REPORT ON

Simultaneous Transmitters: Limited FCC Testing in support of an
Application for Grant of Equipment Authorisation
of a Symbol MC906R (RFID and 802.11b enabled) Mobile Computer

FCC ID: H9PMC906RA

Report No OR612330/02 Issue 1 August 2004

TÜV PRODUCT SERVICE

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DATED 05-08-04

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 c
arried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Part 15. 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

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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 MC906R (RFID and 802.11b enabled) Mobile Computer

1.1 STATUS

EQUIPMENT UNDER TEST	MC906R 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	MC906R (RFID and 802.11b enabled) Mobile Computer
PART NUMBER	MC906R-GK0HBEER4US
SERIAL NUMBER	ALP78944
HARDWARE VERSION	Rev 04 (To be released as Rev A)
DECLARED VARIANTS	MC906R-GK0JBEER4US (Mono)
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 15th July 2004
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal Not Applicable Not Applicable
ORDER NUMBER DATE	EMEA 14241 19th May 2004
START OF TEST	24th June 2004
FINISH OF TEST	24th June 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 MC906R (RFID and 802.11b enabled) Mobile Computer to the requirements of FCC Specification Parts 15 C 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 RLAN and RFID.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The unit supplied for testing is a Symbol MC906R Mobile Computer, which offers 2.4GHz 802.11b Wireless LAN and RFID connectivity with the following options: Pico Imager; Colour (touch) display; 64/64-memory option; Pocket PC; Audio; RFID EPC C1.

The terminal utilises the Symbol 21-64436 Main Terminal Module with embedded RLAN Radio and the Alien ALR-9640-B RFID Module. FCC ID numbers are detailed in Section 1.3.4 “Declaration of Build Status”.

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 802.11b and the Symbol RFID Modules are co-located, and that they are capable of simultaneously transmitting.

1.3.3 Test Configuration

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

RLAN	RFID
2412MHz	927.6MHz
2462MHz	902.8MHz

1.3 PRODUCT INFORMATION – continued

1.3.4 DECLARATION OF BUILD STATUS

MAIN EUT		
MANUFACTURING DESCRIPTION	Mobile Computer	
MANUFACTURER	Symbol Technologies Inc	
TYPE	MC906R	
PART NUMBER	MC906R-GK0HBEER4US	
SERIAL NUMBER	ALP78944	
HARDWARE VERSION	Rev 4 (To be released as Rev A)	
COUNTRY OF ORIGIN	USA	
POWER	7.2V	
FCC ID	H9PMC906RA	
INDUSTRY CANADA ID	1549D-MC906RA	
TECHNICAL DESCRIPTION	The unit supplied for testing is a Symbol MC906R Mobile Computer, which offers 2.4GHz 802.11b Wireless LAN and RFID connectivity with the following options: Pico Imager; Colour (touch) display; 64/64-memory option; Pocket PC; Audio; RFID EPC C1.	
BATTERY/POWER SUPPLY		
MANUFACTURING DESCRIPTION	Lithium Battery	
MANUFACTURER	Symbol Technologies Inc.	
PART NUMBER	21-65587-01	
VOLTAGE	7.2V	
MODULES		
MANUFACTURING DESCRIPTION	Main Terminal Module with Embedded RLAN Radio	Alien RFID Module
MANUFACTURER	Symbol Technologies Inc	Alien Technology
TYPE	21-64436	ALR-9640-B
DECLARED OUTPUT POWER	100mW	1W
TRANSMITTER OPERATING BAND	2400 – 2483.5MHz	902-928MHz
RECEIVER OPERATING BAND	2400 – 2483.5MHz	902-928MHz
INTERMEDIATE FREQUENCIES	374MHz	Not available (Alien information)
ITU DESIGNATION OF EMISSION	11M0F1D	373KL1D
FCC ID	H9P2164436	Not Applicable
INDUSTRY CANADA ID	1549D-2164436	Not Applicable
DSSS/FHSS/COMBINED OR OTHER	DSSS	FHSS

Signature	Marco Belli
Date	15th July 2004
D of B S Serial No	OR612330

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	15.247(c)	Spurious 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 MC906R (RFID and 802.11b enabled) Mobile Computer was powered by its own internal battery and had a headset connected.

1.7 DEVIATIONS FROM THE STANDARD

Not Applicable.

1.8 MODIFICATION RECORD

Not Applicable.

SECTION 2

TEST DETAILS

Simultaneous Transmitters: Limited FCC Testing in support of an
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2.1 SPURIOUS RADIATED EMISSIONS

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

2.1.2 Equipment Under Test

MC906R (RFID and 802.11b enabled) Mobile Computer

2.1.3 Date of Test

24th June 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 Outside the Restricted Bands have been measured and calculated as shown in the table below:

Test Mode	Carrier Frequency MHz	Carrier Field Strength dBµV/m	Limit for Spurious Outside Restricted Band (Carrier F S –20dB) dBµV/m
RLAN	2412	105.2	85.2
RFID	927.6	124.7	104.7*
RLAN	2462	105.0	85.0
RFID	902.8	123.9	103.9*

*In accordance with FCC guidelines, these are the least stringent limits and therefore these are the limits that will be used for any emissions that are found outside the restricted bands.

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 15.247(c) for Radiated Emissions (30MHz – 1GHz).

EUT Tx on RLAN: 2412MHz and RFID: 927.6MHz

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	dBµV/m	µV/m
811.60	H	100	30	44.1	168.3	46.0	200.0
920.00	H	150	10	37.4	74.1	46.0	200.0
960.00	H	143	0	39.0	89.1	46.0	200.0

EUT Tx on RLAN: 2462MHz and RFID: 902.8MHz

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
MHz	H/V	cm	deg	dBµV/m	µV/m	dBµV/m	µV/m
862.8	H	152	18	36.4	66.9	46.0	200.0
942.8	H	148	12	37.9	78.5	46.0	200.0

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: Part 15 Subpart C, Section 15.247(c) for Radiated Emissions (1GHz – 25GHz).

EUT Tx on RLAN: 2412MHz and RFID: 927.6MHz

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
2.783	H	100	140	56.8	74.0	43.7	54.0
3.711	H	100	334	45.5	74.0	33.2	54.0
4.076	H	106	086	54.2	74.0	52.8	54.0
4.638	V	100	081	51.2	74.0	40.6	54.0
4.824	H	100	300	54.5	74.0	48.3	54.0
5.566	V	100	074	63.5	104.7	N/A	N/A

EUT Tx on RLAN: 2462MHz and RFID: 902.8MHz

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
2.708	H	108	140	50.4	74.0	39.1	54.0
4.176	V	100	094	55.8	74.0	51.3	54.0
4.514	V	116	102	52.1	74.0	40.0	54.0
4.924	V	100	164	55.4	74.0	41.8	54.0
5.416	V	100	095	63.7	103.9	N/A	N/A

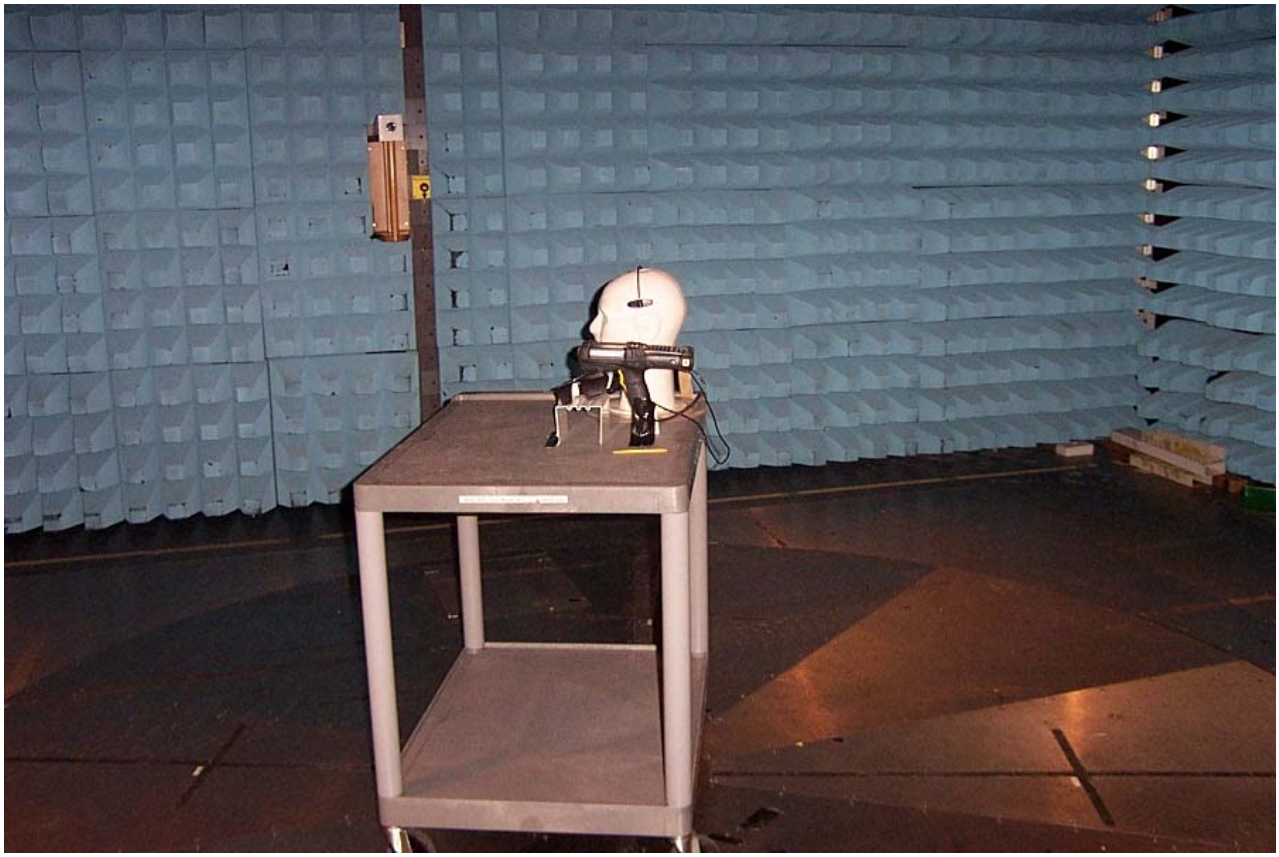
Note: The Measurements in the above table marked N/A are Not Applicable because the frequency does not fall within the Restricted Band (15.205) and hence Average Measurements are not required

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

Instrument	Manufacturer	Type No	Serial No	EMC / INV No	Cal. Due
Section 2.9					
Spectrum Analyser	HEW	8542E	3617A00165_00154	2286	18/05/2005
Bilog Antenna	SCH	CBL6143	5101	2965	12/09/2004
Turntable Controller	H-D	HD 050	050/396	2528	TU
Antenna Mast 6m	EMC	1051-2	9101-1570	2182	TU
Screened Room 5	SIE	EAC54300	NA	2533	TU
Test Receiver	ROH	ESIB40	100181	2972	08/11/2004
Low Noise Amplifier	MIQ	AMF-3d-001080-18-13P	UNK	2457	TU
Amplifier	AVA	AWT-18036	F13365 8452	1081	26/06/2004
Attenuator	NAR	4768-6		2960	TU
Signal Generator	MAR	2031	119301/030	1741	29/10/2004
Emi Test Receiver	ROH	ESIB40	100142/040	2917	11/02/2005
Signal Generator	MAR	2031	119530069	1979	30/10/2004
Filter	DAA	MH-1500-7SS	811014-01	3879	02/10/2004

Key To Manufacturers

AVA	Avantek
DAA	Daden Anthony Associates
EMC	Emco
H-D	No Data
HEW	Hewlett Packard
MAR	Marconi
MIQ	Miteq Corp
NAR	Narda
ROH	Rohde & Schwarz
SCH	Schaffner
SIE	Siemens

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*

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

Side 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