
REPORT ON

Simultaneous Transmitters: Limited FCC Testing in support of an
Application for Grant of Equipment Authorisation
of a Symbol Mobile Computer

COMMERCIAL-IN-CONFIDENCE

FCC ID: H9PMC9062A

Report No OR611524/05 Issue 1

March 2004

REPORT ON Simultaneous Transmitters: Limited FCC Testing in support of an Application for Grant of Equipment Authorisation of a Symbol MC9062 Mobile Computer

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March 2004

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DATED

05-03-04

DISTRIBUTION

Symbol Technologies

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

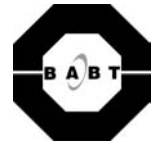
Test Engineers;


A Guy



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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	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 22, Subpart H, January 2001
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	18 th February 2004
FINISH OF TEST	20 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 22, 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 850 with RLAN and GSM/GPRS 850 with Bluetooth.

Although testing is carried out against both FCC Specification Parts 15C and 22, 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 22 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-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 / 1850-1910
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.

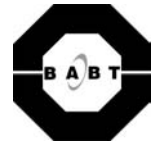
BABT Product Service Limited formally certifies that the manufacturer's declaration as reproduced in this report, is a true and accurate record of the original received from the applicant.



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	22.917	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 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.

1.5.3 Test Configuration

Test Mode 1: RLAN and GSM850
Transmitting Simultaneously on the following frequencies;

RLAN	GSM850
2412MHz	848.4MHz
2462MHz	824.2MHz

Test Mode 2: Bluetooth and GSM850
Transmitting Simultaneously on the following frequencies;

Bluetooth	GSM850
2402MHz	848.4MHz
2480MHz	824.2MHz

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-S 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

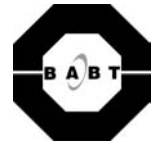
No deviations from the standard were made.



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.

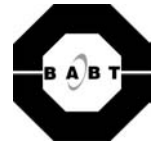
Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	N/A	N/A



SECTION 2

TEST DETAILS

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



2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47: Part 22 Subpart H, Section 22.917

2.1.2 Equipment Under Test

MC9062 Mobile Computer

2.1.3 Date of Test

18th February 2004 to 20th 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 Polarisation. 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 $-(43 + 10\text{Log}(P))$

Where:

Field Strength is measured in dB μ V/m

P is Declared Transmitter Power in Watts

Test Mode	Carrier Frequency GHz	Carrier Field Strength dB μ V/m	Power W	Limit for Spurious Emissions dB μ V/m
Mode 1 (GSM850)	824.2	128.5	2.0	82.5
Mode 1 (GSM850)	848.4	128.5	2.0	82.5



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: Part 22.238 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Mode 1 (RLAN: 2412MHz and GSM850: 848.4MHz)

Measurements were made with the EUT in Mode 1.

No emissions attributable to the EUT were detected within 42dB of the specification limit of 82.5dB μ V/m.

EUT Tx on Mode 1 (RLAN: 2462MHz and GSM850: 824.2MHz)

Measurements were made with the EUT in Mode 1.

No emissions attributable to the EUT were detected within 42dB of the specification limit of 82.5dB μ V/m.

EUT Tx on Mode 2 (Bluetooth: 2402MHz and GSM850: 848.4MHz)

Measurements were made with the EUT in Mode 2.

No emissions attributable to the EUT were detected within 42dB of the specification limit of 82.5dB μ V/m.

EUT Tx on Mode 2 (Bluetooth: 2480MHz and GSM850: 824.2MHz)

Measurements were made with the EUT in Mode 2.

No emissions attributable to the EUT were detected within 42dB of the specification limit of 82.5dB μ V/m.



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: Part 22.238 for Radiated Emissions (1GHz – 25GHz).

EUT Tx on Mode 1 (RLAN: 2412MHz and GSM850: 848.4MHz)

Measurements were made with the EUT in Mode 1.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
GHz	H/V	cm	deg	dB μ V/m	dB μ V/m
1.697	V	125	148	55.8	82.5
4.771	H	115	140	55.3	82.5
6.957	H	113	229	62.4	82.5
7.035	H	100	233	60.3	82.5
7.149	H	100	214	67.7	82.5

EUT Tx on Mode 1 (RLAN: 2462MHz and GSM850: 824.2MHz)

Measurements were made with the EUT in Mode 1.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
GHz	H/V	cm	deg	dB μ V/m	dB μ V/m
1.648	V	137	184	62.9	82.5
4.986	H	100	224	54.0	82.5
6.954	H	105	228	62.3	82.5
70.36	H	100	229	58.3	82.5
7.150	H	100	211	67.7	82.5
7.232	H	163	227	66.1	82.5



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: Part 22.238 for Radiated Emissions (1GHz – 25GHz).

EUT Tx on Mode 2 (Bluetooth: 2402MHz and GSM850: 848.4MHz)

Measurements were made with the EUT in Mode 2.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
GHz	H/V	cm	deg	dB μ V/m	dB μ V/m
1.697	V	126	196	56.7	82.5
2.546	V	100	213	54.6	82.5
4.960	H	110	142	51.2	82.5
7.206	V	100	230	71.3	82.5

1GHz - 8GHz Frequency Range

EUT Tx on Mode 2 (Bluetooth: 2480MHz and GSM850: 824.2MHz)

Measurements were made with the EUT in Mode 2.

Frequency	Antenna		Turntable	Field Strength at 3m	Specification Limit
	Pol	Height	Azimuth		
GHz	H/V	cm	deg	dB μ V/m	dB μ V/m
1.648	H	116	156	64.3	82.5
4.959	H	100	145	53.4	82.5
6.954	H	150	227	57.8	82.5
7.052	H	100	233	57.8	82.5
7.147	H	114	239	61.4	82.5
7.232	H	145	221	62.9	82.5

ABBREVIATIONS FOR ABOVE TABLES

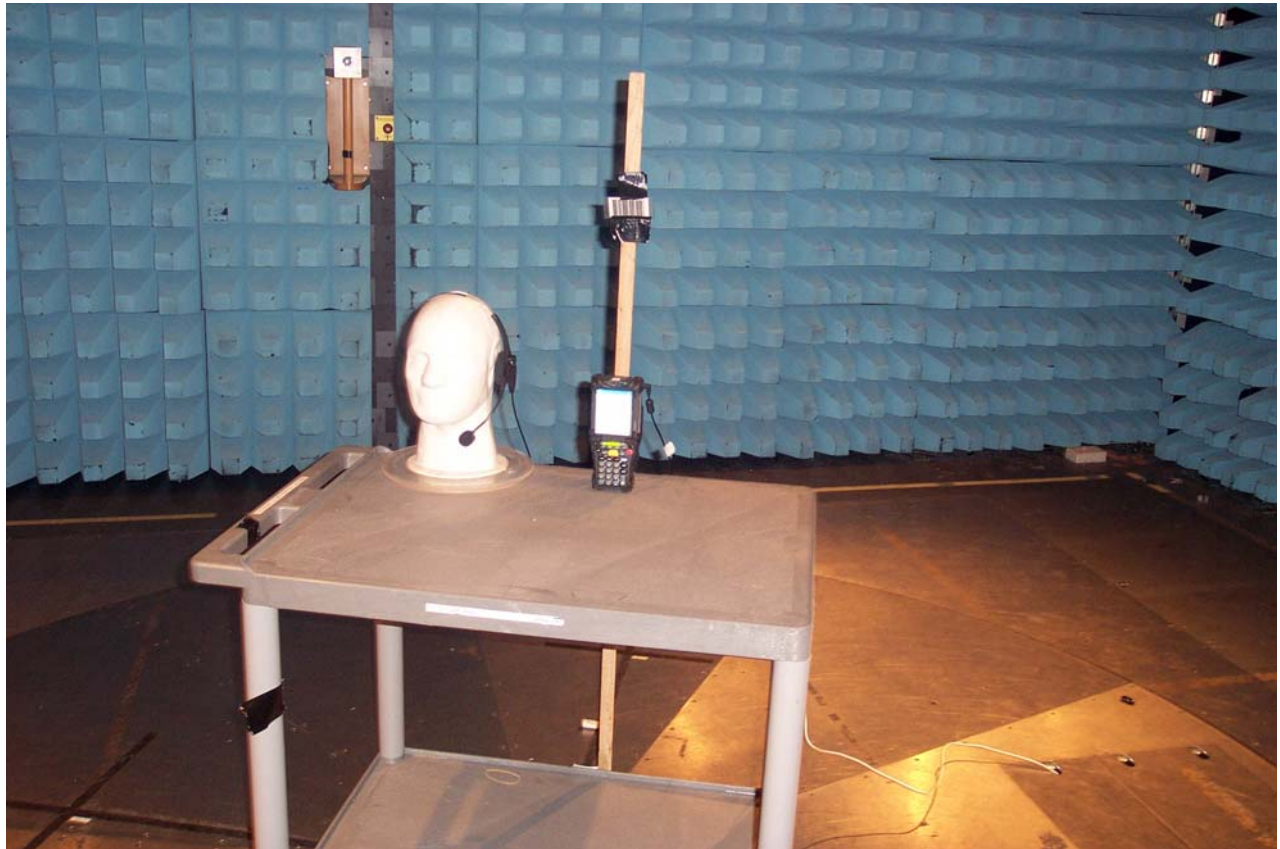
H Horizontal Polarisation
Pol Polarisation

V Vertical 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	Low Noise Amplifier	MIQ	AMF-3d-001080-18-13P	UNK	2457	
6	Test Receiver	ROH	ESIB40	100181	2972	08/11/2004
7	Horn Antenna	EMC	3115	96964848	2297	04/07/2004
8	Horn Antenna	EMC	3115	-	500	04/07/2004
9	Solid State Amplifier	AVA	AWT-18036	F13365 8452	1081	26/06/2004
10	Signal Amplifier	AVA	AMT-26177-33	6669	2072	26/06/2004
11	Hygrometer	Rotronic	A1	-	3155	28/08/2004
12	Barometer	Diplex	-	-	1938	TU
13	High Pass Filter	LOR	5HP7-2500-SR	Y11	3998	03/10/2004
14	High Pass Filter	DAA	MH-1500-7SS	811014-01	3879	02/10/2004
15	High Pass Filter	LOR	9HP7-7000-SR	AD1	4903	14/09/2004
16	MS Base Station	ROH	CMU200	-	4937	13/11/2004

Key To Manufacturers

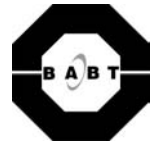
AVA Avanteck
 DAA Dadem
 EMC Emco
 H-D HD Gmbh
 MIQ Miteq Corp
 ROH Rohde & Schwarz
 SIE Siemens DAA
 LOR Lorch



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	$\pm 2 \times 10^{-7} \times$ 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	$\pm 2 \times 10^{-7} \times$ Centre Frequency	± 3.4 dB



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