

FCC CFR47 PART 15 CERTIFICATION CLASS II PERMISSIVE CHANGE TEST REPORT

FOR

WLAN PC CARD

MODEL NUMBER: LA-4131

BRAND NAME: SPECTRUM-24

FCC ID: H9PLA4131M

REPORT NUMBER: 03U1960-1

ISSUE DATE: JUNE 05, 2003

Prepared for SYMBOL TECHNOLOGIES, INC. 6480 VIA DEL ORO DRIVE SAN JOSE, CA 95119 USA

Prepared by

COMPLIANCE CERTIFICATION SERVICES 561 F MONTEREY ROAD MORGAN HILL, CA 95037, USA TEL: (408) 463-0885 FAX: (408) 463-0888

TABLE OF CONTENTS

1.	TE	EST RESULT CERTIFICATION	3
2.	DI	ESCRIPTION OF CLASS II PERMISSIVE CHANGE	4
3.	FA	CILITIES AND ACCREDITATION	5
	3.1.	FACILITIES AND EQUIPMENT	5
	3.2.	TABLE OF ACCREDITATIONS AND LISTINGS	6
4.	CA	ALIBRATION AND UNCERTAINTY	7
	4.1.	MEASURING INSTRUMENT CALIBRATION	
	4.2.	MEASUREMENT UNCERTAINTY	
	4.3.	TEST AND MEASUREMENT EQUIPMENT	7
5.	SU	JPPORT EQUIPMENT / EUT SETUP	8
6.	AF	PPLICABLE RULES AND RESULT 1	0
	6.1.	RADIATED EMISSIONS 1	
	6.2.	DISH ANTENNA RESULTS 1	
	6.3.	YAGI ANTENNA RESULTS 2	
	6.4.	PANEL ANTENNA RESULTS 3	
	6.5.	PATCH ANTENNA RESULTS 4	
	6.6.	DIPOLE ANTENNA RESULTS 6	50
	6.7.	WORST-CASE EMISSIONS 30 TO 1000 MHz7	/1

Page 2 of 74

1. TEST RESULT CERTIFICATION

	APPI ICARI E STANDARDS
DATE TESTED:	MAY 15 TO MAY 21, 2003
MODEL NUMBER:	LA-4131
EUT DESCRIPTION:	WLAN PC CARD
COMPANY NAME:	SYMBOL TECHNOLOGIES, INC. 6480 VIA DEL ORO DRIVE SAN JOSE, CA 95119 USA

APPLICABL	E STANDARDS
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

Tested By:

MH

MIKE HECKROTTE CHIEF EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

Chen Pary

CHIN PANG ASSOCIATE EMC ENGINEER COMPLIANCE CERTIFICATION SERVICES

Page 3 of 74

2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The EUT is a WLAN operating over the 2400 to 2483.5 MHz band with an output power of 17.8 dBm (60 mW). Additional antennas and antenna types are added, as follows:

	FCC ID: H9PLA4 Output Power: 6			l, 11 Mbps, T sive Change	3			Mobile	ork Systems Orga Source Based DC Factor: 0.72 DC Factor: 0.71	20
			M	lobile Ant	ennas	2				
Ant No	Description	Symbol P/N	Туре	Min Cable (In.)	Gain (dBi)	EIRP (mW)	MPE (cm)	TR Status	Device Type	Prof Install
01.	Panel 8.5, 120 ^e Sector	ML-2499-11PNA2-01	Panel		8.5	427	4.9	Sec # 11	Fixed Pt - MutiPt	
02	Panel 9.5, 65"	ML-2499-12PNA2-01	Panel		9.5	538	5.5	Sec # 11	Fixed Pt - MutiPt	
63.	Panel 6.3, 80%, Diverse	ML-2499-7PNA2-01	Fanel		6.3	254	3.8	See # 11	Fixed Pt - MutiPt	
04.	Rubber Duck, Cusheraft	ML>2499-APA2-01	Dipole		2.0	95	2.3	Sec # 9	Fixed Pt - MutiPt	
05.	Pipe Bomb 11" x 48"	ML-2499-HPA3-01	Dipole		4.9	184	3.2	Sec # 9	Fixed Pt - MutiPt	
06.	Panel HID 6.3, 659	ML-2499-PNAHD-01	Panel		6.3	254	3.8	Sec # 11	Fixed Pt - MutiPt	
07.	Patch, 2.3, 48"	ML-2499-SD3-01	Patch		2.3	101	2.4	Tested	Fixed Pt - MutiPt	
08.	Patch, Diversity	ML-2499-SDD1-01	Patch		2.3	101	2.4	See # 7	Fixed Pt - MutiPt	
09.	Dipole 25" x 7"	ML-2499-BMMA1-01	Dipole	120	3.9	148	2.9	Tested	Fixed Pt - Pt	Z
10.	Dish, 18, 10*	ML-2499-BPDA1-01	Dish	120	20.9	7426	20.6	Tested	Fixed Pt - Pt	Ø
11.	Panel 14.5, 31*	ML-2499-BPNA3-01	Panel	120	11.4	833	6.9	Tested	Fixed Pt - Pt	M
12	Yagi, 13.6, 341	ML-2499-BYGA2-01	Yagi	120	13.1	1232	8.4	Tested	Fixed Pt - Pt	2

Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi. The highest fixed point-to-point antenna gain, including coaxial feed cable, is 20.9dBi.

(20.9 dBi - 6 dBi) / 3 = 5 dB, therefore the output power limit is 30 - 5 = 25 dBm, and the EUT output power is 17.8 dBm.

Except for point-to-point operations the output power must be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. The highest such antenna gain, including coaxial feed cable, is 9.5 dBi.

(9.5 dBi - 6 dBi) = 3.5 dB, therefore the output power limit is 30 - 3.5 = 26.5 dBm, and the EUT output power is 17.8 dBm.

Page 4 of 74

TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/1992, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

3.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

Page 5 of 74

3.2. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	FC
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	VCCI R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	N _{ELA 117}
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	N _{ELA-171}
Taiwan	BSMI	CNS 13438	() () () () () () () () () () () () () (
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	Canada IC2324 A,B,C, and F

Page 6 of 74

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measurement instruments utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer's recommendations, and are traceable to national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated	Emission
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz - 2000MHz	+4.6/-2.2dB
Power Line Con	ducted Emission
150kHz – 30MHz	+/-2.9

4.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TES	T AND MEASUREME	ENT EQUIPMENT L	IST	
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
Quasi-Peak Adapter	HP	85650A	2521A01038	7/16/04
SA Display Section	HP	85662A	2314A04793	7/16/04
SA RF Section	HP	85680A	2314A02604	7/16/04
Horn Antenna (1 - 18GHz)	EMCO	3115	6739	2/4/04
Antenna, Biconical	Eaton	94455-1	1214	3/06/04
Antenna, Log Periodic 200- 1000MHz	EMCO	3146	9107-3163	3/06/04
Preamplifier	Miteq	NSP10023988	646456	4/26/04
Spectrum Analyzer	HP	8593EM	3710A00205	6/11/03
High Pass Filter (4.57GHz)	FSY Microwave	FM-4570-9SS	003	N.C.R.

Page 7 of 74

5. SUPPORT EQUIPMENT / EUT SETUP

SUPPORT EQUIPMENT

	PERIPHERA	AL SUPPORT EQUI	IPMENT LIST	
Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	PPL	NA	DoC
PCMCIA Extension Board	NA	NA	NA	NA
AC Adapter	Dell	DA-2	85391	NA

I/O CABLES

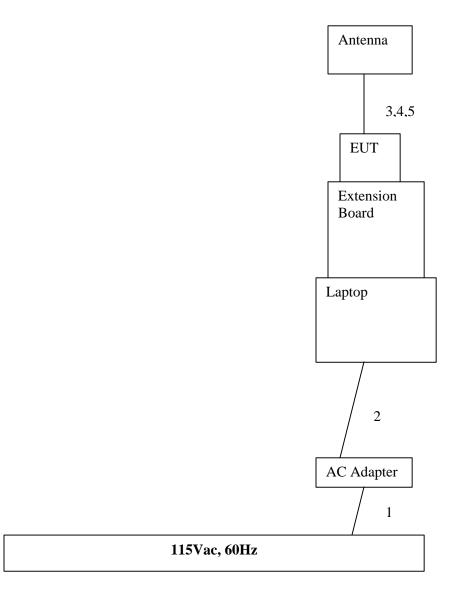
Cable No.	Port	# of Identical	Connector Type	Cable Type	Cable Length	Remarks
		Ports	•••	• •	•	
1	AC	2	US115V	Un-Shielded	2m	NA
2	DC	1	DC	Un-Shielded	2m	NA
3	RF	2	BNC M	Un-Shielded	10cm	NA
4	RF	2	Coax	Un-Shielded	100m	NA
5	RF	2	BNC M - N M	Un-Shielded	30cm	NA

TEST SETUP

The EUT was operated as a standalone device, using an Ethernet connection to make setup adjustments. Each antenna is external.

Page 8 of 74

SETUP DIAGRAM



Page 9 of 74

6. APPLICABLE RULES AND RESULT

RADIATED EMISSIONS 6.1.

LIMITS

\$15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

 1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. 2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

Page 10 of 74

\$15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. bands listed below:

6.2. DISH ANTENNA RESULTS

SETUP PHOTOS

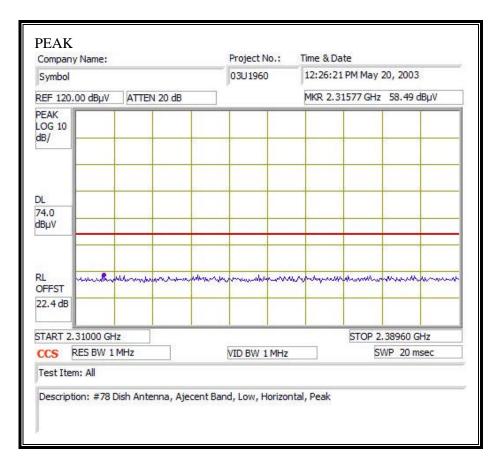


Page 12 of 74



Page 13 of 74

ADJACENT RESTRICTED BAND (LOW CHANNEL, HORIZONTAL)

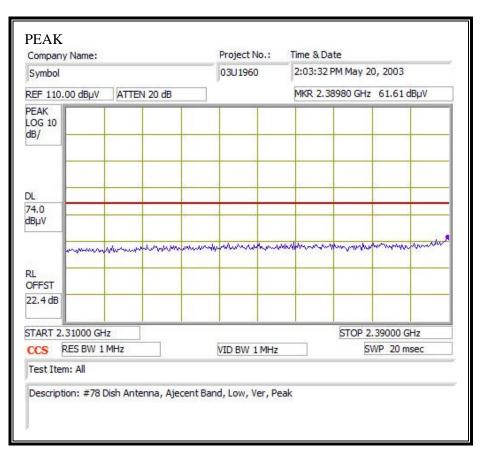


Page 14 of 74

Symbol	03U1960	12.31.21	12:31:21 PM May 20, 2003			
Symbol	0301900	12.01.211				
REF 110.00 dBµV AT		MKR 2.39	000 GHz 36.	57 dBµV		
PEAK LOG 10 dB/						
DL						
RL OFFST						
22.4 dB						
START 2.31000 GHz				STOP 2.3900	0 GHz	
CCS RES BW 1 MHz		VID BW 10 Hz		SWP 2	4.00 sec	
Test Item: All						

Page 15 of 74

ADJACENT RESTRICTED BAND (LOW CHANNEL, VERTICAL)

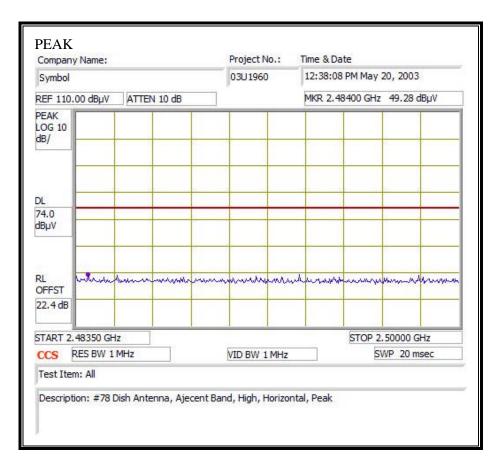


Page 16 of 74

Symbo					03U1960	12:21:4	18 PM May	20, 2003			
10		ATTEN	20 dB		,	MKD 2	20000 CH-	51.46 dBµV			
	0.00 dBµV	ATTEN	1 20 GB	_	0	MINK Z.	39000 GH2	51.40 UDUV			
PEAK .OG 10 dB/						_	-				
DL 54.0 dBµV	_					-					
RL OFFST											
22.4 dB											
START :	2.31000 GH	z	1	-			STOP 2	. 39000 GHz			
CCS	RES BW 1	MHz			VID BW 10 Hz	2	SWP 24.00 sec				
Task Th	em: All		0.0				2				

Page 17 of 74

ADJACENT RESTRICTED BAND (HIGH CHANNEL, HORIZONTAL)

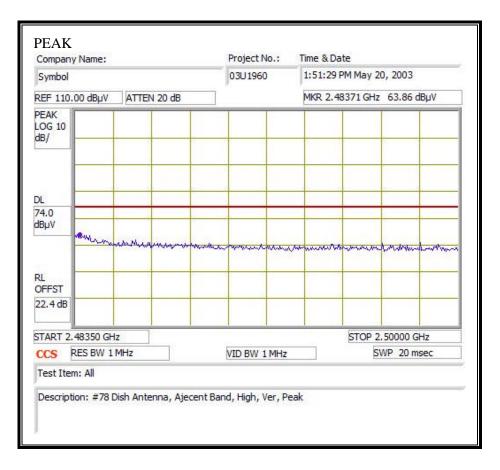


Page 18 of 74

Symbol	ny Name:		03U1960	12.40.26	PM May 20, 2	003				
Symbol			0301900	12, 10,20	111110y 20, 2	000				
REF 110	.00 dBµV ATTE	N 10 dB		MKR 2.48	MKR 2.48358 GHz 36.39 dBµV					
PEAK LOG 10 dB/										
DL 54.0 ЫВµV										
RL OFFST										
22.4 dB						-				
START 2	. 48358 GHz				STOP 2.5000	0 GHz				
CCS	RES BW 1 MHz		VID BW 10 Hz		SWP 5	.00 sec				
Test Ite	em: All	551 								

Page 19 of 74

ADJACENT RESTRICTED BAND (HIGH CHANNEL, VERTICAL)



Page 20 of 74

Symbol		03U 1960	1.57.40	M May 2	0 2003
	1002-02 000	0301900	1.07.101	initiay 2	0, 2005
REF 110.00 dBµV ATTEN	20 dB		MKR 2.48	3350 GHz	51.37 dBµV
PEAK LOG 10 dB/					
				,	
DL54.0 dBµV					
RL DFFST					
22.4 dB					
START 2.48350 GHz				STOP 2	. 50000 GHz
CCS RES BW 1 MHz		VID BW 10 Hz		SI	WP 5.00 sec
Test Item: All					

Page 21 of 74

HARMONICS AND SPURIOUS EMISSIONS

			Measureme												
Complia	nce Ce	rtification \$	Services, Mo	organ H	ill Op	en Field	Site								
Project # Company EUT Des EUT M/I Test Tar; Mode Op	:03U19 crip.:2.4 N:LA41 get:FCC per:Tx (ol Technolog 4 GHz PCM 31 with Anto 2 Part 15.24 Dn	gies Emea CIA Card 11 2nna # 78, Dis 7 Class II Per	sh ML-2	499-BI										
fest Equ	ipment:	<u>.</u>													
EMCO	Horn 1-	18GHz	Pre-amplife	er 1-26GF	Iz	5	Spectrum A	nalyzer			Horn >18	GHz			
T73; S/	N: 6717	@1m 🗕	T87 Miteq 9	024342	•	HP 8	566B Analy	zer	-				•		
Hi Freq			✓ (4 ~ 6 ft)	🗹 (12 ft)				1 MHz	Measureme Resolution E Video Bandw	andwidth			vidth		
f	Dist feet	Read Pk		AF	CL	Amp	D Corr dB	HPF	Peak dBuV/m	Avg	Pk Lim dBuV/m	.0	Pk Mar dB	Avg Mar dB	Notes
CH ₂			dBuV							dBuV/m					
GHz		dBuV 47.4	dBuV	dB/m	dB	dB		1.0							Low V Noise
.824	9.9 9.9	dBuV 47.4 48.1	dBuV 36.2 36.1	dB/m 33.9 33.9	5.0 5.0	dB -44.7 -44.7	0.1 0.1	1.0 1.0	42.7 43.4	dBuV/m 31.5 31.4	74.0 74.0	54.0 54.0	-31.3 -30.6	-22.5 -22.6	Low,V Noise Low,H Noise
.824 .824	9.9	47.4	36.2	33.9	5.0	-44.7	0.1		42.7	31.5	74.0	54.0	-31.3	-22.5	
.824 .824 .874 .874	9.9 9.9 9.9 9.9 9.9	47.4 48.1 49.1 50.2	36.2 36.1 36.8 38.2	33.9 33.9 33.9 33.9 33.9	5.0 5.0 5.0 5.0	-44.7 -44.7 -44.7 -44.7	0.1 0.1 0.1 0.1	1.0 1.0 1.0	42.7 43.4 44.4 45.5	31.5 31.4 32.1 33.5	74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0	-31.3 -30.6 -29.6 -28.5	-22.5 -22.6 -21.9 -20.5	Low,H Noise Mid,H Mid,V
1.824 1.824 1.874 1.874 1.874 1.924	9.9 9.9 9.9 9.9 9.9 9.9	47.4 48.1 49.1 50.2 46.6	36.2 36.1 36.8 38.2 35.5	33.9 33.9 33.9 33.9 33.9 34.0	5.0 5.0 5.0 5.0 5.1	-44.7 -44.7 -44.7 -44.7 -44.8	0.1 0.1 0.1 0.1 0.1	1.0 1.0 1.0 1.0	42.7 43.4 44.4 45.5 41.9	31.5 31.4 32.1 33.5 30.8	74.0 74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0 54.0	-31.3 -30.6 -29.6 -28.5 -32.1	-22.5 -22.6 -21.9 -20.5 -23.2	Low,H Noise Mid,H Mid,V High,V Noise
GHz 4.824 4.824 4.874 4.874 4.924 4.924	9.9 9.9 9.9 9.9 9.9	47.4 48.1 49.1 50.2	36.2 36.1 36.8 38.2	33.9 33.9 33.9 33.9 33.9	5.0 5.0 5.0 5.0	-44.7 -44.7 -44.7 -44.7	0.1 0.1 0.1 0.1	1.0 1.0 1.0	42.7 43.4 44.4 45.5	31.5 31.4 32.1 33.5	74.0 74.0 74.0 74.0	54.0 54.0 54.0 54.0	-31.3 -30.6 -29.6 -28.5	-22.5 -22.6 -21.9 -20.5	Low,H Noise Mid,H Mid,V

Note: no other harmonics or spurious detected above 1 GHz.

Page 22 of 74

6.3. YAGI ANTENNA RESULTS

SETUP PHOTOS

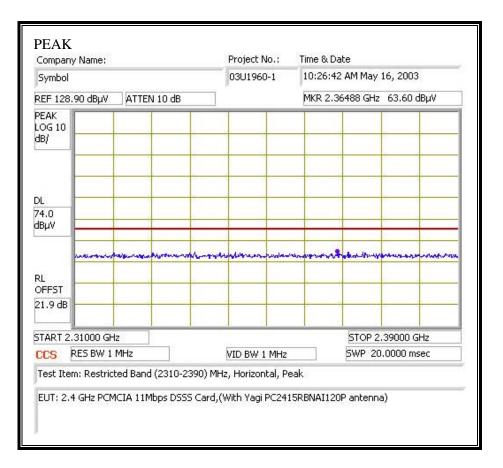


Page 23 of 74



Page 24 of 74

ADJACENT RESTRICTED BAND (LOW CHANNEL, HORIZONTAL)

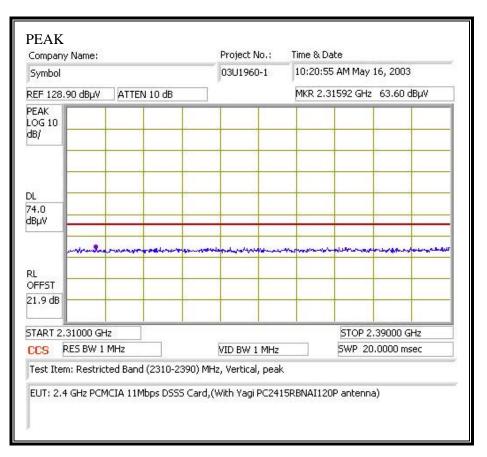


Page 25 of 74

REF 128.90 dBµV ATTEN 10 dB MKR 2.36488 GHz 63.60 dBµV PEAK LOG 10 dB/ Image: Constraint of the second secon	Company	Humor		Project No.: 03U1960-1	10:26:41	AM May	14 2003			
PEAK LOG 10 dB/ DL DL 74.0 dBµV RL OFFST 21.9 dB START 2.31000 GHz CCS RES BW 1 MHz VID BW 1 MHz SWP 20.0000 msec	Symbol			0301900-1	10:20:42	. Am may	16, 2003			
dBμV Image: CCS RES BW 1 MHz Image: CCS STOP 2.39000 GHz	REF 128.9	90 dBµV ATTEN	4 10 dB		MKR 2.36	6488 GHz	63.60 dBµ'	٧		
74.0 dBμV dBμV dBμV <td>LOG 10</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	LOG 10									
74.0 dBμV										
RL OFFST Image: Constraint of the second secon	74.0 dBμV									
START 2.31000 GHz STOP 2.39000 GHz CCS RES BW 1 MHz VID BW 1 MHz SWP 20.0000 msec	RL OFFST	unterson of the purchase	en ser	Angliteran	fromount	alen to we	nan en	what have		
CCS RES BW 1 MHz VID BW 1 MHz SWP 20.0000 msec	21.7 00									
	START 2.3	31000 GHz				STOP 2.39000 GHz				
Test Item: Restricted Band (2310-2390) MHz, Horizontal, Peak	CCS P	ES BW 1 MHz		VID BW 1 MHz		SWP 20	.0000 msec			
	Test Item	n: Restricted Band	(2310-2390) M	Hz, Horizontal, Pe	eak					

Page 26 of 74

ADJACENT RESTRICTED BAND (LOW CHANNEL, VERTICAL)

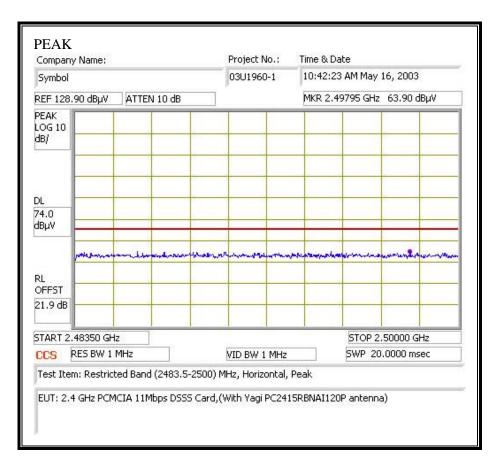


Page 27 of 74

Company Name:		Project No.:	Time & Date
Symbol		03U1960-1	10:19:14 AM May 16, 2003
REF 128.90 dBµV	ATTEN 10 dB		MKR 2.38936 GHz 52.50 dBµV
PEAK LOG 10 dB/			
DL			
RL DFFST 21.9 dB			
5TART 2.31000 GHz			STOP 2.39000 GHz
CCS RES BW 1 N	٩Hz	VID BW 10 Hz	SWP 24.00 sec
	ed Band (2310-2	390) MHz, Vertical, Aver	erage

Page 28 of 74

ADJACENT RESTRICTED BAND (HIGH CHANNEL, HORIZONTAL)

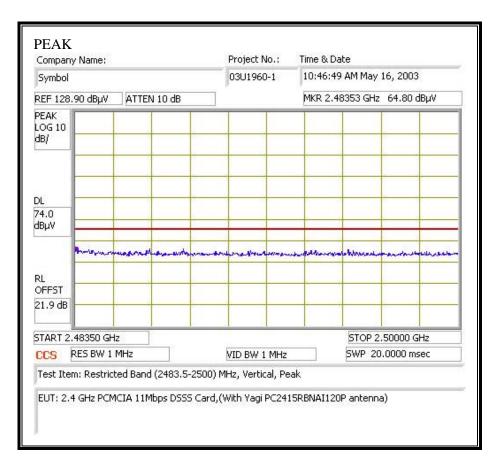


Page 29 of 74

Company	Name,			Project	00000	Time & D.	Second second second	14, 2002
Symbol				03U19	60-1	10:30:4	2 AM May	16, 2003
REF 128.	90 dBµV 🛛 🛛	ATTEN 10	0 dB			MKR 2.4	18395 GHz	2 51.70 dBµV
PEAK LOG 10 dB/								
DL 54.0 ქΒμV								
RL								
OFFST 21.9 dB								
START 2.	48350 GHz						STOP 2	.50000 GHz
CCS F	RES BW 1 MH	z		VID BW	V 10 Hz		SWP 5.	00 sec
Test Iten	n: Restricted	Band (2	483.5-250	0) MHz, Hor	rizontal,	Average		
	GHz PCMCIA	all		Louit us	100040			

Page 30 of 74

ADJACENT RESTRICTED BAND (HIGH CHANNEL, VERTICAL)



Page 31 of 74

Company N	ame,		Project No.:	Time &	Shield in the second	. 1/2 . 00000
Symbol			03U1960-1	10:45:	:53 AM May	16, 2003
REF 128.90	dBµV ATTE/	N 10 dB		MKR 2	2.48350 GH;	z 53.10 dBµV
PEAK LOG 10 dB/						
DL 54.0 ქВµV						
RL OFFST 21.9 dB						
START 2.48	350 GHz			<u>.</u>	STOP :	2.50000 GHz
CCS RES	5 BW 1 MHz		VID BW 10 Hz	5	SWP 5	.00 sec
Test Item:	Restricted Banr	d (2483.5-250	00) MHz, Vertical, A	werage		
					120P antenn	

Page 32 of 74

HARMONICS AND SPURIOUS EMISSIONS

06/04/03 Complia			Measureme Services, Mo		ill Op	en Field	Site								
Test Engr Project # Company EUT Dese EUT M/N Test Targ Mode Op	: y: crip.: N: get:		Frank Ibrahim 03U1960-1 Symbol Techno 2.4 GHz PCMO LA4131 FCC 15.247 TX ON at Low	CIA 11M	ops DSS		With Yagi P	C2415R	BNAI120P a	antenna)					
	Horn 1- N: 6717 (uency Cab	18GHz @3m	Pre-amplife T87 Miteq 9 □ (4 ~ 6 ft)	24342	iz •		Spectrum A 566B Analy	7zer <u>Peak M</u> 1 MHz	• Measureme Resolution B Video Bandw	<u>nts:</u> landwidth		N:1049 [easuremen lution Bandw			
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m		Pk Mar dB	Avg Mar dB	Notes
2.412	9.8	86.6	79.7	29.2	1.6	0.0	0.0	0.0	117.4	110.5					V
	f Dist Read AF CL	68.3 Measureme Distance to Analyzer R Antenna Fa Cable Loss	Reading actor	29.2	1.6	0.0 Amp D Corr Avg Peak HPF	Average	Correc Field S d Peak	99.1 et to 3 mete strength @ t Field Stre	3 m	1	Pk Lim	Peak Field Margin vs	Field Strengtl 1 Strength Li 2. Average Li 3. Peak Limit	mit imit

Note: no harmonics or spurious detected in the freq range of 1-25 GHz.

Page 33 of 74

HARMONICS AND SPURIOUS EMISSIONS

Test En	gr:		Frank Ibrahim													
Project			03U1960-1													
Compar	ny:		Symbol Techn	ologies, Ir	ıc.											
EUT De	scrip.:		2.4 GHz PCM	CIA 11M	bps DSS	SS Card, (V	With Yagi P	C2415R	BNAI120P a	intenna)						
EUT M/	'N:		LA4131													
Test Tai	0		FCC 15.247													
Mode O	per:		TX ON at Mid	dle Chanr	nel (243	7MHz)										
fest Ea	uipment															
									_							
EMCO	Horn 1-	18GHz	Pre-amplife	er 1-26GH	Iz	s	Spectrum A	nalyzer			Horn >18	GHz				
T72. 6			-		_	III										
							HP 8566B Analyzer 🗸 T87; ARA 18-26GHz; S/N:1049 🗸									
175,5	/N: 6/17	@3m 🚽	T87 Miteq9	24342	-	HP8	566B Analy	zer	-	T87; ARA 1	18-26GHz; S/	N:1049	-			
			T87 Miteq9	24342	•	HP8										
Г ^{Hi Fre}	equency Cat	les			•	НР8		Peak M	Aeasureme	nts:	Average M	leasuremen	<u>ts:</u>			
	equency Cat	les	T87 Miteq 9		-	HP8		Peak M 1 MHz	Measureme Resolution B	<u>nts:</u> andwidth	Average M 1 MHz Reso	leasuremen	<u>ts:</u>			
	equency Cat	les			•	HP 8		Peak M 1 MHz	Aeasureme	<u>nts:</u> andwidth	Average M	leasuremen	<u>ts:</u>			
Hi Fre	equency Cab 2 ft)	(2 ~ 3 ft)	(4 ~ 6 ft)	✔ (12 ft)				<u>Peak M</u> 1 MHz 1 MHz V	Aeasureme Resolution B Video Bandw	nts: andwidth ridth	Average M 1 MHz Reso 10Hz Video	leasuremen lution Bandw Bandwidth	<u>ts:</u> ⁄idth			
Hi Fre	equency Cab 2 ft) Dist	les (2 ~ 3 ft) Read Pk	(4~6 ft) Read Avg.	 ✓ (12 ft) AF 	CL	Amp	D Corr	<u>Peak M</u> 1 MHz 1 MHz V	Acasureme Resolution B Video Bandw Peak	nts: andwidth ridth Avg	Average M 1 MHz Reso 10Hz Video Pk Lim	leasuremen lution Bandw Bandwidth Avg Lim	ts: ridth Pk Mar	Avg Mar	Notes	
f GHz	equency Cab 2 ft) Dist feet	(2 ~ 3 ft) Read Pk dBuV	(4~6 ft) Read Avg. dBuV	✓ (12 ft) AF dB/m	dB	Amp dB	D Corr dB	Peak M 1 MHz 1MHz V HPF	Aeasureme Resolution B Video Bandw Peak dBuV/m	nts: andwidth idth Avg dBuV/m	Average M 1 MHz Reso 10Hz Video	leasuremen lution Bandw Bandwidth Avg Lim	<u>ts:</u> ⁄idth	Avg Mar dB		
f GHz 2.437	equency Cat (2 ft) Dist feet 9.8	les	(4~6 ft) Read Avg. dBuV 80.1	✓ (12 ft) AF dB/m 29.3	dB 1.6	Amp dB 0.0	D Corr dB 0.0	Peak M 1 MHz 1MHz HPF 0.0	Measureme Resolution B Video Bandw Peak dBuV/m 118.2	nts: andwidth idth Avg dBuV/m 111.0	Average M 1 MHz Reso 10Hz Video Pk Lim	leasuremen lution Bandw Bandwidth Avg Lim	ts: ridth Pk Mar	0	v	
f GHz 2.437	equency Cab 2 ft) Dist feet	(2 ~ 3 ft) Read Pk dBuV	(4~6 ft) Read Avg. dBuV	✓ (12 ft) AF dB/m	dB	Amp dB	D Corr dB	Peak M 1 MHz 1MHz V HPF	Aeasureme Resolution B Video Bandw Peak dBuV/m	nts: andwidth idth Avg dBuV/m	Average M 1 MHz Reso 10Hz Video Pk Lim	leasuremen lution Bandw Bandwidth Avg Lim	ts: ridth Pk Mar	0		
f GHz 2.437	equency Cat (2 ft) Dist feet 9.8	Read Pk dBuV 87.3 68.9	(4~6 ft) Read Avg. dBuV 80.1	 ✓ (12 ft) ▲F dB/m 29.3 29.3 	dB 1.6 1.6	Amp dB 0.0 0.0	D Corr dB 0.0	Peak M 1 MHz 1MHz HPF 0.0 0.0	Measureme Resolution B Video Bandw Peak dBuV/m 118.2	nts: andwidth idth Avg dBuV/m 111.0	Average M 1 MHz Reso 10Hz Video Pk Lim	leasuremen lution Bandw Bandwidth Avg Lim dBuV/m	ts: ridth Pk Mar dB	0	V H	
f GHz 2.437	2 ft) Dist feet 9.8 9.8	Read Pk dBuV 87.3 68.9	(4~6 ft) Read Avg. dBuV 80.1 62.3 ent Frequency	 ✓ (12 ft) ▲F dB/m 29.3 29.3 	dB 1.6 1.6	Amp dB 0.0 0.0 Amp	D Corr dB 0.0 0.0 Preamp C	Peak M 1 MHz 1MHz V HPF 0.0 0.0 Gain	Measureme Resolution B Video Bandw Peak dBuV/m 118.2	nts: andwidth tidth Avg dBuV/m 111.0 93.2	Average M 1 MHz Reso 10Hz Video Pk Lim	leasuremen lution Bandw Bandwidth Avg Lim Avg Lim	ts: ridth Pk Mar dB Average F	dB	V H	
f GHz 2.437	tripped and the second	Read Pk dBuV 87.3 68.9 Measureme	(4~6 ft) Read Avg. dBuV 80.1 62.3 ent Frequency Antenna	 ✓ (12 ft) ▲F dB/m 29.3 29.3 	dB 1.6 1.6	Amp dB 0.0 0.0 Amp D Corr	D Corr dB 0.0 0.0 Preamp C Distance	Peak M 1 MHz 1MHz HPF 0.0 0.0 Gain Correct	Acasureme Resolution B Video Bandw Peak dBuV/m 118.2 99.8	nts: aandwidth idth Avg dBuV/m 111.0 93.2	Average M 1 MHz Reso 10Hz Video Pk Lim dBuV/m	Ieasuremen Jution Bandw Bandwidth Avg Lim dBuV/m Avg Lim Pk Lim	ts: ridth Pk Mar dB Average F Peak Field	dB Field Streng	V H th Limit .imit	
Hi Fre C (2 f	Dist feet 9.8 9.8 f Dist	Read Pk dBuV 87.3 68.9 Measureme Distance to	Read Avg. dBuV 80.1 62.3 ent Frequency Antenna teading	 ✓ (12 ft) ▲F dB/m 29.3 29.3 	dB 1.6 1.6	Amp dB 0.0 0.0 Amp D Corr Avg	D Corr dB 0.0 0.0 Preamp C Distance Average	Peak M 1 MHz 1MHz V HPF 0.0 0.0 Gain Correct Field S	Measuremee Resolution B Video Bandw Peak dBuV/m 118.2 99.8 et to 3 mete	nts: andwidth idth Avg dBuV/m 111.0 93.2 rs 3 m	Average M 1 MHz Reso 10Hz Video Pk Lim dBuV/m	Icasuremen Jution Bandw Bandwidth Avg Lim dBuV/m Avg Lim Avg Lim Avg Mar	ts: iidth Pk Mar dB Average F Peak Field Margin vs	dB Field Streng	V H th Limit .imit .imit	

Note: no harmonics or spurious detected in the freq range of 1-25 GHz.

Page 34 of 74

HARMONIC AND SPURIOUS EMISSIONS

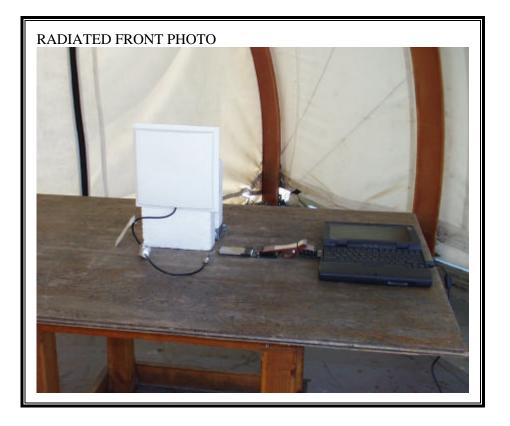
06/04/03 Compli a			Measureme Services, Mo		ill Op	en Field	Site								
Test Eng Project # Compan EUT Des EUT M/I Test Tar Mode Op <u>Test Equ</u>	r: 4: scrip.: N: get: per:		Frank Ibrahim 03U1960-1 Symbol Techn 2.4 GHz PCM LA4131 FCC 15.247 TX ON at Higi	ologies, Ir CIA 11Mł	nc. ops DS	SS Card, (C2415F	BNAI120P a	untennâ)					
T73; S/	Horn 1- N: 6717 quency Cab	@3m -	Pre-amplife T87 Miteq 9 (4 ~ 6 ft)	924342	iz T			7zer <u>Peak M</u> 1 MHz	• Measureme Resolution B Video Bandw	<u>nts:</u> andwidth	Horn > 18 18-26GHz; S/ Average M 1 MHz Reso 10Hz Video	N:1049 Ieasuremen			
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m		Pk Mar dB	Avg Mar dB	Notes
2.462	9.8	85.7	80.0	29.3	1.6	0.0	0.0	0.0	116.6	110.9					V
2.462	9.8	67.9	62.0	29.3	1.6	0.0	0.0	0.0	98.8	92.9					Н
	f Dist Read AF CL	Measureme Distance to Analyzer R Antenna Fa Cable Loss	Reading actor	у		Amp D Corr Avg Peak HPF	Average	Correc Field S d Peak	t to 3 mete strength @ Field Stre	3 m		Pk Lim Avg Mar	Peak Field Margin vs	ield Streng l Strength L . Average I . Peak Limi	Limit Limit

Note: no harmonics or spurious detected in the freq range of 1-25 GHz.

Page 35 of 74

6.4. PANEL ANTENNA RESULTS

SETUP PHOTOS



Page 36 of 74