REPORT ON

Simultaneous Transmitters: Limited FCC 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 OR611528/04 Issue 1 March 2004

TÜV PRODUCT SERVICE

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March 2004

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DATED 05-03-04

DISTRIBUTION

Symbol Technologies	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: Part 24. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineers;

A Guy

J Holcombe

UKAS TESTING 0141 Group

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SECTION 1

REPORT SUMMARY

Simultaneous Transmitters: Limited FCC 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 24, Subpart D, January 2001
NUMBER OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Commercial In Confidence
INCOMING RELEASE DATE	Declaration of Build Status 26th January 2004
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER DATE	EMEA 13602 3rd November 2003
START OF TEST	15th February 2004
FINISH OF TEST	19th 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 C and 24, for Simultaneous Transmission of Co-Located Transmitters.

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

The purpose of this Test Report is to show compliance for Simultaneous Radio Operation of GSM/GPRS 1900 with RLAN and GSM/GPRS 1900 with Bluetooth.

Although testing is carried out against both FCC Specification Parts 15 C and 24, it is only a requirement for the EUT to comply with the least stringent limit when both Radios are transmitting. Therefore in this report only the limits for Part 24 have been applied.

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 26th January 2004

D of B S Serial No 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
2.1	24.238	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”.

1.5.3 Test Configuration

Test Mode 1: RLAN and GSM 1900
Transmitting Simultaneously on the following frequencies;

RLAN	GSM 1900
2412MHz	1909.8MHz
2462MHz	1850.2MHz

Test Mode 2: Bluetooth and GSM 1900
Transmitting Simultaneously on the following frequencies;

Bluetooth	GSM 1900
2402MHz	1909.8MHz
2480MHz	1850.2MHz

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.

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

Simultaneous Transmitters: Limited FCC Testing in support of an
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Of a Symbol MC9062 Mobile Computer

2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 24 Subpart E, Section 24.238

2.1.2 Equipment Under Test

MC9062 Mobile Computer

2.1.3 Date of Test

15th – 19th 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.

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.

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.5 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 Declared Transmitter Power in Watts

Test Mode	Carrier Frequency GHz	Carrier Field Strength dBµV/m	Declared Power W	Limit for Spurious Emissions dBµV/m
Mode 1 (GSM 1900)	1850.2	126.6	1.0	83.6
Mode 1 (GSM 1900)	1909.8	125.0	1.0	82.0

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results

30MHz - 1GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: 24.238 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Mode 1 (RLAN: 2412MHz and GSM 1900: 1909.8MHz)

Measurements were made with the EUT in Mode 1.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
30.0	H	100	0	56.6	82.0
31.2	V	100	360	56.4	82.0
867.3	H	100	360	62.8	82.0
961.3	V	100	0	62.2	82.0

EUT Tx on Mode 1 (RLAN: 2462MHz and GSM 1900: 1850.2MHz)

Measurements were made with the EUT in Mode 1.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
30.0	H	100	360	56.8	83.6
942.5	H	100	0	62.9	83.6
965.0	V	100	0	62.3	83.6

2.1 SPURIOUS RADIATED EMISSIONS – continued

2.1.6 Test Results – continued

EUT Tx on Mode 2 (Bluetooth: 2402MHz and GSM 1900: 1909.8MHz)

Measurements were made with the EUT in Mode 2.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
31.2	V	100	0	56.3	82.0
970.0	V	100	360	62.3	82.0
996.3	H	100	0	62.5	82.0

EUT Tx on Mode 2 (Bluetooth: 2480MHz and GSM 1900: 1850.2MHz)

Measurements were made with the EUT in Mode 2.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
30.0	V	100	360	57.5	83.6
943.8	H	100	360	62.0	83.6
977.0	V	100	0	61.9	83.6

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	deg	degree

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results - continued

1GHz – 25GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: 24.238 for Radiated Emissions (1GHz – 25GHz).

EUT Tx on Mode 1 (RLAN: 2412MHz and GSM 1900: 1909.8MHz)

Measurements were made with the EUT in Mode 1.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
4.823	V	100	108	61.2	83.6
13.368	H	100	240	67.1	83.6

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results - continued

1GHz - 25GHz Frequency Range - continued

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: 24.238 for Radiated Emissions (1GHz – 25GHz).

EUT Tx on Mode 1 (RLAN: 2462MHz and GSM 1900: 1850.2MHz)

Measurements were made with the EUT in Mode 1.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
4.932	V	106	117	63.0	83.6
11.101	V	100	208	64.6	83.6

EUT Tx on Mode 2 (Bluetooth: 2402MHz and GSM 1900: 1909.8MHz)

Measurements were made with the EUT in Mode 2.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
2.409	V	138	69	65.8	82.0
2.448	V	137	68	56.9	82.0
3.819	V	122	182	66.4	82.0
5.729	V	151	179	56.4	82.0
11.459	H	100	106	58.4	82.0
13.369	H	100	76	63.5	82.0

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.6 Test Results – continued

1GHz - 25GHz Frequency Range

EUT Tx on Mode 2 (Bluetooth: 2480MHz and GSM 1900: 1850.2MHz)

Measurements were made with the EUT in Mode 2.

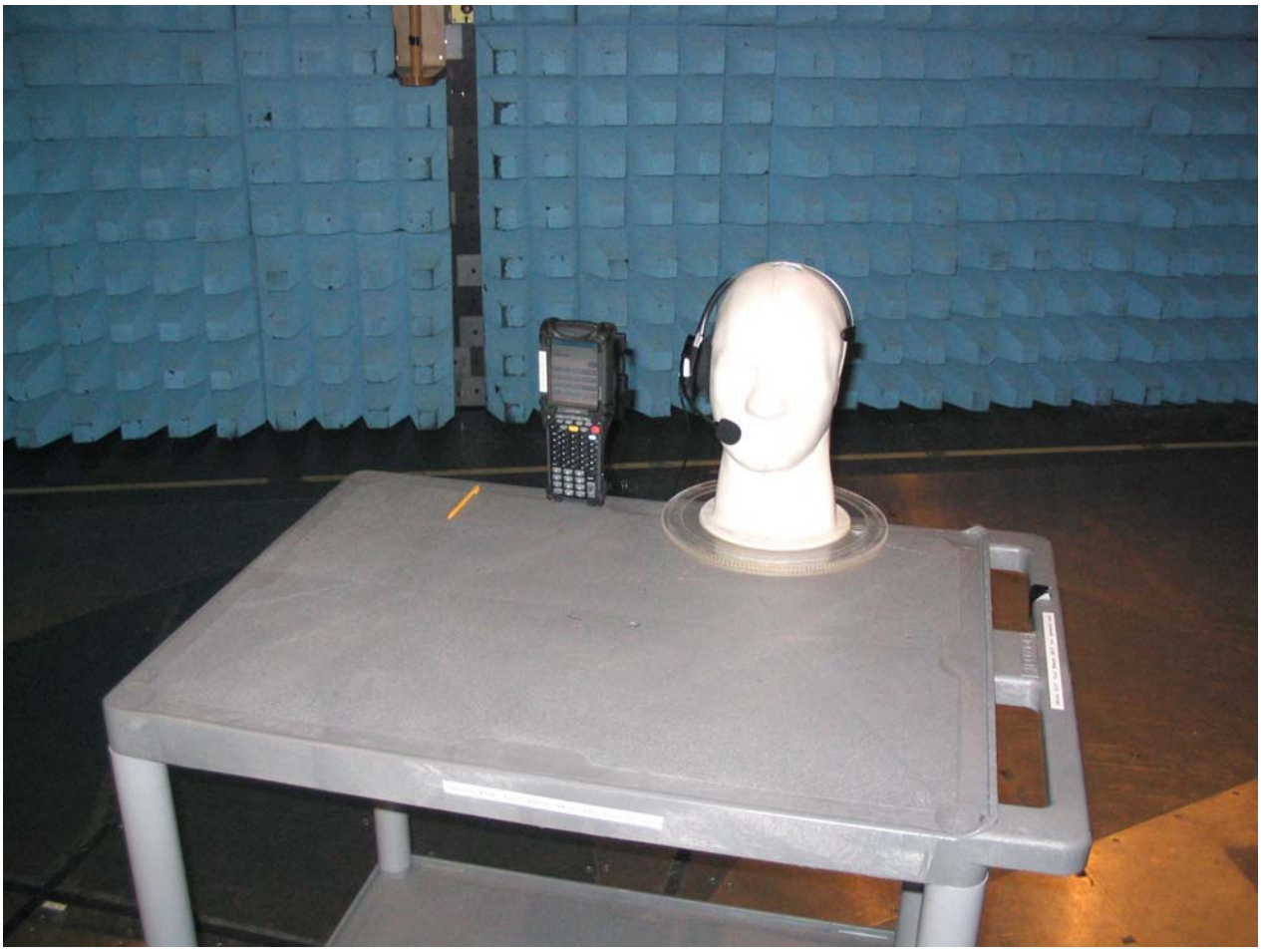
Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
MHz	H/V	cm	deg	dBµV/m	dBµV/m
2.415	V	143	74	54.5	83.6
3.700	V	124	177	63.0	83.6
5.550	V	100	174	58.3	83.6
11.101	H	100	213	60.9	83.6
12.951	H	105	144	60.8	83.6

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	deg	degree

2.1 SPURIOUS RADIATED EMISSIONS - continued

2.1.7 Set Up Photograph



Spurious Radiated Emissions Set Up Photograph

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	Receiver	HEW	8542E	-	2286	09/12/2004
6	Bilog Antenna	Chase	Cbl 6143	-	2860	11/04/2004
7	GSM Test Set	HEW	8922M	-	3803	TU
8	DCS Test Set	HEW	8922E	-	3804	TU

Key To Manufacturers

EMC	Emco
H-D	No Data
HEW	Hewlett Packard
SIE	Siemens
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	$\pm 2 \times 10^{-7}$x 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	$\pm 2 \times 10^{-7}$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).

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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

Thomas W Phillips
Electronics Engineer