



FCC Certification Report for the  
**LA3021-100** WLAN PC Card  
Class II Permissive Change

EXHIBIT 2.1

**TEST REPORT 2**

Antennas:  
Micropac  
IEC PC-LP  
6146

**Radiated Emissions in Restricted Bands  
Permissive Change Test Report  
FCC Part 15.247 (c)  
for  
Symbol Technologies  
on the  
Spread Spectrum Frequency Hopping Radio  
Model: H9PLA3021-100**

Test Report #: 202567861  
Date of Report: September 27, 2000

Job #: J200256786  
Date of Test: September 20-21, 2000

Total No. of Pages Contained in this Report: 12 + data pages



Lab Code: 200201-01

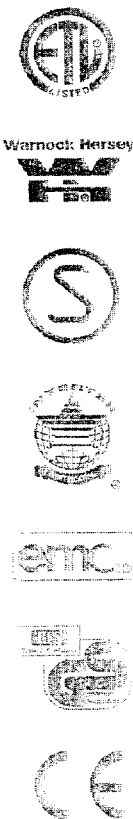
	Barry E. Smith, Test Engineer
<i>call: 433 for</i>	David Chernomordik, Ph.D., EMC Site Manager

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Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

1.0 Summary of Tests

**Symbol Technologies Inc. - Model No. H9PLA3021-100**

TEST	REFERENCE	RESULTS
Radiated Emission in Restricted Bands	15.247(c)	Passed

Test Engineer:   
Barry E. Smith

Date: 9/29/00

EMC Site Mgr.:   
David Chernomordik

Date: 9/29/00

Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

**2.0 General Description**

## 2.1 Product Description

The Symbol Technologies model H9PLA3021-100 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.

**Overview of the EUT**

Trade Name & Model No.	Symbol Technologies, Model No. H9PLA3021-100
Frequency Range (MHz)	2402 – 2480
Antenna(s)	Micropaq 50-21900-037 IEC PC-LP 60-20926-01 6146 10-35305-02
Manufacturer name & address	Symbol Technologies 6480 Via Del Oro San Jose CA 95119

Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

### 2.3 Test Methodology

This report is designed to show that 3 new antennas, added to the previously certified device, complies with FCC regulations. Only radiated emissions in restricted bands were tested because the transmitter itself has not been modified.

Radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Data Sheet**" of this Application.

### 2.4 Test Facility

The open area test site facility used to collect the radiated data is located at 1365 Adams Court, Menlo Park, CA 94025. This test facility and site measurement data have been fully placed on file with the FCC.

Symbol Technologies,  
Model No. H9PLA3021-100

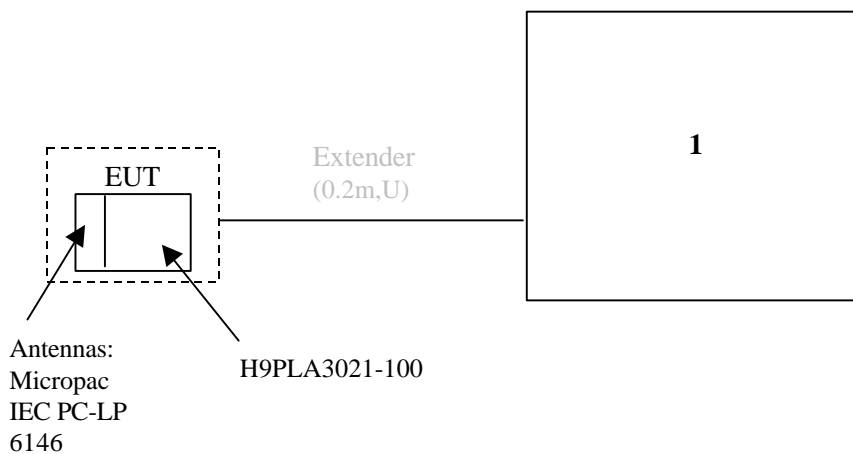
Date of Test: September 20-21, 2000

**3.0 System Test Configuration**

3.1 Support Equipment

Item #	Description	Model No.	Serial No.	FCC ID
1	Compaq Notebook Computer	2860A	7448HJJ53R518	CNT75MB2CA

3.2 Block Diagram of Test Setup



m: Length in meters

U: Unshielded

Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

### 3.3 Justification

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions.

For radiated emission measurements, the EUT is attached to a cardboard box (if necessary) and placed on the wooden turntable. If the EUT attaches to peripherals, they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

### 3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

### 3.5 Mode of Operation During Test

For emissions testing, the unit was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

### 3.6 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 Inc. prior to compliance testing):

No modifications were made to the EUT by Intertek Testing Services.



#### 4.0 Measurement Results

##### 4.1 Transmitter Radiated Emissions in Restricted Bands, *FCC Ref: 15.247(c)*

Radiated emission measurements were performed from 30 MHz to 25000 MHz. Analyzer resolution is 100 kHz or greater for frequencies from 30 MHz to 1000 MHz and 1 MHz for frequencies above 1000 MHz.

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection and average detection (above 1 GHz) unless otherwise specified.

On the following pages, the emissions on the harmonics frequencies, the limits, and the margin of compliance are presented. These tests were made when the transmitter is in full radiated power. Duty cycle correction was not used.

For the test results, refer to the following radiated emission data sheets.

Note : It was verified that radiated emission data from digital portion of the EUT is not worse than the data previously measured and presented in the original report.

Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

4.2 Radiated Emission Test Results

See attachment test data sheets.

**Radiated Emissions  
Test Data**

Company:	Symbol			Model #:	3021w/50-21900-037	Standard	FCC § 15.247 (R.B.)
EUT:	LA3021-100 Freq Hopper			S/N #:		Limits	11
Project #:	J200256786			Test Date:	SEP 20, 2000	Test Distance	3 meters
Test Mode:	Xmit with Micropac			Engineer:	Barry S.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	21	0	8	12	13	21	0	0	0
Model:	EMCO 31-5	3160-g	None	CDI_P100 g	ACO/180	ACO/400	Gm_M+L	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(f/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
2402	77.4	Peak	8		H	29.1	0.0	2.3	0.0	108.8		
4804	29.0	Peak	8	8	H	33.9	28.1	3.2	0.0	38.0	74.0	-36.0
4804	20.0	Ave.	8	8	H	33.9	28.1	3.2	0.0	29.0	54.0	-25.0
12010	34.8	Peak	8	12	H	42.1	32.4	5.9	0.0	50.4	74.0	-23.6
12010	26.8	Ave.	8	12	H	42.1	32.4	5.9	0.0	42.4	54.0	-11.6
19216	37.7	Peak	21	13	H	40.2	23.3	7.7	-9.5	52.8	74.0	-21.2
19216	30.0	Ave.	21	13	H	40.2	23.3	7.7	-9.5	45.1	54.0	-8.9
2440	79.9	Peak	8		H	29.1	0.0	2.3	0.0	111.3		
4880	29.3	Peak	8	8	H	33.9	28.1	3.2	0.0	38.3	74.0	-35.7
4880	22.5	Ave.	8	8	H	33.9	28.1	3.2	0.0	31.5	54.0	-22.5
7320	36.2	Peak	8	8	H	36.8	28.0	4.3	0.0	49.3	74.0	-24.7
7320	30.8	Ave.	8	8	H	36.8	28.0	4.3	0.0	43.9	54.0	-10.1
12220	34.4	Peak	8	12	H	42.1	32.4	5.9	0.0	50.0	74.0	-24.0
12220	26.6	Ave.	8	12	H	42.1	32.4	5.9	0.0	42.2	54.0	-11.8
19520	37.7	Peak	21	13	H	40.3	23.3	7.7	-9.5	52.9	74.0	-21.1
19520	30.0	Ave.	21	13	H	40.3	23.3	7.7	-9.5	45.2	54.0	-8.8
2480	78.3	Peak	8		H	29.1	0.0	2.3	0.0	109.7		
4960	28.7	Peak	8	8	H	33.9	28.1	3.2	0.0	37.7	74.0	-36.3
4960	22.4	Ave.	8	8	H	33.9	28.1	3.2	0.0	31.4	54.0	-22.6
7440	34.4	Peak	8	8	H	36.8	28.0	4.3	0.0	47.5	74.0	-26.5
7440	28.5	Ave.	8	8	H	36.8	28.0	4.3	0.0	41.6	54.0	-12.4
12400	34.6	Peak	8	12	H	42.1	32.4	5.9	0.0	50.2	74.0	-23.8
12400	27.0	Ave.	8	12	H	42.1	32.4	5.9	0.0	42.6	54.0	-11.4
19840	35.5	Peak	21	13	H	40.3	23.3	7.7	-9.5	50.7	74.0	-23.3
19840	25.6	Ave.	21	13	H	40.3	23.3	7.7	-9.5	40.8	54.0	-13.2
22320	40.1	Peak	21	13	H	40.3	23.3	7.9	-9.5	55.5	74.0	-18.5
22320	31.2	Ave.	21	13	H	40.3	23.3	7.9	-9.5	46.6	54.0	-7.4

Subtract 9 dB for all readings to account for duty cycle  
DCF of -9.5 were taken at 1 meter with RBW at 300kHz

- 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.

## Radiated Emissions Test Data

Company:	Symbol				Model #:	LA3021w/60-20926-01	Standard:	FCC § 15.247 (R.E.)
EUT:	LA3021-100 Frequency Hopper				S/N #:		Limits:	11
Project #:	J200256786				Test Date:	SEP 21, 2000	Test Distance:	3 meters
Test Mode:	Xmit with antenna IEC PC-LP				Engineer:	Barry S.	Duty Relaxation:	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	21	0	8	12	13	21	0	0	0
Model:	EMCO 3115	3160-9	None	CD_P100 G	ACO/100	ACO/400	Gm_M+L	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(f/m)	dB	dB	dB	dB(µV/m)	dB(µV/m)	dB
2402	86.4	Peak	8		H	29.1	0.0	2.3	0.0	117.8		
4804	47.8	Peak	8	8	H	33.9	28.1	3.2	0.0	56.8	74.0	-17.2
4804	46.6	Ave.	8	8	H	33.9	28.1	3.2	0.0	55.6	54.0	1.6
12010	34.2	Peak	8	12	H	42.1	32.4	5.9	0.0	49.8	74.0	-24.2
12010	26.9	Ave.	8	12	H	42.1	32.4	5.9	0.0	42.5	54.0	-11.5
19216	37.9	Peak	21	13	H	40.2	23.3	7.7	-9.5	53.0	74.0	-21.0
19216	30.1	Ave.	21	13	H	40.2	23.3	7.7	-9.5	45.2	54.0	-8.8
2440	82.6	Peak	8		H	29.1	0.0	2.3	0.0	114.0		
4880	46.2	Peak	8	8	H	33.9	28.1	3.2	0.0	55.2	74.0	-18.8
4880	44.2	Ave.	8	8	H	33.9	28.1	3.2	0.0	53.2	54.0	-0.8
7320	36.5	Peak	8	8	H	36.8	28.0	4.3	0.0	49.6	74.0	-24.4
7320	31.4	Ave.	8	8	H	36.8	28.0	4.3	0.0	44.5	54.0	-9.5
12220	31.7	Peak	8	12	H	42.1	32.4	5.9	0.0	47.3	74.0	-26.7
12220	26.2	Ave.	8	12	H	42.1	32.4	5.9	0.0	41.8	54.0	-12.2
19520	35.1	Peak	21	13	H	40.3	23.3	7.7	-9.5	50.3	74.0	-23.7
19520	29.9	Ave.	21	13	H	40.3	23.3	7.7	-9.5	45.1	54.0	-8.9
2480	83.0	Peak	8		V	29.1	0.0	2.3	0.0	114.4		
4960	45.5	Peak	8	8	H	33.9	28.1	3.2	0.0	54.5	74.0	-19.5
4960	44.4	Ave.	8	8	H	33.9	28.1	3.2	0.0	53.4	54.0	-0.6
7440	34.7	Peak	8	8	H	36.8	28.0	4.3	0.0	47.8	74.0	-26.2
7440	28.6	Ave.	8	8	H	36.8	28.0	4.3	0.0	41.7	54.0	-12.3
12400	34.8	Peak	8	12	H	42.1	32.4	5.9	0.0	50.4	74.0	-23.6
12400	26.9	Ave.	8	12	H	42.1	32.4	5.9	0.0	42.5	54.0	-11.5
19840	36.0	Peak	21	13	H	40.3	23.3	7.7	-9.5	51.2	74.0	-22.8
19840	27.3	Ave.	21	13	H	40.3	23.3	7.7	-9.5	42.5	54.0	-11.5
22320	40.1	Peak	21	13	H	40.3	23.3	7.9	-9.5	55.5	74.0	-18.5
22320	31.0	Ave.	21	13	H	40.3	23.3	7.9	-9.5	46.4	54.0	-7.6
<b>Subtract 9 dB for all readings to account for duty cycle</b>												
<b>DCF of -9.5 were taken at 1 meter with RBW at 300kHz</b>												

<b>Notes:</b>	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.

## Radiated Emissions Test Data

Company:	Symbol			Model #:	LA3021w/10-35305-02	Standard	FCC § 15.247 (R.B.)
EUT:	LA3021-100 Frequency Hopper			S/N #:		Limits	11
Project #:	J200256786			Test Date:	SEP 21, 2000	Test Distance	3 meters
Test Mode:	Xmit with antenna 6146			Engineer:	Barry S.	Duty Relaxation	0 dB

	Antenna Used			Pre-Amp Used			Cable Used			Transducer Used
Number:	8	21	0	8	12	13	21	0	0	0
Model:	EMCO 3115	3160-9	None	CDI_P100 0	ACO180	ACO400	Gm_M+L	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
2402	87.9	Peak	8		H	29.1	0.0	2.3	0.0	119.3		
4804	34.4	Peak	8	8	H	33.9	28.1	3.2	0.0	43.4	74.0	-30.6
4804	30.5	Ave.	8	8	H	33.9	28.1	3.2	0.0	39.5	54.0	-14.5
12010	29.4	Peak	8	12	H	42.1	32.4	5.9	0.0	45.0	74.0	-29.0
12010	25.0	Ave.	8	12	H	42.1	32.4	5.9	0.0	40.6	54.0	-13.4
19216	41.1	Peak	21	13	H	40.2	23.3	7.7	-9.5	56.2	74.0	-17.8
19216	30.7	Ave.	21	13	H	40.2	23.3	7.7	-9.5	45.8	54.0	-8.2
2440	88.6	Peak	8		H	29.1	0.0	2.3	0.0	120.0		
4880	33.1	Peak	8	8	H	33.9	28.1	3.2	0.0	42.1	74.0	-31.9
4880	28.0	Ave.	8	8	H	33.9	28.1	3.2	0.0	37.0	54.0	-17.0
7320	35.4	Peak	8	8	H	36.8	28.0	4.3	0.0	48.5	74.0	-25.5
7320	30.1	Ave.	8	8	H	36.8	28.0	4.3	0.0	43.2	54.0	-10.8
12220	42.0	Peak	8	12	H	42.1	32.4	5.9	-9.5	48.1	74.0	-25.9
12220	31.1	Ave.	8	12	H	42.1	32.4	5.9	-9.5	37.2	54.0	-16.8
19520	42.3	Peak	21	13	H	40.3	23.3	7.7	-9.5	57.5	74.0	-16.5
19520	30.5	Ave.	21	13	H	40.3	23.3	7.7	-9.5	45.7	54.0	-8.3
2480	87.9	Peak	8		H	29.1	0.0	2.3	0.0	119.3		
4960	23.9	Peak	8	8	H	33.9	28.1	3.2	0.0	32.9	74.0	-41.1
4960	16.3	Ave.	8	8	H	33.9	28.1	3.2	0.0	25.3	54.0	-28.7
7440	35.2	Peak	8	8	H	36.8	28.0	4.3	0.0	48.3	74.0	-25.7
7440	30.3	Ave.	8	8	H	36.8	28.0	4.3	0.0	43.4	54.0	-10.6
12400	31.2	Peak	8	12	H	42.1	32.4	5.9	0.0	46.8	74.0	-27.2
12400	28.4	Ave.	8	12	H	42.1	32.4	5.9	0.0	44.0	54.0	-10.0
19840	33.3	Peak	21	13	H	40.3	23.3	7.7	-9.5	48.5	74.0	-25.5
19840	24.0	Ave.	21	13	H	40.3	23.3	7.7	-9.5	39.2	54.0	-14.8
22320	39.9	Peak	21	13	H	40.3	23.3	7.9	-9.5	55.3	74.0	-18.7
22320	30.0	Ave.	21	13	H	40.3	23.3	7.9	-9.5	45.4	54.0	-8.6

Subtract 9 dB for all readings to account for duty cycle  
DCF of -9.5 were taken at 1 meter with RBW at 300kHz

<b>Notes:</b>	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.

Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

4.3 Radiated Emission Configuration Photograph

Radiated Emissions Setup  
Antenna Micropac



Radiated Emissions Setup  
Antenna IEC PC-LP





Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

Radiated Emissions Setup  
Antenna 6146





Symbol Technologies,  
Model No. H9PLA3021-100

Date of Test: September 20-21, 2000

**5.0 Document History**

<b>Revision/Job Number</b>	<b>Date</b>	<b>Change</b>
1.0 / J200256786	9/27/00	Original document