1	V	100	332	29.9	31.3	46.0	200
603.4	V	100	11	27.3	23.2	46.0	200
623.0	H	100	10	30.2	32.4	46.0	200
810.0	V	100	325	25.8	19.5	46.0	200

EUT Tx on Middle Channel (2441MHz)

Measurements were made with the EUT in Mode 2. (Bluetooth)

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBμV/m	μV/m	dBμV/m	μV/m
498.6	V	100	35	24.9	17.6	46.0	200
519.1	V	100	339	30.1	32.0	46.0	200
553.6	V	100	26	28.4	26.3	46.0	200
600.6	V	100	298	27.0	22.4	46.0	200
623.0	H	219	7	31.5	37.6	46.0	200
811.9	V	100	330	25.8	19.5	46.0	200



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 Test Results – continued

30MHz - 1GHz Frequency Range

EUT Tx on Top Channel (2480MHz)

Measurements were made with the EUT in Mode 2. (Bluetooth)

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
500.3	V	100	343	28.0	25.1	46.0	200.0
519.1	V	100	30	30.1	32.0	46.0	200.0
550.4	V	100	329	29.6	30.2	46.0	200.0
600.0	V	100	335	27.0	22.4	46.0	200.0
623.0	H	220	333	30.7	34.3	46.0	200.0
811.0	V	100	11	26.2	20.4	46.0	200.0

ABBREVIATIONS FOR ABOVE TABLES

H Horizontal Polarisation
 Pol Polarisation
 deg degree

V Vertical Polarisation
 Hgt Height
 Azm Azimuth



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 Test Results - continued

1GHz - 25GHz 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 – 25GHz).

EUT Tx on Bottom Channel (2412MHz)

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

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
2.484	V	100	265	59.0	74.0	52.1	54.0
4.076	V	122	217	52.5	74.0	46.7	54.0
4.824	V	120	230	56.8	74.0	43.4	54.0

EUT Tx on Middle Channel (2437MHz)

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

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
4.126	V	144	196	50.1	74.0	45.8	54.0
4.874	V	100	85	61.2	74.0	47.2	54.0

EUT Tx on Top Channel (2462MHz)

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

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
4.176	V	125	218	52.1	74.0	48.3	54.0
4.924	V	100	79	59.3	74.0	46.3	54.0



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 Test Results - continued

1GHz - 25GHz 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 – 25GHz).

EUT Tx on Bottom Channel (2402MHz)

Measurements were made with the EUT in Mode 2. (Bluetooth)

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
2.369	V	142	61	57.8	74.0	24.8*	54.0
2.409	V	144	63	52.9	74.0	N/A	N/A
4.804	H	131	165	61.6	74.0	26.2*	54.0
7.103	V	146	58	54.6	89.6	N/A	N/A
7.205	H	100	49	55.7	89.6	N/A	N/A
7.281	V	168	58	59.2	74.0	26.5*	54.0
9.607	H	100	33	58.0	89.6	N/A	N/A

* Note these results have been corrected using the Bluetooth Duty Cycle Correction Factor for the EUT, as calculated on page 21 of this report.

Note: The Measurements in the above table marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 Test Results - continued

1GHz - 25GHz Frequency Range - continued

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 – 25GHz).

EUT Tx on Middle Channel (2441MHz)

Measurements were made with the EUT in Mode 2. (Bluetooth)

Frequency	Antenna		Turntable	Peak Field Strength	Peak Limit	Average Field Strength	Average Limit
	Pol	Height	Azimuth				
GHz	H/V	cm	deg	dB μ V/m	dB μ V/m	dB μ V/m	dB μ V/m
2.376	V	170	63	54.6	74.0	18.3*	54.0
2.408	V	141	58	55.3	85.2	N/A	N/A
4.882	H	102	88	69.5	74.0	35.6*	54.0
7.024	H	100	95	50.6	85.2	N/A	N/A
7.203	V	137	58	48.9	85.2	N/A	N/A
7.322	V	108	53	51.5	74.0	18.9*	54.0

Note: The Measurements in the above table marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

* Note these results have been corrected using the Bluetooth Duty Cycle Correction Factor for the EUT, as calculated on page 21 of this report.



2.3 SPURIOUS RADIATED EMISSIONS – continued

2.3.6 Test Results – continued

1GHz - 25GHz Frequency Range

EUT Tx on Top Channel (2480MHz)

Measurements were made with the EUT in Mode 2. (Bluetooth)

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
2.319	V	146	51	53.7	74.0	19.4*	54.0
2.415	V	140	47	51.1	82.7	N/A	N/A
4.959	H	101	93	63.1	74.0	30.8*	54.0
6.946	H	100	85	49.5	82.7	N/A	N/A
7.440	V	101	332	64.7	74.0	30.8*	54.0

Note: The Measurements in the above table marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required.

* Note these results have been corrected using the Bluetooth Duty Cycle Correction Factor for the EUT, as calculated on page 21 of this report.

ABBREVIATIONS FOR ABOVE TABLES

H Horizontal Polarisation
Pol Polarisation
deg degree

V Vertical Polarisation
Hgt Height
Azm Azimuth



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	H-D	HD 050	050/396	2528	TU
2	Antenna Mast	EMCO	2070	-	-	TU
3	Antenna Mast Controller	EMCO	2090	-	-	TU
4	Screened Room 5	SIE	EAC54300	NA	2533	TU
5	High Pass Filter	RLC	F-100-3000-5-R	-	4467	TU
6	Low Noise Amplifier	MIQ	AMF-3D-001080-18-13P	-	2457	TU
7	Test Receiver	ROH	ESIB 40	100181	2972	08/11/2004
8	Horn Antenna	EMC	3115	96964848	2297	04/07/2004
9	Horn Antenna	EMC	3115	97015079	2397	04/07/2004
10	Signal Generator	HEW	8672A	2016A01097	411	26/02/2004
11	Aneroid Barometer	VAR	DIPLEX	B05/1-04B04	1938	TU
12	Hygrometer	RTC	A1	10400016	4066	28/08/2004
13	Amplifier	AVA	AWT-18036	F133658452	1081	26/06/2004
14	Amplifier	AVA	AMT-26177-33	6669	2072	26/06/2004
15	Horn Antenna	FLA	2024-20	164	1396	TU
16	Peak Power Meter	HEW	8990A	3107A00124	1670	14/08/2004
17	Peak Power Meter Probe	HEW	84812A	3107A00126	1662	14/08/2004



3.1 TEST EQUIPMENT USED – Continued

Item	Instrument	Manufacturer	Type No	Serial No	EMC / INV No	Cal. Due
Section 2.2 and 2.3						
1	Turntable & Controller	H-D	HD 050	050/396	2528	TU
2	Antenna Mast	EMCO	2070	-	-	TU
3	Antenna Mast Controller	EMCO	2090	-	-	TU
4	Screened Room 5	SIE	EAC54300	NA	2533	TU
5	High Pass Filter	RLC	F-100-3000-5-R	-	4467	TU
6	Low Noise Amplifier	MIQ	AMF-3D-001080-18-13P	-	2457	TU
7	Test Receiver	ROH	ESIB 40	100181	2972	08/11/2004
8	Horn Antenna	EMC	3115	96964848	2297	04/07/2004
9	Horn Antenna	EMC	3115	97015079	2397	04/07/2004
10	Signal Generator	HEW	8672A	2016A01097	411	26/02/2004
12	Hygrometer	RTC	A1	10400016	4066	28/08/2004
14	Amplifier	AVA	AMT-26177-33	6669	2072	26/06/2004
15	Horn Antenna	FLA	2024-20	164	1396	TU
18	Signal Generator	ROH	SMT03	848161/006	2449	09/04/2004
19	Signal Generator	HEW	8673B	2147A00423	954	04/06/2004
20	Hygrometer	ORE	BA116	-	Lab 2	TU
21	Hygrometer	RTC	A1	643-29	4066	28/08/2004

Key To Manufacturers

AVA	Avantek
EMC	Emco
FLA	Flann
H-D	No Data
HEW	Hewlett Packard
MIQ	Miteq Corp
ORE	Oregon
RLC	RLC Electronics
ROH	Rohde & Schwarz
RTC	Rotronic
SEM	Sematron
SCH	Schaffner
SIE	Siemens
VAR	Various
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 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 25GHz		
TEST	FREQUENCY	AMPLITUDE
For Spurious Radiated Emissions measurements	$\pm 2 \times 10^{-7} \times \text{Centre Frequency}$	$\pm 3.4\text{dB}$
For Effective Radiated Power (ERP) measurements	Not Applicable	$\pm 1.45\text{dBm}$



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).

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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**