FCC Certification Report for the LA4121 WLAN PC Card

EXHIBIT 11

ATTESTATION STATEMENTS

ITS Intertek Testing Services
ETL SEMKO

FCC Part 15, Class B (DoC) Emissions Test Report
for
Symbol Technologies
on the
Triology 2 Radio
Model: LA4121

Test Report #: J20008658c
Date of Report: April 11, 2000

Job #: J20008658-C
Date of Test: April 3 & 7, 2000

Total No. of Pages Contained in this Report: 22 + data pages

NVLAP®

for	Barry E. Smith, Test Engineer
David Chernomordik	David Chernomordik, Ph.D., EMC Site Manager

ITS Intertek Testing Services
ETL SEMKO

VERIFICATION OF COMPLIANCE
Report No. J20008658c

Verification is hereby issued to the named APPLICANT and is VALID ONLY for the equipment tested hereon for use under the rules and regulations listed below

Equipment Under Test:	Triology 2 Radio
Trade Name:	Symbol Technologies
Model No.:	LA4121
Serial No.:	Not Labeled
Applicant:	Symbol Technologies
Contact:	Mr. Jon Nagel
Address:	2145 Hamilton Ave. San Jose, CA 95125 USA
Tel. number:	408/528-2677
Fax number:	408/528-2740
Applicable Regulation:	FCC Part 15, Subpart B, and Industry Canada ICES-003 issue 2
Equipment Class:	Class B
Test Site Location:	ITS - Site 3 1365 Adams Drive Menlo Park, CA 94025
Date of Test:	April 3 & 7, 2000

We attest to the accuracy of this report:

Barry E. Smith
Test Engineer

David Chernomordik
David Chernomordik, Ph.D.
EMC Site Manager

Table of Contents

1.0 Introduction

This report is designed to show compliance with the FCC Part 15, Subpart B Rules for an unintentional radiator. The test procedures, as described in American National Standards Institute C63.4-1992, were employed. A description of the product and operating configuration, the various provisions of the rules, the methods for determining compliance, and a detailed summary of the results are included within this test report.

2.0 Description of Equipment

The Symbol Technologies model LA4121 is 2.4 GHz Spread Spectrum radio in the form of a PCMCIA card that is used for wireless communication from a computer to a LAN.

A pre-production version of the sample was received on January 31, 2000 in good condition.

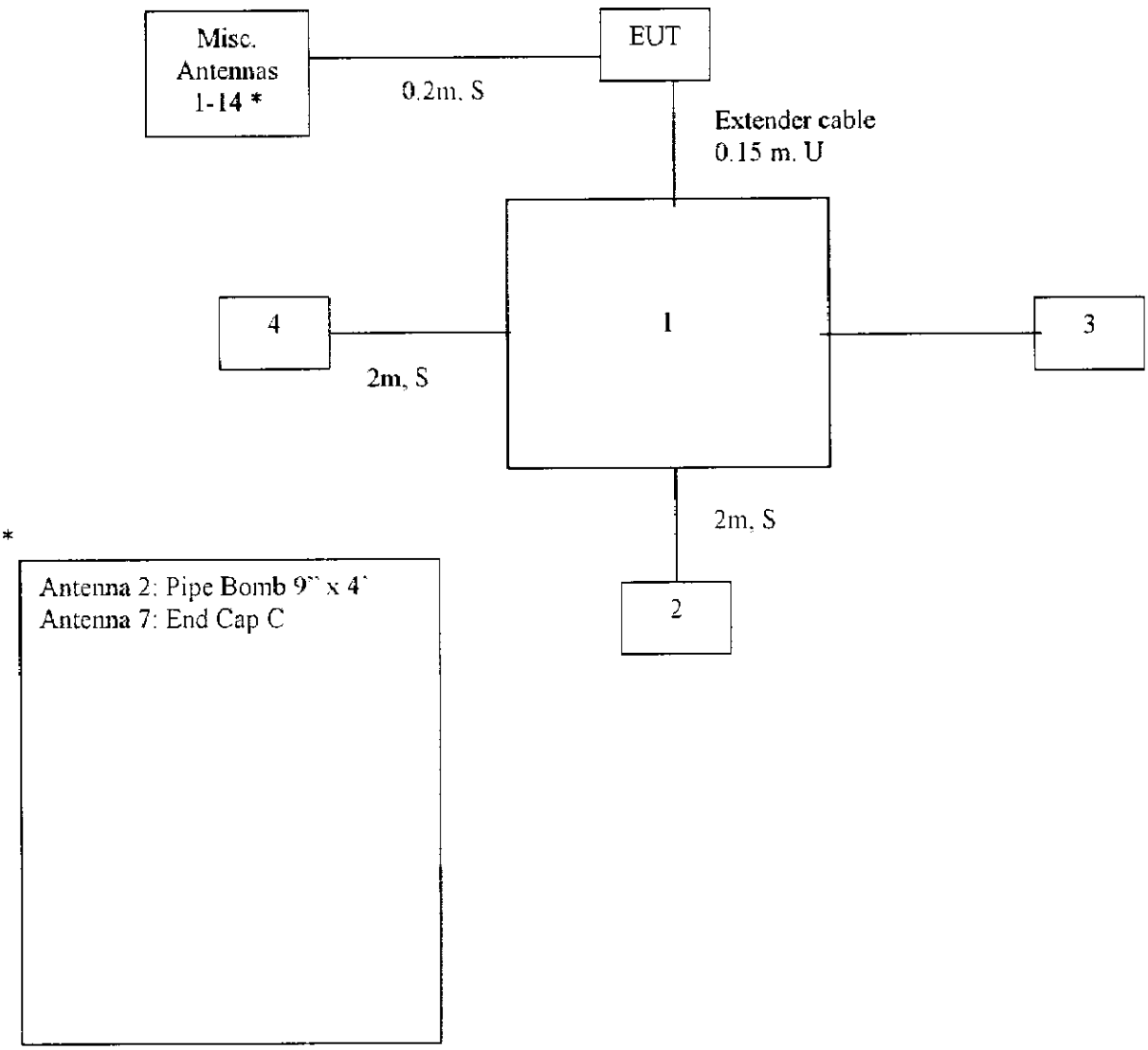
3.0 Test Summary

Test results are given in full in section 5 and 6.

FCC Part 15 Subpart B Summary of Test Results			
Test Condition	**Description**	**Class**	**Compliance Status**
Conducted Emission (AC main)	0.45 MHz - 30 MHz	B	Pass
Radiated Emission	30 MHz - 1000 MHz	B	Pass

4.0 System Test Configuration

4.1 Support Equipment



m: Length in meters
S: Shielded

4.3 Justification

The EUT was configured as a customer would normally use it.

4.4 Software Exercise Program

The software provided by Symbol was used to exercise the EUT.

4.5 Mode of Operation During Test

The EUT was set to continuously receive.

4.6 Modifications Required for Compliance

The following modifications were installed during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by Symbol Technologies prior to compliance testing):

No modifications were installed by Intertek Testing Services.

4.7 Additions, deviations and exclusions from standards

No additions, exclusions, or deviations were made to the standard.

5.0 Radiated Emissions

5.1 Radiated Emission Limits

The following radiated emission limits apply to Class B unintentional radiators:

Radiated Emissions Limits, Section 15.109(a)

Frequency MHz	Class B at 3m μV/m	Class B at 3m dB(μV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Note: Three sets of units are commonly used for EMI measurement, decibels below one milliwatt (-dBm), decibels above a microvolt, dB(μV), and microvolts (μV). To convert between them, use the following formulas: 20 LOG$_{10}$(μV) = dB(μV), dB(m) = dB(μV)-107.

5.2 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
where FS = Field Strength in dB(μV/m)
RA = Receiver Amplitude (including preamplifier) in dB(μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB/m
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

FS = RR + LF
where FS = Field Strength in dB(μV/m)
RR = RA - AG in dB(μV)
LF = CF + AF in dB/m

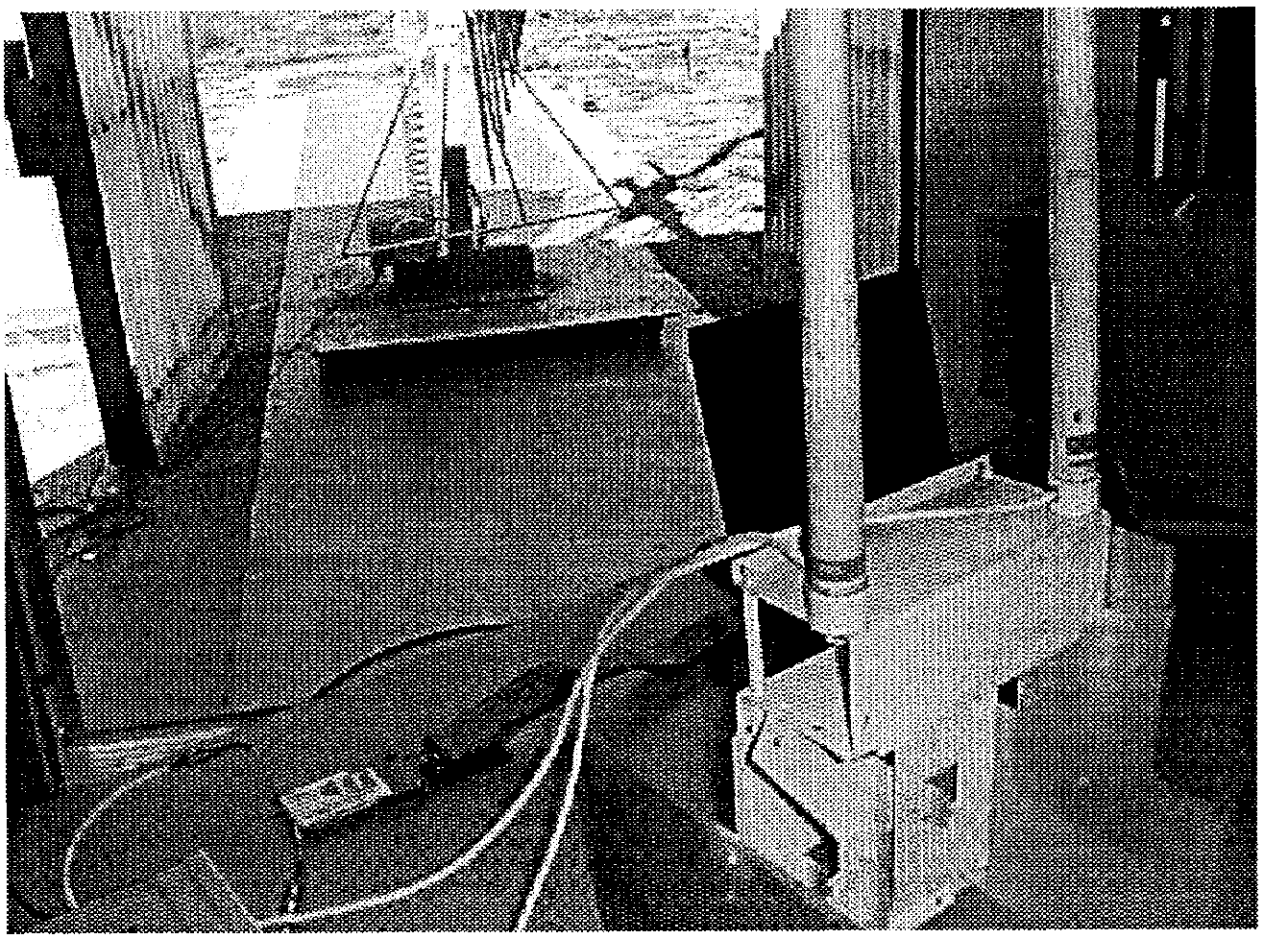
Assume a receiver reading of 52.0 dB(μV) is obtained. The antenna factor of 7.4 1/m and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB(μV/m). This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dB(μV)
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dB(μV/m)

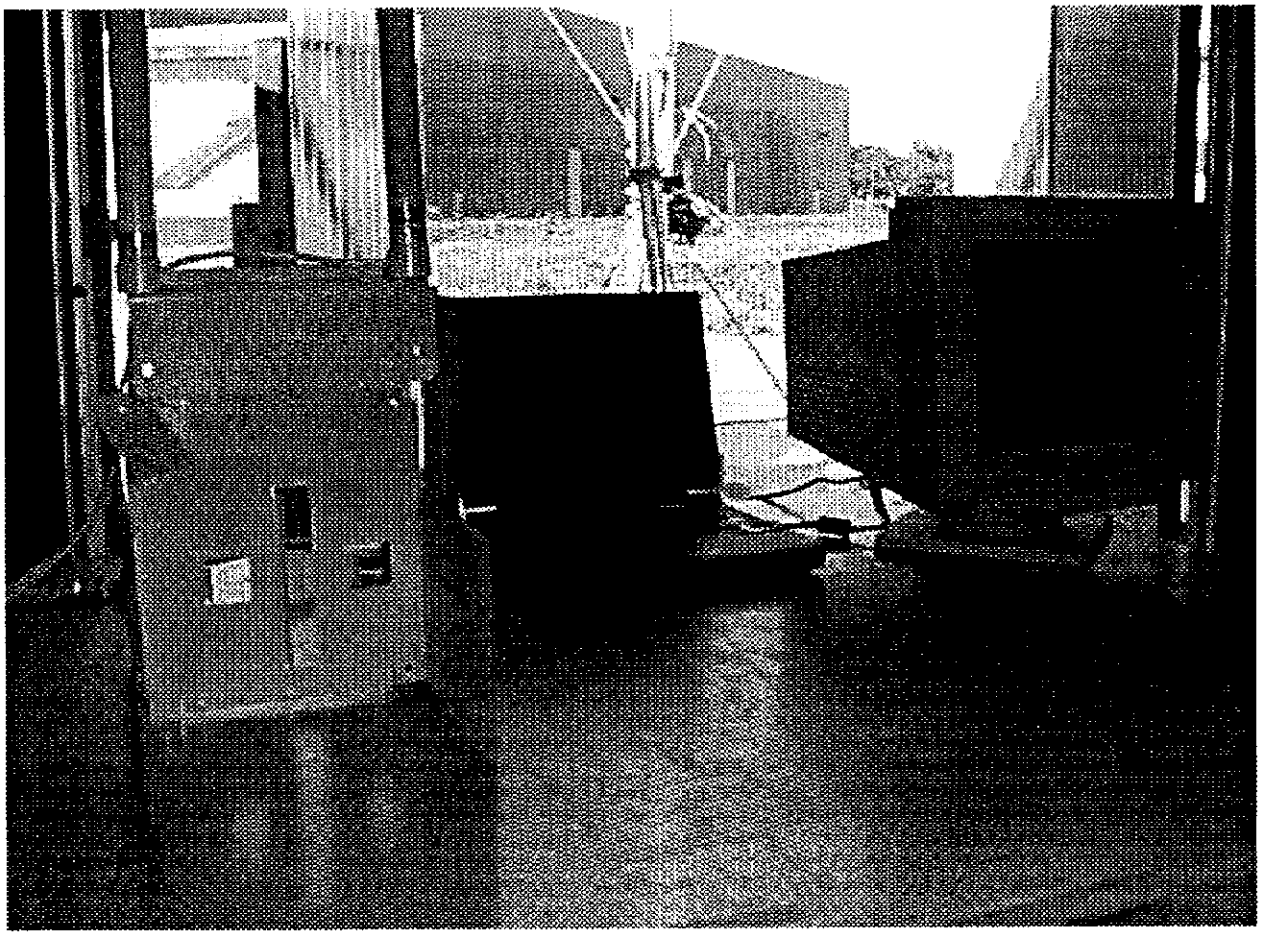
RR = 23.0 dB(μV)
LF = 9.0 dB

Level in μV/m = Common Antilogarithm {[32 dB(μV/m)]/20} = 39.8 μV/m

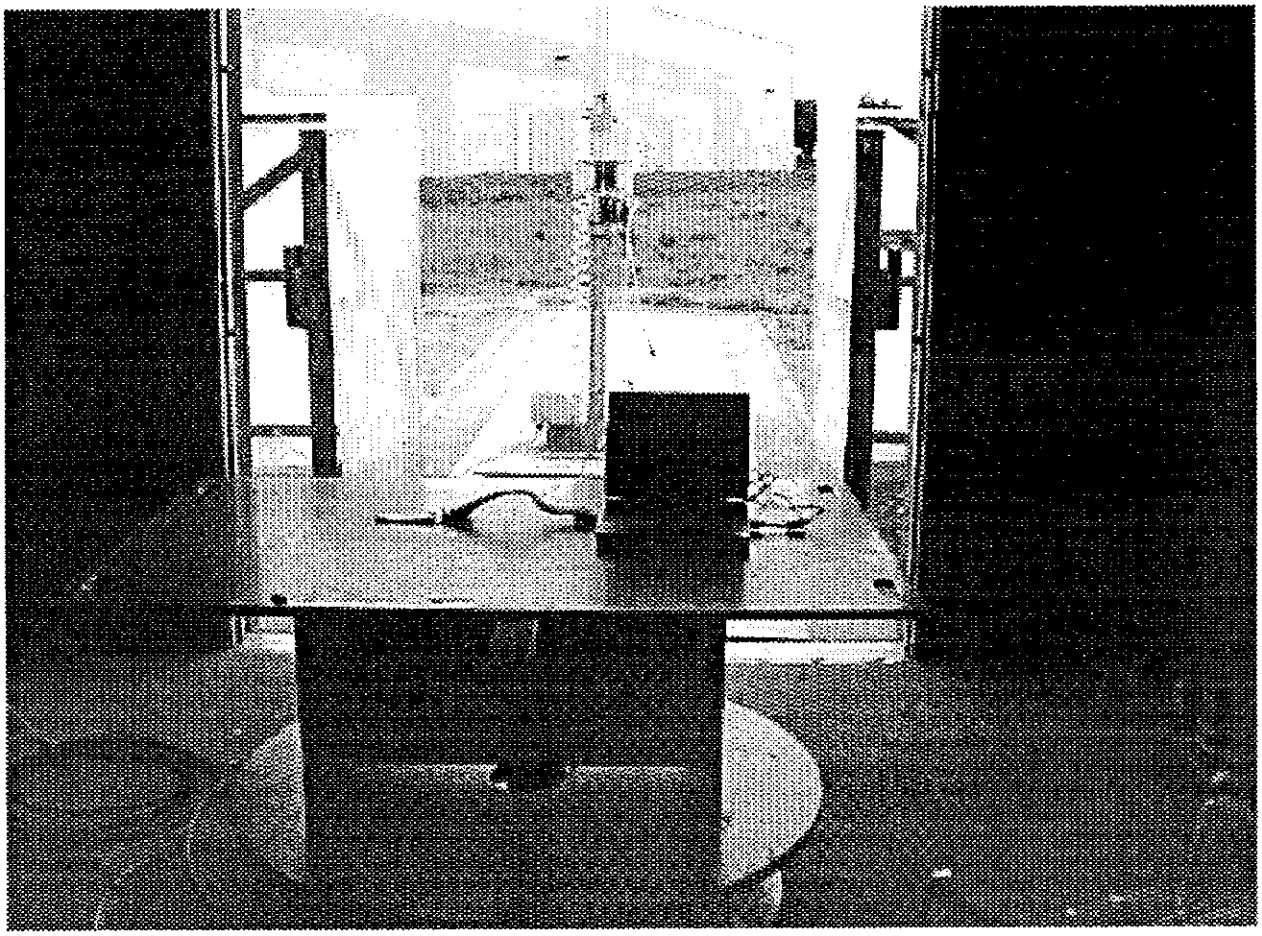
5.3 Radiated Emissions Configuration Photographs



5.3 Radiated Emissions Configuration Photographs



5.3 Radiated Emissions Configuration Photographs



5.4 Test Data

The results on the following page(s) were obtained when the device was tested in the condition described in section 4.

Results:	**Passed** by 25 dB at 132 MHz

Note: a) A complete scan from 30-1000 MHz was made with antenna oriented horizontally and vertically.

b) All emissions not reported are at least 10 dB below the limits

c) Analyzer setting: RBW ≥100 kHz, VBW ≥ 100 kHz
Detector mode: Peak unless otherwise specified in the data page

ITS Intertek Testing Services

Radiated Emissions Test Data

Company:	Symbol Technologies	Model #:	LA4121	Standard_	FCC § 15B
EUT:	Trilogy 2	S/N #:		Limits	2
Project #:	J20008658	Test Date:	April 4, 2000	Test Distance_	3 meters
Test Mode:	Receive mode	Engineer:	Barry S.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	14	8	2	8	10	2	2	0	0	0
Model:	EMCO 3115	EMCO 3115	EMCO 3143	CDI_P100 0	AFT16855	HP 8447D	Site 2 3m	None	None	None

Frequency	Reading	Detector	Ant	Amp.	Ant. Pol.	Ant. Factor	Pre-Amp	Insert. Loss	D. C. F.	Net	Limit @3m	Margin
MHz	dB(µV)	P/A/Q	#	#	H/V	dB(1/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
44.00	23.8	Peak	2	2	V	7.1	32.0	1.0	0.0	-0.1	40.0	-40.1
66.00	22.8	Peak	2	2	V	5.8	32.0	1.1	0.0	-2.3	40.0	-42.3
88.00	30.0	Peak	2	2	V	6.5	32.0	1.2	0.0	5.7	43.5	-37.8
132.00	40.4	Peak	2	2	H	7.8	32.0	1.4	0.0	17.6	43.5	-25.9
176.00	27.6	Peak	2	2	H	9.1	32.0	1.7	0.0	6.4	43.5	-37.1
180.00	19.9	Peak	2	2	H	9.3	32.0	1.7	0.0	-1.1	43.5	-44.6
220.00	27.4	Peak	2	2	H	11.4	32.0	1.8	0.0	8.6	46.0	-37.4
264.00	21.2	Peak	2	2	H	12.7	32.0	2.0	0.0	3.9	46.0	-42.1
308.00	23.8	Peak	2	2	H	13.7	32.0	2.2	0.0	7.7	46.0	-38.3

Notes:

a) D.C.F. Distance Correction Factor

b) Insert. Loss (dB) = Cable A + Cable B + Cable C .

c) Net (dB) = Reading + Antenna Factor - Pre-amp + Insert. Loss. - Transducer Loss - Duty Relaxation (transmitter only).

d) Negative signs (-) in Margin column signify levels below the limits.

e) All other emissions not reported are below the equipment noise floor which is at least 20 dB below the limits.

6.0 AC Mains Line-Conducted Emissions

6.1 Line Conducted Emission Limits

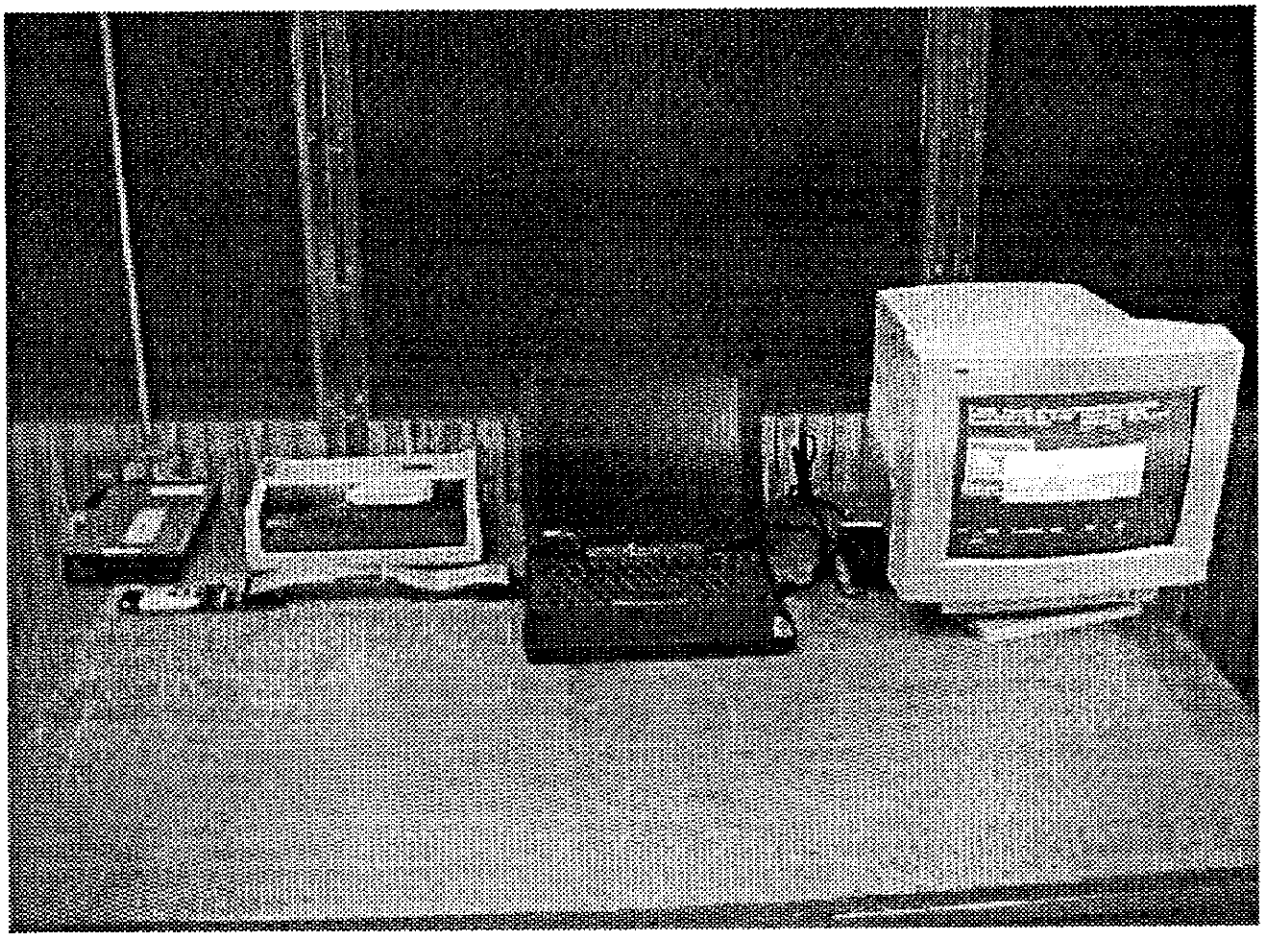
The following AC line conducted emission limits apply to Class B unintentional radiators:

Conducted Emissions Limits, Section 15.107(a)

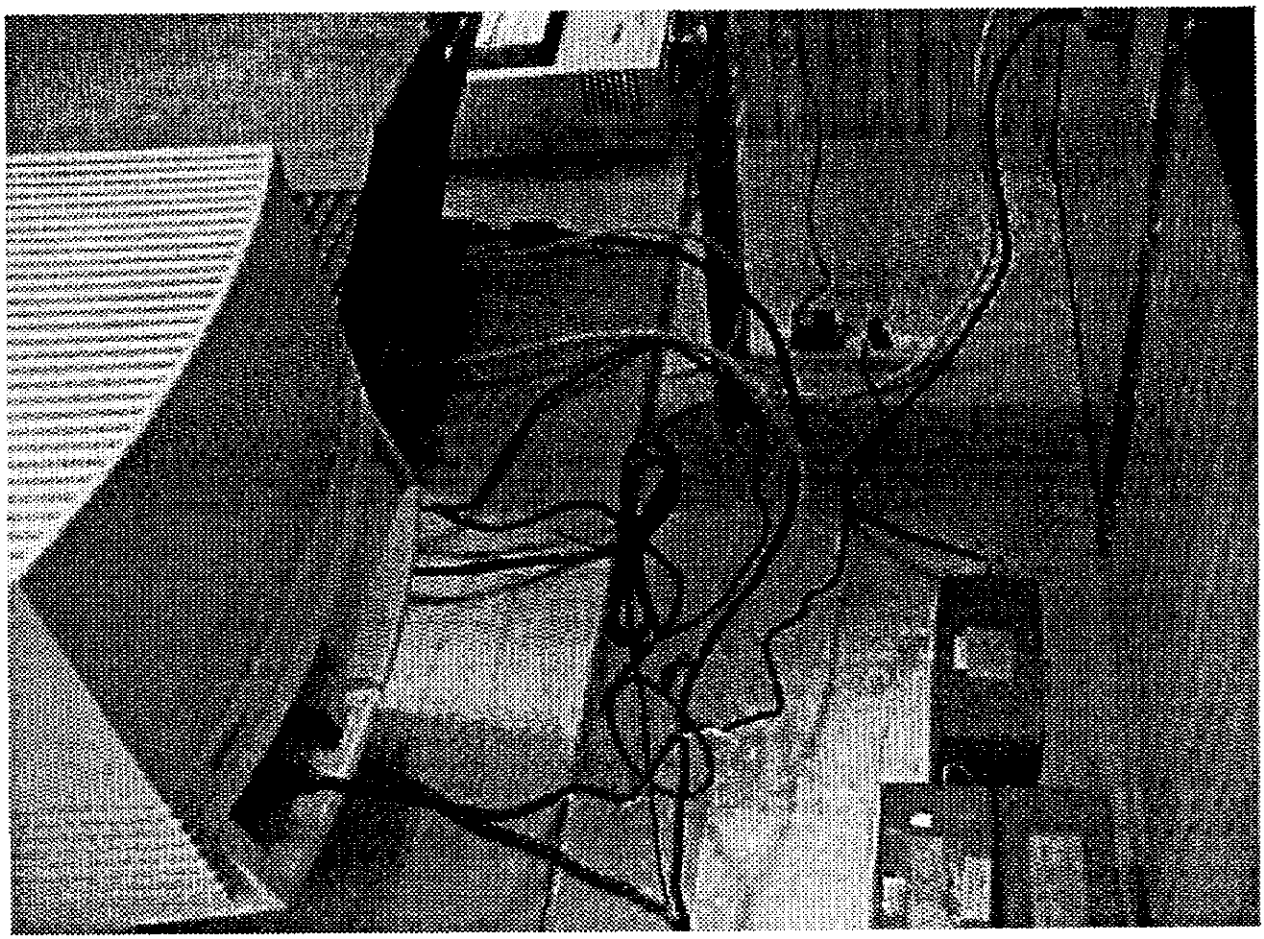
Frequency MHz	Class B μV	Class B dB(μV)
0.45 - 1.705	250	48
1.705 to 30.000	250	48

Note: Three sets of units are commonly used for EMI measurement, decibels below one milliwatt (-dBm), decibels above a microvolt,dB(μV), and microvolts (μV). To convert between them, use the following formulas: 20 LOG_{10}(μV) = dB(μV), dB(m) = dB(μV)-107.

6.2 Configuration Photographs – Line Conducted Emissions



6.2 Configuration Photographs – Line Conducted Emissions



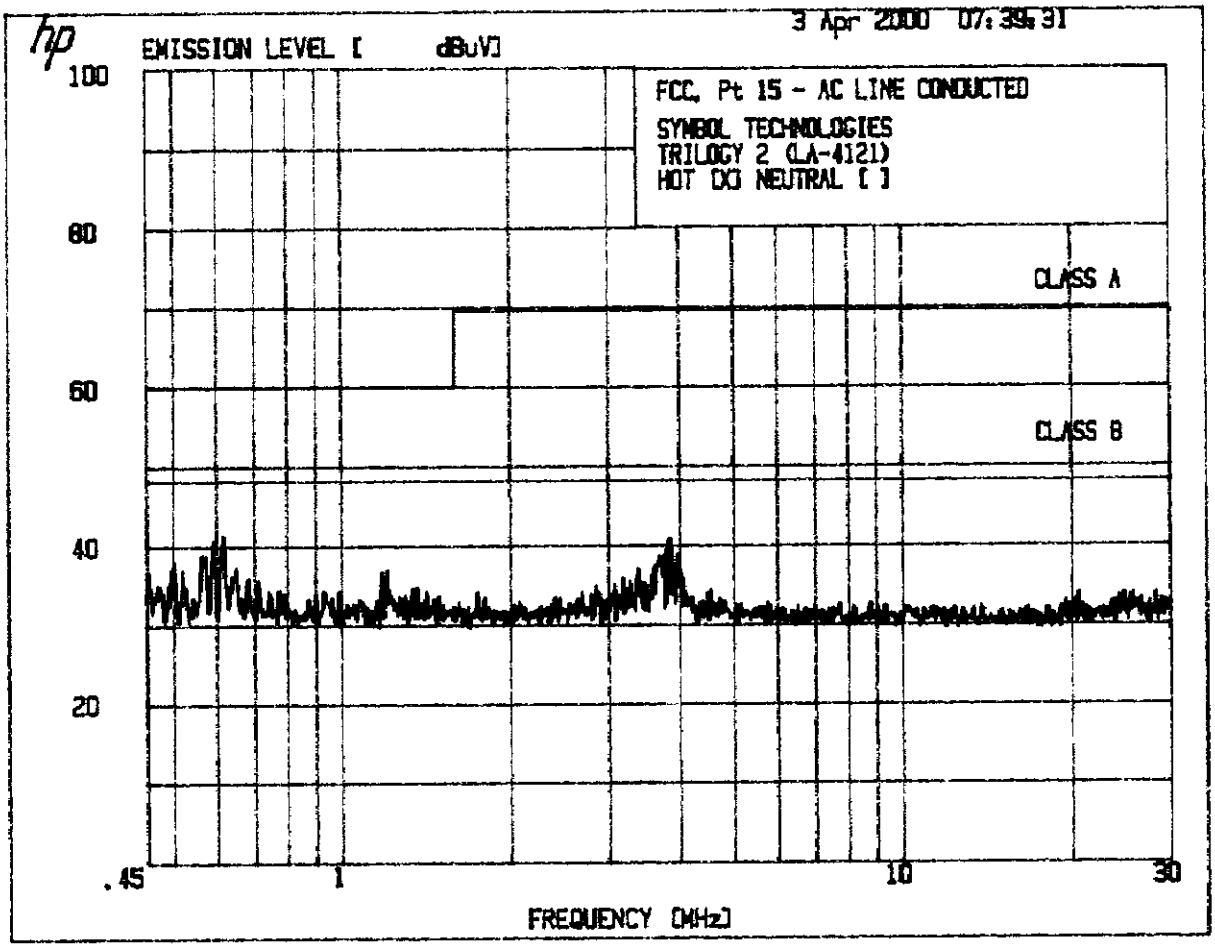
6.3 Test Data

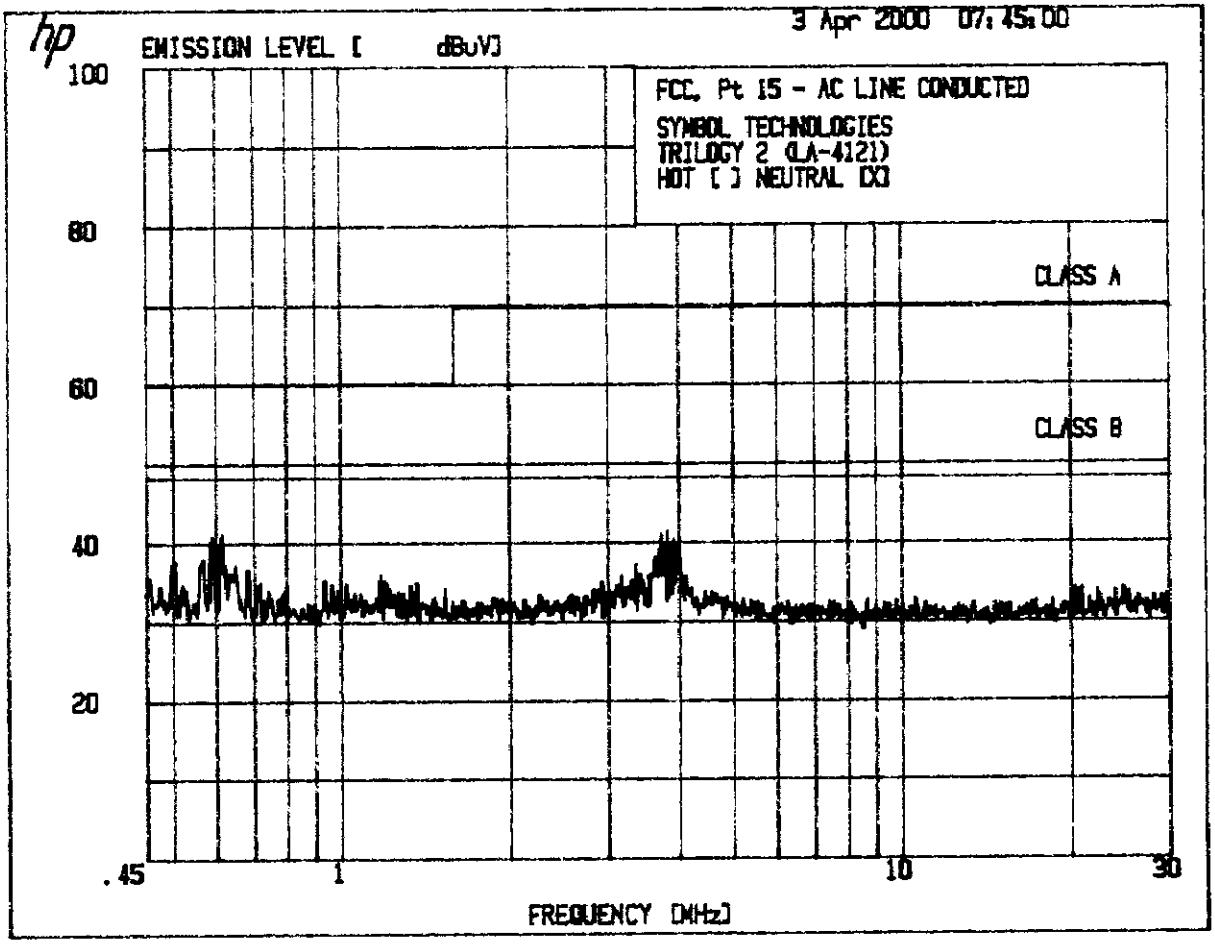
The results on the following page(s) were obtained when the device was tested in the condition described in section 4.

Results:	**Passed** by 7.2 dB at 3.8 MHz

Note: a) A complete scan from 0.45 - 30 MHz was made.

b) Analyzer setting: RBW ≥ 9 kHz, VBW ≥ 9 kHz
Detector mode: Peak unless otherwise specified in the data page


3 Apr 2000 07:39:31
EMISSION LEVEL [dBuV]
FCC, Pt 15 - AC LINE CONDUCTED
SYMBOL TECHNOLOGIES
TRILOGY 2 (LA-4121)
HOT [X] NEUTRAL [ ]
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]


3 Apr 2000 07:45:00
EMISSION LEVEL [dBuV]
FCC, Pt 15 - AC LINE CONDUCTED
SYMBOL TECHNOLOGIES
TRILOGY 2 (LA-4121)
HOT [ ] NEUTRAL [X]
CLASS A
CLASS B
100
80
60
40
20
.45
1
10
30
FREQUENCY [MHz]

3 Apr 2000 07:39:31

3. FCC CFR 47, Pt 15
3.1 FCC, Pt 15 - AC LINE CONDUCTED

SYMBOL TECHNOLOGIES
TRILOGY 2 (LA-4121)
HOT [X] NEUTRAL [ ]

PEAKS FOUND ABOVE 38 dBuV

PEAK#	FREQ (MHz)	AMPL(dBuV)
1	.5082	38.0
2	.5716	38.6
3	.5586	40.6
4	.6242	41.3
5	3.792	38.7
6	3.824	39.3
7	3.956	40.5
8	3.888	40.8
9	3.931	39.6
10	4.021	38.7

3 Apr 2000 07:45:00

3. FCC CFR 47, Pt 15
3.1 FCC, Pt 15 - AC LINE CONDUCTED

SYMBOL TECHNOLOGIES
TRILOGY 2 (LA-4121)
HOT [ ] NEUTRAL [X]

PEAKS FOUND ABOVE 38 dBuV

PEAK#	FREQ (MHz)	AMPL(dBuV)
1	.5361	40.7
2	.6216	41.0
3	3.760	40.3
4	3.792	39.5
5	3.656	41.3
6	3.888	39.2
7	3.921	39.4
8	3.954	40.2
9	3.987	38.6

7.0 Test Equipment

7.1 Equipment List

All test sites are FCC listed, IC accepted, and NVLAP accredited.

Industry Canada identifier number	**IC 2059**
NVLAP Lab Code	**200201-0**

Instruments used for emission compliance tests described in this report are listed below:

TEST EQUIPMENT FOR EMISSION TESTING						
EQUIPMENT	**MFG.**	**MODEL**	**SERIAL NUMBER**	**CAL. INTERVAL (Months)**	**CAL. DUE DATE (m/d/y)**	**USED**
Bi-Log Antenna	EMCO	3143	9509-1160	12	4/15/00	X
Pre-Amplifier	Hewlett Packard	8447D	2648A04700	12	7/28/00	X
Spectrum Analyzer w/85650 QP Adaptor	Hewlett Packard	8566B	2416A00317 2043A00251	6	7/4/00	X
Spectrum Analyzer w/85650 QP Adaptor	Hewlett Packard	8568B	1912A00553 2521A01021	12	2/16/01	X
LISN	Solar Electronics	8028-50-TS-24-BNC	941501	12	12/10/00	X
LISN	Solar Electronics	8028-50-TS-24-BNC	941502	12	12/10/00	X
Pulse limiter	Hewlett Packard	11947A	2820A00184	12	12/10/00	X

7.2 Measurement Uncertainty

7.2.1 **Radiated Emission** - 3m Open Site Test Distance

The uncertainty in the measured field strength is estimated as follows, for a minimum confidence probability of 95 %

Freq. Range	Detection Mode	Uncertainty
30 MHz to 200 MHz	Quasi-peak	± 4.4 dB
200 MHz to 1000 MHz	Quasi-peak	+ 5.0 / - 3.6 dB

7.2.2 Conducted Emission - AC Supply

The uncertainty in the measured voltage is estimated as follows, for a minimum confidence probability of 95 %

Freq. Range	Detection Mode	Uncertainty
9 kHz to 150 kHz	Average	± 2.1 dB
	Quasi-peak	± 2.5 dB
150 kHz to 30 MHz	Average	± 2.4 dB
	Quasi-peak	± 2.6 dB

7.3 Measurement Traceability

All measurements described in this report are traceable to National Institute of Standards and Technology (NIST) standards.

8.0 Miscellaneous Information or Other Comments

None.

8.1 Labeling - USA

Products subject to Declaration of Conformity (DoC) shall be labeled as shown below. The label shall be located in a conspicuous location on the device and shall contain the unique identification described in FCC Section 2.1074.

The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as described in FCC Section 2.925(d). "Permanently affixed" means that the label is etched, engraved, stamped, silkscreened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

(i) If the product is authorized based on testing of the product or system

Trade Name	Model Number
FC	Tested To Comply With FCC Standards
FOR HOME OR OFFICE USE	

(ii) If the product is authorized based on assembly using separately authorized components and the resulting product is not separately tested:

Trade Name	Model Number
FC	Assembled From Tested Components (Complete System Not Tested)
FOR HOME OR OFFICE USE	

8.2 Labeling - Canada

Canadian Emissions and Labeling Requirements

The Canadian Government has announced an amendment of the radio act which will require computing equipment to comply with EMI Specifications in Canada. The effective date for products imported into Canada is January 31, 1989.

The intent of the amendment is to establish Canadian Regulations which are harmonized with the existing FCC Regulations. As such, no retesting is required and devices which have been tested and comply with the FCC Specifications (Class A or B) also comply with the Canadian Specification (Class A or B).

A record of the measurements and results shall be retained by the manufacturer or importer for a period of at least five years and made available for examination on the request of the Canadian Government.

A written notice indicating compliance must accompany each unit of digital apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. Where because of insufficient space or other restrictions it is not feasible to affix a label to the apparatus, the notice may be in form of a statement included in the user's manual.

A suggested text for the notice, in English and French, is as follows:

This Class [*] digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe [*] respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

*Insert either "A" or "B" but not both as appropriate for the equipment requirements.

8.3 Compliance Information - USA

If a product must be tested and authorized under a Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

(a) Identification of the product, e.g., name and model number.

(b) A statement that the product complies with Part 15 of the regulations:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(c) The identification, by name, address and telephone number, of the responsible party. The responsible party for a Declaration of Conformity must be located within the United States.

The compliance information statement shall be included in the user's manual or as a separate sheet.

The users manual or instruction manual shall also caution the user that:

Changes or modifications not expressly approved the party responsible for compliance could void the user's authority to operate this equipment.

8.4 Manufacturer's Certification

Declaration of Conformity

Standard to which conformity is declared: FCC Part 15 Subpart B Class B

Manufacturer/Importer's Information

Name: Symbol Technologies, Inc.

Address: 6480 Via Del Oro Drive

San Jose, CA 95119-1208

Telephone Number: 408-528-2649

Equipment Information

Type of Equipment: 2.4 GHz Part 15 Spread Spectrum Transceiver

Trade Name: Spectrum 24© WLAN PC CARD

Model Number: LA-4121

Test Report Reference: Report NO. J20008658c

I, the undersigned, hereby declare that the equipment specified above conforms to Part 15 of the FCC Rules.

Norman H Nelson

(Signature)

Norman H. Nelson, Sr. EMC Engineer

(Name & Title)

May 5, 2000

(Date)

9.0 Document History

Revision/Job Number	Date	Change
1.0 / J20008658-C	4/11/00	Original document