

**Thomas N. Cokenias** *EMC & Radio Type Approvals*  
*Test & Consulting Services for Commercial, Military, International Compliance*  
P.O. Box 1086  
El Granada, CA 94018

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FCC Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046

20 December 1998

Attention: Applications Examiner  
Reviewing Engineer

Re: Class 2 Permissive Change Request for U-NII Transceiver

Applicant: RadioLAN Inc.  
FCC ID: MCIPUNIIT  
Original Grant Date: March 18, 1998

Hello,

A directional antenna manufactured by European Antennas, Ltd. has been developed for use with the referenced product in the 5.725 GHz band. The antenna exhibits gain of approximately 18 dBi. The product will consist of the radio module, the 18 dBi antenna, and a fixed length of Andrew Corp. model FSJ4RN-50B coaxial cable. Cable length will be 15 ft or 45 ft length.

A similar permissive change application for a 15 dBi antenna was submitted in March of 1998 and was granted in May of 1998.

No other changes have been made to the previously granted device, other than those required to accommodate the antenna cable to be connected with the radio ("N" connector).

Peak power from the EUT is 50 mW, or 17 dBm. Peak EIRP is  $18 + 17 = 35$  dBm EIRP. Peak power spectral density is approximately  $1.14$  mW/MHz = 0.6 dBm/MHz. Both levels are below those requiring power level reductions per 15.407 (a)3.

Installation of units with directional antennas is by trained professional installers.

Data is presented to support that the EUT with the new antenna continues to meet the applicable regulations for a device of this type. A new user manual statement will be inserted to reflect the change in MPE due to the increased antenna gain.

Based on the above, and the attachments which follow, on behalf of my client RadioLAN, I respectfully request a class 2 permissive change be issued for the referenced device.

If you have questions or need further information regarding this submission, please don't hesitate to give me a call, fax, or email.

Sincerely,

THOMAS N. COKENIAS  
Agent for RadioLAN

tel: 650-726-1263 fax: 650-726-1252 internet: trephonc@macconnect.com

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CLASS 2 PERMISSIVE CHANGE TEST REPORT FOR A UNII TRANSCEIVER

Applicant: RadioLAN  
455 DeGuigne Drive  
Sunnyvale, CA 94089

FCC ID: MCIPUNIIT  
Grant Date: 12 March 1998

Change Request: Additional antenna, 18 dBi (point to point)

FCC Rule Part: 15.401

Used For: WLAN from building to building

Power Source: Power from host computer via PCMCIA card

Test Location: RadioLAN rooftop

All tests were performed by me or under my supervision. The RadioLAN PUNII with the new 18 dBi antenna continues to meet the emissions requirements specified under Parts 2 and 15 of the Commission's Rules.

THOMAS N. COKENIAS

20 December 1998

## **EXHIBITS**

EXHIBIT A: Product Photographs

EXHIBIT B: Antenna Pattern Polar Plots

EXHIBIT C: Photographs of Test Set-ups

EXHIBIT D: User Manual Statement re: MPE

EXHIBIT E: Report of Measurements

## **EXHIBIT A: Product Photographs**

**EXHIBIT B: Antenna Pattern Polar Plots**

## **EXHIBIT C: Photographs of Test Set-Ups**



## Test Set-up: Looking Towards EUT



**EXHIBIT D: User Manual Statement Re: MPE**

**NOTICE**

While operating this radio with the 18 dBi directional antenna, the radio frequency exposure limits may be exceeded at distances closer than 16 cm from the antenna of this device.



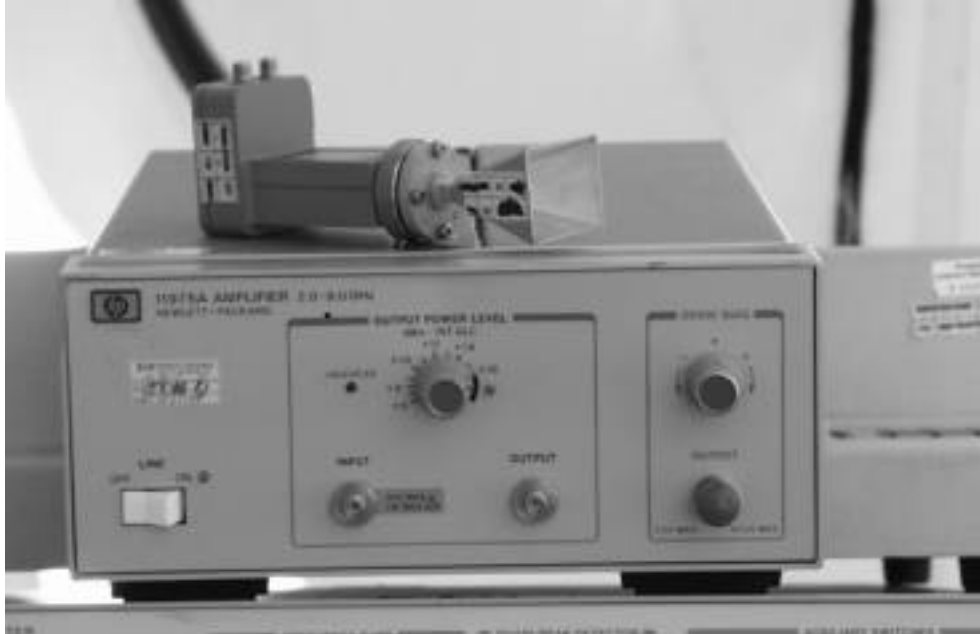
## **EXHIBIT E: REPORT OF MEASUREMENTS**

### **Equipment Used to Perform Test**



## **Equipment Used to Perform Tests (cont).**

### **External mm mixers with leveling preamplifier**



## 5725 - 5825 MHz UNII Transmitter Emissions Test Report

Applicant: RadioLAN  
455 DeGuigne Drive  
Sunnyvale, CA 94089

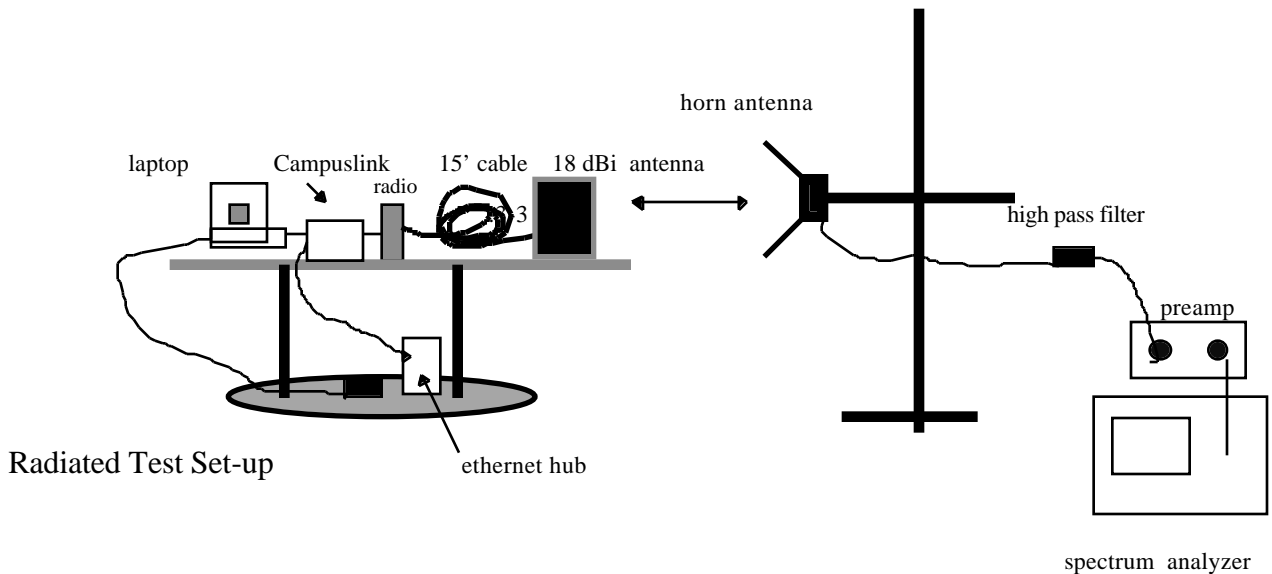
Product Description: 5725-5825 MHz UNII transceiver

FCC ID: MCIPUNIIT

FCC Rule Paragraphs 15.405, 15.205, 15.209, 15.107

### TEST LOCATION

Radiated emissions were performed at CCS site A in Morgan Hill, CA. The EA 18 dBi transmit antenna was placed on a 1 meter high turntable. Antenna to antenna distance was as little as 1 ft so that low level signals up to 40 GHz could be detected above measurement system noise floor.



### TRANSMITTER TEST PROCEDURES

#### Radiated Emissions and RF Radiation Exposure

A 15 ft length of Andrew FSJ4RN-50B cable connected the EA antenna to the radio. The radio was connected to the RadioLAN CampusLink network interface box, in turn connected via serial cable to a laptop computer. An ethernet hub was connected via CAT 5 cable to the ethernet RJ45 connector on the CampusLink unit to establish a local data network link for the test. The laptop was programmed to send a constant stream of data to the EUT.

The search antenna was raised and lowered in both horizontal and vertical polarities in order to maximize received levels at each emission.

**TEST EQUIPMENT**

Description	Manufacturer	Model
Spectrum analyzer	HP	8566B
Horn Antenna, 1-18 GHz	ARA	DRG118
Horn Antenna, 18-26 GHz	AH	MWH18-26
Low loss cable, 18 ft	Flexco	FC195
Harmonic Mixer, 18-26.5 GHZ	HP	11970K
Harmonic Mixer, 26.5-40 GHZ	HP	11970A
Levelling Pre-amplifier for Mixers	HP	11975A

**TEST RESULTS**

**15.205, 15.209** Emissions are below limits for transmitter harmonics and out of band emissions.

*CLASS 2 PERMISSIVE CHANGE: RADIATED EMISSIONS*

*Company: RadioLAN*

*Date: 15-Dec-98*

*RadioLAN U-NII radio with 18 dBi antenna*

*FCC ID: MCIPUNIIT*

*Tested At: Compliance Certification Services*

*Tested To: 15.205, 15.209*

*Test Site A  
Morgan Hill, CA*

*Tested By: P. Krebill*

*Test Distance: 1 ft*

<i>F(MHz)</i>	<i>Level, dBuV</i>	<i>AF, dB</i>	<i>Dist, dB</i>	<i>Amp, dB</i>	<i>Cable loss</i>	<i>Duty Cycle</i>	<i>E, dBuV/m</i>	<i>Lim, dBuV,</i>
<i>11555Pk(H)</i>	<i>36.2</i>	<i>40.2</i>	<i>-20</i>	<i>0</i>	<i>1.4</i>	<i>0</i>	<i>57.8</i>	<i>74</i>
<i>11555Av(H)</i>	<i>24.9</i>	<i>40.2</i>	<i>-20</i>	<i>0</i>	<i>1.4</i>	<i>-23.2</i>	<i>23.3</i>	<i>54</i>
<i>17327Pk(H)</i>	<i>41</i>	<i>45.7</i>	<i>-20</i>	<i>0</i>	<i>1.8</i>	<i>0</i>	<i>68.5</i>	<i>74</i>
<i>17327Av(H)</i>	<i>30</i>	<i>45.7</i>	<i>-20</i>	<i>0</i>	<i>1.8</i>	<i>-23.2</i>	<i>34.3</i>	<i>54</i>
<i>23103Pk(H)</i>	<i>34</i>	<i>35.4</i>	<i>-20</i>	<i>-35</i>	<i>2.4</i>	<i>0</i>	<i>16.8</i>	<i>74</i>
<i>23103Av(H)</i>	<i>34</i>	<i>35.4</i>	<i>-20</i>	<i>-35</i>	<i>2.4</i>	<i>-23.2</i>	<i>-6.4</i>	<i>54</i>
<i>to 40 GHz</i>	<i>no emissions detected within 20 dB of limit</i>							

**15.407(f) Radio Frequency Exposure Requirements**

From Table 2B: Maximum Permissible Exposure, Uncontrolled Environment: 1 mW/cm<sup>2</sup>

$$E^2/377 = W/m^2, E^2/3770 = mW/m^2 = 1 mW/m^2$$

$$E = 61.4 V/m$$

Again using the relationship between field strength E, power in watts P, numeric gain over isotropic G, distance in meters d and solving for d,

$$G = 15 \text{ dBi} = 63.2 \text{ numeric}$$

$$d = ((0.05 W_{pk} * 30 * 63.2)^{0.5}) / 61.4$$

d = 15.8 cm, assuming peak power output is constant, which it never is.

The pulse position modulation system results in an average power of 3.46 mW. This is obtained in the following fashion:

Pulse duty cycle 0.121 \* packet duty cycle 0.572 \* 50 mW = 3.46 mW. If this power level is put into the equation,

$$d = 4.1 \text{ cm}$$

A statement shall be placed in the user manual with the following wording:

**NOTICE**

While operating this radio with the 18 dBi directional antenna, the radio frequency exposure limits may be exceeded at distances closer than 16 cm from the antenna of this device.

**CONCLUSION**

The RadioLAN low power UNII transceiver, FCC ID: MCIPUNIIT, continues to meet all emissions requirements in Part 15 when used with the EA 18 dBi antenna.

T.N. Cokenias

21 December 1998