

Nemko Test Report: 3L0515RUS1

Applicant: Innerwireless
1155 Kas Drive #200
Richardson, TX 75081

**Equipment Under Test:
(E.U.T.)** Access Point Interface Model Number: 11001Q002
with Innerwireless Discone, PCB LPA, and LPA
antennas

FCC ID: RO5IWAPINTERFACE

In Accordance With: **FCC Part 15, Subpart C, 15.247**
Direct Sequence Spread Spectrum Transmitters

Tested By: Nemko Dallas Inc.
802 N. Kealy
Lewisville, Texas 75057-3136



Authorized By:

Tom Tidwell, Frontline Manager

Date: 12/17/03

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EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

Section 1. Summary of Test Results

Manufacturer: Innerwireless

Model No.: Discone: P/N. 00702A001 Rev. C, S/N. AWO 2003-0486
PCB LPA: P/N. 00701L001, S/N. 0101
LPA: 00701C001, S/N. 0216

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 for Direct Sequence Spread Spectrum devices. Radiated tests were conducted in accordance with ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE
TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



NVLAP LAB CODE: 100426-0

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Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	RESULT
Powerline Conducted Emissions	15.207(a)	48 dB μ V	NA*
Minimum 6 dB Bandwidth	15.247(a)(2)	>500 kHz	NA*
Maximum Peak Power Output	15.247(b)(1)	<1 Watt	NA*
Spurious Emissions (Antenna Conducted)	15.247(c)	-20 dBc/100kHz	NA*
Spurious Emissions (Restricted Bands)	15.247(c)	< 74 dBuV/m Peak < 54 dBuV/m Avg	Complies
Peak Power Spectral Density	15.247(d)	+8 dBm/3kHz	NA*

Footnotes:

*These tests were not performed. The Cisco Access Point is already approved under FCC ID: LDK102042

When the Access Point was previously tested it was determined that worst-case emission levels are found with the access point operating at a data rate of 11 Mbps. Therefore spurious emissions were tested in this configuration only. All emissions were measured including emission levels on the upper band edge.

Please refer to supporting documentation.

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Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Frequency Band:

☐ 902 – 928 MHz

☒ 2400 – 2483.5 MHz

☐ 5725 – 5850 MHz

Operating Range:

2412 – 2462 MHz (channels 1 – 11)

User Frequency Adjustment:

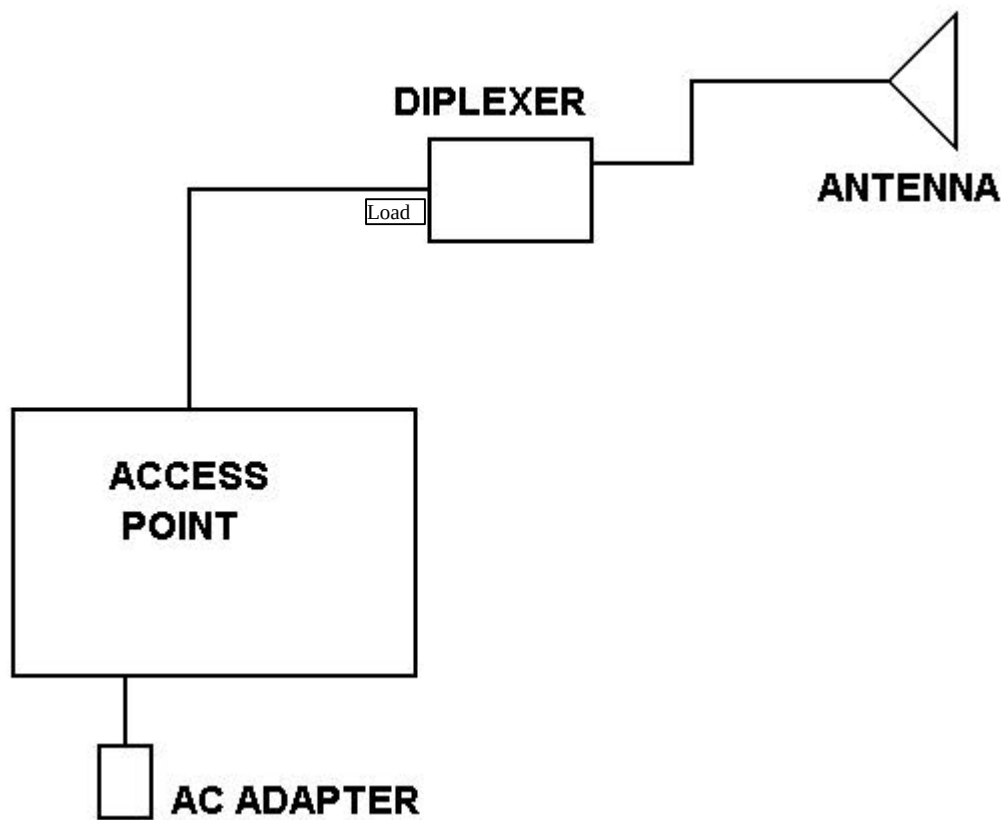
Software controlled

EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

Theory of Operation

This is an access point system that provides WLAN access for an area

System Diagram



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Section 3. Spurious Emissions (radiated)

NAME OF TEST: Spurious Emissions	PARA. NO.: 15.247 (c)
TESTED BY: David Light	DATE: 12/13/03

Test Results: Complies.

Measurement Data: See attached table.

Measurement Uncertainty: +/- 3.6dB

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Test Data – Radiated Emissions (Restricted Bands)

Restricted Band Emissions								
Page 1 of 1								
Job No.: 3L0515R		Date: 12/13/2003						
Specification: 15.247/15.205		Temperature(°C): 22						
Tested By: David Light		Relative Humidity(%) 30						
E.U.T.: Cisco AP with Discone antenna								
Configuration:								
Sample Number: 1								
Location: AC 3		RBW: 1 MHz						
Detector Type: Peak		VBW: 1 MHz						
Test Equipment Used								
Antenna: 1304		Directional Coupler:						
Pre-Amp: 1016		Cable #1: 1484						
Filter: 1482		Cable #2: 1485						
Receiver: 1036		Cable #3:						
Attenuator #1:		Cable #4:						
Attenuator #2:		Mixer:						
Measurement Uncertainty: +/-3.6 dB								
Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
								Channel 11 Horizontal
2483.5	30.8	28.2	3.1	0.0	62.1	74	-11.9	Peak
2483.5	19	28.2	3.1	0.0	50.3	54	-3.7	Average
4924.0	37.5	33.9	4.6	32.7	43.3	54	-10.7	Peak - NF
7386.0	37.7	36.5	6.3	32.9	47.6	54	-6.4	Peak - NF
								Channel 11 Vertical
2483.5	36.8	28.2	3.1	0.0	68.1	74	-5.9	Peak
2483.5	19	28.2	3.1	0.0	50.3	54	-3.7	Average
4924.0	37.5	33.9	4.6	32.7	43.3	54	-10.7	Peak - NF
7386.0	37.7	36.5	6.3	32.9	47.6	54	-6.4	Peak - NF
								Channel 6 Vertical
4874.0	37	33.9	4.6	32.7	42.8	54	-11.2	Peak - NF
7311.0	37	36.3	6.3	32.8	46.8	54	-7.2	Peak - NF
								Channel 6 Horizontal
4874.0	37	33.9	4.6	32.7	42.8	54	-11.2	Peak - NF
7311.0	37	36.3	6.3	32.8	46.8	54	-7.2	Peak - NF
								Channel 1 - Horizontal
4824	38	33.9	4.6	32.7	43.8	54	-10.2	Peak - NF
7236	36.8	36.3	6.3	32.5	46.9	54	-7.1	Peak - NF
								Channel 1 - vertical
4824	38	33.9	4.6	32.7	43.8	54	-10.2	Peak - NF
7236	36.8	36.3	6.3	32.5	46.9	54	-7.1	Peak - NF
Notes: Scanned spectrum to 25 Ghz - If PEAK readings met AVG limit, then an AVG reading was not taken.								
AVG readings using 1MHz RBW/10 MHz VBW utilizing AVERAGE detector								
No emissions were detected except those indicated in RED								

EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: 3L0515RUS1

Test Data – Radiated Emissions (Restricted Bands)

Restricted Band Emissions								
Page 1 of 1								
Job No.: 3L0515R		Date: 12/13/2003						
Specification: 15.247/15.205		Temperature(°C): 22						
Tested By: David Light		Relative Humidity(%) 30						
E.U.T.: Cisco AP with LPA Antenna								
Configuration: Tx 11 MB/s								
Sample Number: 1								
Location: AC 3		RBW: 1 MHz						
Detector Type: Peak		VBW: 1 MHz						
Test Equipment Used								
Antenna: 1304		Directional Coupler:						
Pre-Amp: 1016		Cable #1: 1484						
Filter: 1482		Cable #2: 1485						
Receiver: 1036		Cable #3:						
Attenuator #1:		Cable #4:						
Attenuator #2:		Mixer:						
Measurement Uncertainty: +/-3.6 dB								
Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
								Channel 11 Horizontal
2483.5	26.5	28.2	3.1	0.0	57.8	74	-16.2	Peak - NF
2483.5	17	28.2	3.1	0.0	48.3	54	-5.7	Average - NF
4924.0	37.5	33.9	4.6	32.7	43.3	54	-10.7	Peak - NF
7386.0	37.7	36.5	6.3	32.9	47.6	54	-6.4	Peak - NF
								Channel 11 Vertical
2483.5	26.5	28.2	3.1	0.0	57.8	74	-16.2	Peak - NF
2483.5	17	28.2	3.1	0.0	48.3	54	-5.7	Average - NF
4924.0	37.5	33.9	4.6	32.7	43.3	54	-10.7	Peak - NF
7386.0	37.7	36.5	6.3	32.9	47.6	54	-6.4	Peak - NF
								Channel 6 Vertical
4874.0	37	33.9	4.6	32.7	42.8	54	-11.2	Peak - NF
7311.0	37	36.3	6.3	32.8	46.8	54	-7.2	Peak - NF
								Channel 6 Horizontal
4874.0	37	33.9	4.6	32.7	42.8	54	-11.2	Peak - NF
7311.0	37	36.3	6.3	32.8	46.8	54	-7.2	Peak - NF
								Channel 1 - Horizontal
4824	38	33.9	4.6	32.7	43.8	54	-10.2	Peak - NF
7236	36.8	36.3	6.3	32.5	46.9	54	-7.1	Peak - NF
								Channel 1 - vertical
4824	38	33.9	4.6	32.7	43.8	54	-10.2	Peak - NF
7236	36.8	36.3	6.3	32.5	46.9	54	-7.1	Peak - NF
Notes: Scanned spectrum to 25 Ghz - If PEAK readings met AVG limit, then an AVG reading was not taken.								
AVG readings using 1MHz RBW/10 MHz VBW utilizing AVERAGE detector								
No emissions were detected								

EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: 3L0515RUS1

Test Data – Radiated Emissions (Restricted Bands)

Restricted Band Emissions								
Page 1 of 1								
Job No.: 3L0515R		Date: 12/13/2003						
Specification: 15.247/15.205		Temperature(°C): 22						
Tested By: David Light		Relative Humidity(%) 30						
E.U.T.: Cisco AP with PCB LNA Antenna								
Configuration: Tx 11 MB/s								
Sample Number: 1								
Location: AC 3		RBW: 1 MHz						
Detector Type: Peak		VBW: 1 MHz						
Test Equipment Used								
Antenna: 1304		Directional Coupler:						
Pre-Amp: 1016		Cable #1: 1484						
Filter: 1482		Cable #2: 1485						
Receiver: 1036		Cable #3:						
Attenuator #1:		Cable #4:						
Attenuator #2:		Mixer:						
Measurement Uncertainty:								
Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
								Channel 11 Horizontal
2483.5	26.5	28.2	3.1	0.0	57.8	74	-16.2	Peak - NF
2483.5	17	28.2	3.1	0.0	48.3	54	-5.7	Average - NF
4924.0	37.5	33.9	4.6	32.7	43.3	54	-10.7	Peak - NF
7386.0	37.7	36.5	6.3	32.9	47.6	54	-6.4	Peak - NF
								Channel 11 Vertical
2483.5	26.5	28.2	3.1	0.0	57.8	74	-16.2	Peak - NF
2483.5	17	28.2	3.1	0.0	48.3	54	-5.7	Average - NF
4924.0	37.5	33.9	4.6	32.7	43.3	54	-10.7	Peak - NF
7386.0	47.1	36.5	6.3	32.9	57.0	74	-17.0	Peak
7386.0	41.7	37.8	6.9	35.1	51.3	54	-2.7	Average
								Channel 6 Vertical
4874.0	37	33.9	4.6	32.7	42.8	54	-11.2	Peak - NF
7311.0	37	36.3	6.3	32.8	46.8	54	-7.2	Peak - NF
								Channel 6 Horizontal
4874.0	37	33.9	4.6	32.7	42.8	54	-11.2	Peak - NF
7311.0	37	36.3	6.3	32.8	46.8	54	-7.2	Peak - NF
								Channel 1 - Horizontal
4824	38	33.9	4.6	32.7	43.8	54	-10.2	Peak - NF
7236	36.8	36.3	6.3	32.5	46.9	54	-7.1	Peak - NF
								Channel 1 - vertical
4824	38	33.9	4.6	32.7	43.8	54	-10.2	Peak - NF
7236	36.8	36.3	6.3	32.5	46.9	54	-7.1	Peak - NF
Notes: Scanned spectrum to 25 Ghz - If PEAK readings met AVG limit, then an AVG reading was not taken.								
AVG readings using 1MHz RBW/10 MHz VBW utilizing AVERAGE detector								
No emissions were detected except those indicated in RED								

EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

Test Setup Photos (Discone Antenna)



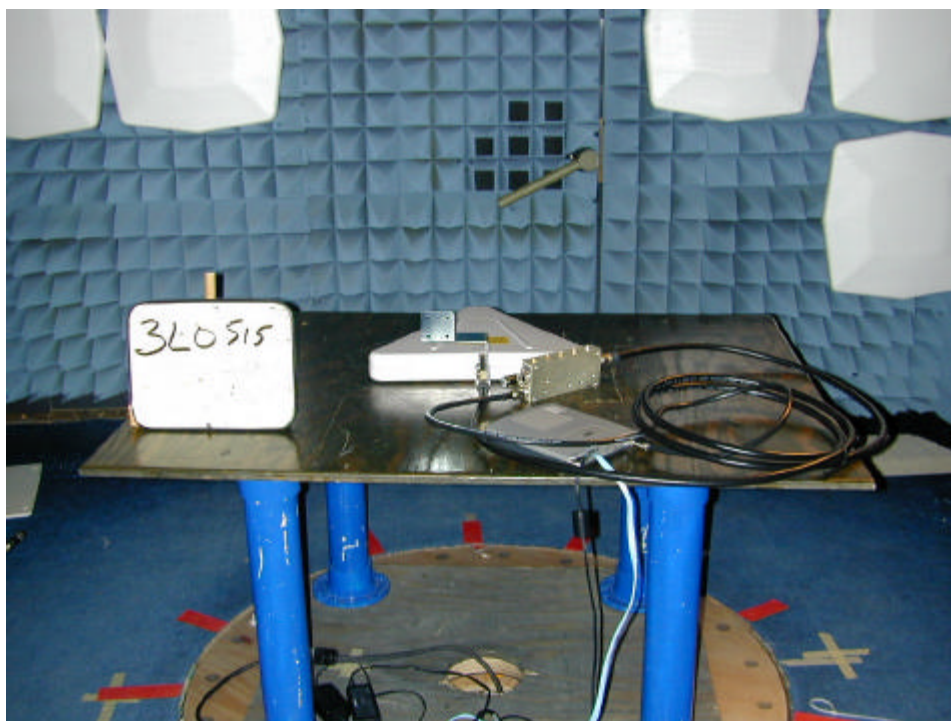
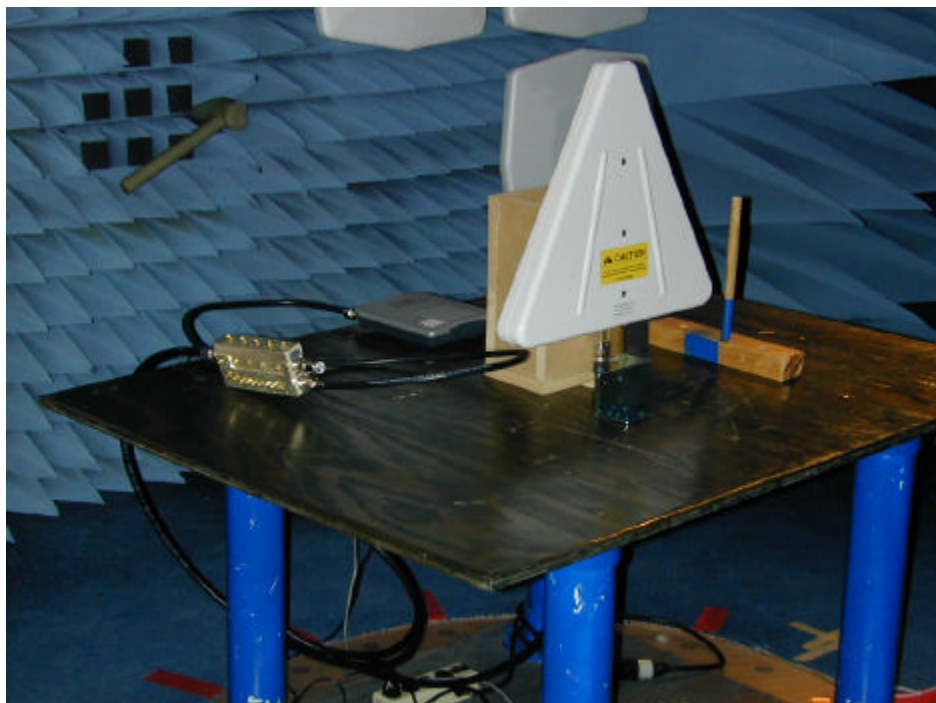
EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

Test Setup Photos (PCB LPA Antenna)



EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

Test Setup Photos (LPA Antenna)



EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

Section 4. Test Equipment List

Nemko ID	Description	Manufacturer Model Number	Serial Number	Calibration Date	Calibration Due
1036	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	12/18/01	12/19/03
1482	Band Pass Filter	K & L 11SH10-4000/T12000-0/0	2	Cal B4 Use	N/A
1484	Cable 2.0-18.0 Ghz	Storm PR90-010-072	N/A	07/24/03	07/23/04
1485	Cable 2.0-18.0 Ghz	Storm PR90-010-216	N/A	07/24/03	07/23/04
1016	Pre-Amp	HEWLETT PACKARD 8449A	2749A00159	07/15/02	07/15/03
1304	HORN ANTENNA	ELECTRO METRICS RGA-60	6151	09/22/03	09/22/05

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ANNEX A - TEST DETAILS

EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

NAME OF TEST: Radiated Spurious Emissions PARA. NO.: 15.247(c)

Minimum Standard: In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits:

Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency (MHz)	Field Strength (mV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC

15.205 Restricted Bands

MHz	MHz	MHz	GHz
0.09-0.11	16.42-16.423	399.9-410	4.5-5.25
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
6.125-6.218	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	Above 38.6
13.36-13.41	1718		

Number of channels tested:

Tuning range	Number of channels tested	Channel location in band
1 MHz or less	1	middle
1 to 10 MHz	2	top and bottom
more than 10 MHz	3	top, middle, bottom

EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

ANNEX B - TEST DIAGRAMS

EQUIPMENT: Model Number: 11001Q002 TEST REPORT NO.: [3L0515RUS1](#)

Test Site For Radiated Emissions

