Washington Laboratories, Ltd.

# FCC Class II Permissive Change Test Report
# For the
# Proxim Corporation
# 5054-LR Module

## FCC ID: HZB-5054-LR

WLL JOB# **9306**
**Revision 1**
**July 28, 2006**

Prepared for:

**Proxim Corporation**
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**San Jose, CA 95131**

Prepared By:

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**Gaithersburg, Maryland 20879**

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Prepared by: Brian J. Dettling
Documentation Specialist

Reviewed by: Michael Violette
President

# Abstract

This report has been prepared on behalf of Proxim Corporation to support Application for a Class II Permissive Change to existing certified equipment. The test report and application are submitted for a DTS Device under Part 15C of the FCC Rules and Regulations. This Certification Test Report documents the test configuration and test results for a Proxim Corporation 5054-LR Radio with the following change in equipment configuration:

- Addition of Gabriel DFPD2-52 flat panel antenna.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

The Proxim Corporation 5054-LR Module complies with the limits for a DTS Device under FCC Part 15C.

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# 1 Introduction

## 1.1 Compliance Statement

The Proxim Corporation 5054-LR Module complies with the limits for a DTS Device under FCC Part 15C.

## 1.2 Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance with FCC Public Notice DA 00-705 and the 2001 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

## 1.3 Contract Information

| | |
|---|---|
| Customer: | Proxim Corporation<br>2115 O'Nel Drive<br>San Jose, CA 95131 |
| Purchase Order Number: | 97234 |
| Quotation Number: | 63046 |

## 1.4 Test Dates

| | |
|---|---|
| Testing was performed on the following date(s): | July 21, 2006 |

## 1.5 Test and Support Personnel

| | |
|---|---|
| Washington Laboratories, LTD | Mike Violette |
| Client Representative | Mike Young |

## 1.6 Abbreviations

| | |
|---|---|
| **A** | **A**mpere |
| **ac** | **a**lternating **c**urrent |
| **AM** | Amplitude Modulation |
| **Amps** | **Amp**ere**s** |
| **b/s** | **b**its per **s**econd |
| **BW** | **B**and**W**idth |
| **CE** | **C**onducted **E**mission |
| **cm** | **c**enti**m**eter |
| **CW** | **C**ontinuous **W**ave |
| **dB** | **d**eci**B**el |
| **dc** | **d**irect **c**urrent |
| **EMI** | **E**lectro**m**agnetic **I**nterference |
| **EUT** | **E**quipment **U**nder **T**est |
| **FM** | **F**requency **M**odulation |
| **G** | **g**iga - prefix for $10^9$ multiplier |
| **Hz** | **H**ertz |
| **IF** | **I**ntermediate **F**requency |
| **k** | **k**ilo - prefix for $10^3$ multiplier |
| **LISN** | **L**ine **I**mpedance **S**tabilization **N**etwork |
| **M** | **M**ega - prefix for $10^6$ multiplier |
| **m** | **m**eter |
| **µ** | **m**icro - prefix for $10^{-6}$ multiplier |
| **NB** | **N**arrow**b**and |
| **QP** | **Q**uasi-**P**eak |
| **RE** | **R**adiated **E**missions |
| **RF** | **R**adio **F**requency |
| **rms** | **r**oot-**m**ean-**s**quare |
| **SN** | **S**erial **N**umber |
| **S/A** | **S**pectrum **A**nalyzer |
| **V** | **V**olt |

# 2 Equipment Under Test

## 2.1 EUT Identification & Description

The Proxim Corporation 5054-LR Module is an outdoor wireless point-to-point transmit system.

**Table 1. Device Summary**

| ITEM | DESCRIPTION |
|---|---|
| Manufacturer: | Proxim Corporation |
| FCC ID: | HZB-5054-LR |
| Model: | 5054-LR Module |
| FCC Rule Parts: | §15C |
| Frequency Range: | 5745.00 – 5825.00 MHz |
| Maximum Output Power: | 0.371W |
| Modulation: | OFDM |
| Keying: | Automatic, Manual |
| Type of Information: | Data |
| Power Output Level | Fixed |
| Antenna Connector | N-Connector |
| Antenna Type | Gabriel DFPD2-52 28.4dBi gain Flat Panel |
| Interface Cables: | Ethernet with DC injector |
| Power Source & Voltage: | 48VDC |

## 2.2 Test Configuration

The 5054-LR Module was configured with a Gabriel Electronics DFPD2-52 flat panel antenna with 28.4 dBi gain.

## 2.3 Testing Algorithm

The 5054-LR Module was tested in normal operation mode.

Worst case emission levels are provided in the test results data.

## 2.4 Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by NIST NVLAP (NVLAP Lab Code: 200066-0) as an independent FCC test laboratory.

## 2.5 Measurements

### 2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

## 2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

# 3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

**Table 2: Test Equipment List**

Site 2 List:

| WLL Asset # | Manufacturer Model/Type | Function | Cal. Due |
|---|---|---|---|
| 0073 | HP 8568B | SPECTRUM ANALYZER | 6/30/2006 |
| 0069 | HP 85650A | QUASI-PEAK ADAPTER | 6/30/2006 |
| 0125 | SOLAR 8028-50-TS-BNC | LISN | 10/31/2005 |
| 0126 | SOLAR 8028-50-TS-BNC | LISN | 10/31/2005 |
| 0073 | HP 8568B | SPECTRUM ANALYZER | 6/30/2006 |
| 0007 | ARA LPB-2520 | BICONILOG ANTENNA | 12/25/2005 |
| 0074 | HEWLETT-PACKARD 8593A | SPECTRUM ANALYZER | 10/04/2006 |
| 0522 | HEWLETT-PACKARD 8449B | MICROWAVE PREAMP | 4/11/2006 |
| 0425 | ARA DRG118/A | MICROWAVE HORN ANTENNA | 10/31/2005 |
| 0026 | EMCO 3110B | BICONICAL ANTENNA | 12/10/2005 |
| 0029 | EMCO 3146A | LOG PERIODIC ANTENNA | 6/28/2006 |
| 0071 | HP 85685A | RF PRESELECTOR | 6/30/2006 |
| 0069 | HP 85650A | QUASI-PEAK ADAPTER | 6/30/2006 |

# 4 Test Results

## 4.1 Radiated Spurious Emissions: (FCC Part §2.1053)

The EUT must comply with the requirements for radiated spurious emissions that fall within the restricted bands and outside the transmit band. These emissions must meet the limits specified in §15.247 and §15.209 and §15.35(b) for peak measurements.

### 4.1.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2001. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

| Frequency Range | Resolution Bandwidth | Video Bandwidth |
|---|---|---|
| 30MHz-1000 MHz | 120kHz | >100 kHz |
| >1000 MHz | 1 MHz | <30 Hz (Avg.)<br>1MHz (Peak) |

# Table 3: Radiated Emission Test Data

| | | | |
|---|---|---|---|
| **Client:** | Proxim | **Date:** | 7/21/2006 |
| **Tester:** | Mike Violette | **Job #:** | 9306 |
| **EUT Information:** | | **Test Requirements:** | |
| **EUT:** | 5054-LR with 2 Foot Flat Panel Antenna | TEST STANDARD: | FCC Part 15.247 |
| **Antenna Mfr** | Gabriel Electronics | | |
| **Antenna Model** | DFPD2-52 | | |
| **Configuration:** | Transmitting at 54 Mbps | DISTANCE: | 3m |
| **Test Equipment (<1GHz):** | | **Test Equipment (>1GHz):** | |
| ANTENNA: | A_00007 | ANTENNA: | A_00425 |
| LIMIT: | LFCC_3m_Class_B | AMPLIFIER: | A_00066 |
| CABLE: | CSITE2_10m | CABLE: | CSITE2_HF |

| Frequency (MHz) | Polarity H/V | SA Level (QP) (dBµV) | Ant. Corr. (dB/m) | Cable Corr. (dB) | Amp Gain (dB) | Corr. Level dBµV/m | Corr. Level µV/m | Limit µV/m | Margin (dB) | Notes | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| **TRANSMIT FREQUENCY 5745 MHz** | | | | | | | | | | | |
| Power Setting: 16 dBm on ART | | | | | | | | | | | |
| 3830.000 | V | 50.0 | 30.6 | 2.8 | 31.9 | 51.5 | 374.5 | 500 | -2.5 | AVE | |
| 3830.000 | V | 58.6 | 30.6 | 2.8 | 31.9 | 60.1 | 1007.8 | 5000 | -13.9 | PEAK | |
| 800000 | V | 33.5 | 37.3 | 6.3 | 31.0 | 46.1 | 201.8 | 500 | -7.9 | NOISE FLR | |
| 800000 | V | 44.5 | 37.3 | 6.3 | 31.0 | 57.1 | 716.1 | 5000 | -16.9 | NOISE FLR | |
| 1000000 | V | 33.2 | 39.0 | 4.9 | 30.8 | 46.3 | 206.5 | 500 | -7.7 | NOISE FLR | |
| 1000000 | V | 46.1 | 39.0 | 4.9 | 30.8 | 59.2 | 912.0 | 5000 | -14.8 | NOISE FLR | |
| 11490.000 | V | 33.8 | 39.5 | 5.6 | 30.8 | 48.1 | 254.1 | 500 | -5.9 | NOISE FLR | |
| 11490.000 | V | 45.1 | 39.5 | 5.6 | 30.8 | 59.4 | 933.2 | 5000 | -14.6 | NOISE FLR | |
| 1600000 | V | 32.5 | 39.1 | 6.7 | 29.6 | 48.7 | 272.3 | 500 | -5.3 | NOISE FLR | |
| 1600000 | V | 43.5 | 39.1 | 6.7 | 29.6 | 59.7 | 966.1 | 5000 | -14.3 | NOISE FLR | |
| 17235.000 | V | 33.0 | 42.7 | 9.4 | 29.5 | 55.7 | 606.3 | 500 | **1.7** | NOISE FLR | * |
| 17235.000 | V | 44.0 | 42.7 | 9.4 | 29.5 | 66.7 | 2151.1 | 5000 | -7.3 | NOISE FLR | * |
| | | | | | | | | | | | |
| 3830.000 | H | 44.4 | 30.6 | 2.8 | 31.9 | 45.9 | 196.5 | 500 | -8.1 | AVE | |
| 3830.000 | H | 52.0 | 30.6 | 2.8 | 31.9 | 53.5 | 471.4 | 5000 | -20.5 | PEAK | |
| 800000 | H | 33.3 | 37.3 | 6.3 | 31.0 | 45.9 | 197.2 | 500 | -8.1 | NOISE FLR | |
| 800000 | H | 43.3 | 37.3 | 6.3 | 31.0 | 55.9 | 623.7 | 5000 | -18.1 | NOISE FLR | |
| 1000000 | H | 33.1 | 39.0 | 4.9 | 30.8 | 46.2 | 204.2 | 500 | -7.8 | NOISE FLR | |
| 1000000 | H | 45.1 | 39.0 | 4.9 | 30.8 | 58.2 | 812.8 | 5000 | -15.8 | NOISE FLR | |
| 11490.000 | H | 32.8 | 39.5 | 5.6 | 30.8 | 47.1 | 226.5 | 500 | -6.9 | NOISE FLR | |
| 11490.000 | H | 44.4 | 39.5 | 5.6 | 30.8 | 58.7 | 861.0 | 5000 | -15.3 | NOISE FLR | |
| 1600000 | H | 33.3 | 39.1 | 6.7 | 29.6 | 49.5 | 298.5 | 500 | -4.5 | NOISE FLR | |
| 1600000 | H | 43.5 | 39.1 | 6.7 | 29.6 | 59.7 | 966.1 | 5000 | -14.3 | NOISE FLR | |
| 17235.000 | H | 33.0 | 42.7 | 9.4 | 29.5 | 55.7 | 606.3 | 500 | **1.7** | NOISE FLR | * |
| 17235.000 | H | 44.8 | 42.7 | 9.4 | 29.5 | 67.5 | 2358.7 | 5000 | -6.5 | NOISE FLR | * |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| Frequency (MHz) | Polarity H/V | SA Level (QP) (dBµV) | Ant. Corr. (dB/m) | Cable Corr. (dB) | Amp Gain (dB) | Corr. Level dBµV/m | Corr. Level µV/m | Limit µV/m | Margin (dB) | Notes | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRANSMIT FREQUENCY 5785 MHz** | | | | | | | | | | | |
| Power Setting: 16 dBm on ART | | | | | | | | | | | |
| 3857.000 | V | 49.5 | 30.6 | 2.8 | 31.9 | 51.0 | 355.7 | 500 | -3.0 | AVE | |
| 3857.000 | V | 57.2 | 30.6 | 2.8 | 31.9 | 58.7 | 863.1 | 5000 | -15.3 | PEAK | |
| 800000 | V | 33.3 | 37.3 | 6.3 | 31.0 | 45.9 | 197.2 | 500 | -8.1 | NOISE FLR | |
| 800000 | V | 43.3 | 37.3 | 6.3 | 31.0 | 55.9 | 623.7 | 5000 | -18.1 | NOISE FLR | |
| 1000000 | V | 33.1 | 39.0 | 4.9 | 30.8 | 46.2 | 204.2 | 500 | -7.8 | NOISE FLR | |
| 1000000 | V | 45.1 | 39.0 | 4.9 | 30.8 | 58.2 | 812.8 | 5000 | -15.8 | NOISE FLR | |
| 11490.000 | V | 32.8 | 39.5 | 5.6 | 30.8 | 47.1 | 226.5 | 500 | -6.9 | NOISE FLR | |
| 11490.000 | V | 44.4 | 39.5 | 5.6 | 30.8 | 58.7 | 861.0 | 5000 | -15.3 | NOISE FLR | |
| 1600000 | V | 33.3 | 39.1 | 6.7 | 29.6 | 49.5 | 298.5 | 500 | -4.5 | NOISE FLR | |
| 1600000 | V | 43.5 | 39.1 | 6.7 | 29.6 | 59.7 | 966.1 | 5000 | -14.3 | NOISE FLR | |
| 17235.000 | V | 33.0 | 42.7 | 9.4 | 29.5 | 55.7 | 606.3 | 500 | **1.7** | NOISE FLR | * |
| 17235.000 | V | 44.8 | 42.7 | 9.4 | 29.5 | 67.5 | 2358.7 | 5000 | -6.5 | NOISE FLR | * |
| | | | | | | | | | | | |
| 3857.000 | H | 43.5 | 30.6 | 2.8 | 31.9 | 45.0 | 178.3 | 500 | -9.0 | AVE | |
| 3857.000 | H | 51.0 | 30.6 | 2.8 | 31.9 | 52.5 | 422.7 | 5000 | -21.5 | PEAK | |
| 800000 | H | 33.3 | 37.3 | 6.3 | 31.0 | 45.9 | 197.2 | 500 | -8.1 | NOISE FLR | |
| 800000 | H | 43.3 | 37.3 | 6.3 | 31.0 | 55.9 | 623.7 | 5000 | -18.1 | NOISE FLR | |
| 1000000 | H | 33.1 | 39.0 | 4.9 | 30.8 | 46.2 | 204.2 | 500 | -7.8 | NOISE FLR | |
| 1000000 | H | 45.1 | 39.0 | 4.9 | 30.8 | 58.2 | 812.8 | 5000 | -15.8 | NOISE FLR | |
| 11490.000 | H | 32.8 | 39.5 | 5.6 | 30.8 | 47.1 | 226.5 | 500 | -6.9 | NOISE FLR | |
| 11490.000 | H | 44.4 | 39.5 | 5.6 | 30.8 | 58.7 | 861.0 | 5000 | -15.3 | NOISE FLR | |
| 1600000 | H | 33.3 | 39.1 | 6.7 | 29.6 | 49.5 | 298.5 | 500 | -4.5 | NOISE FLR | |
| 1600000 | H | 43.5 | 39.1 | 6.7 | 29.6 | 59.7 | 966.1 | 5000 | -14.3 | NOISE FLR | |
| 17235.000 | H | 33.0 | 42.7 | 9.4 | 29.5 | 55.7 | 606.3 | 500 | **1.7** | NOISE FLR | * |
| 17235.000 | H | 44.8 | 42.7 | 9.4 | 29.5 | 67.5 | 2358.7 | 5000 | -6.5 | NOISE FLR | * |
| | | | | | | | | | | | |
| **TRANSMIT FREQUENCY 5825 MHz** | | | | | | | | | | | |
| Power Setting: 16 dBm on ART | | | | | | | | | | | |
| 3883.500 | V | 49.4 | 30.6 | 2.8 | 31.9 | 51.0 | 353.8 | 500 | -3.0 | AVE | |
| 3883.500 | V | 57.0 | 30.6 | 2.8 | 31.9 | 58.6 | 848.6 | 5000 | -15.4 | PEAK | |
| 800000 | V | 33.3 | 37.3 | 6.3 | 31.0 | 45.9 | 197.2 | 500 | -8.1 | NOISE FLR | |
| 800000 | V | 43.3 | 37.3 | 6.3 | 31.0 | 55.9 | 623.7 | 5000 | -18.1 | NOISE FLR | |
| 1000000 | V | 33.1 | 39.0 | 4.9 | 30.8 | 46.2 | 204.2 | 500 | -7.8 | NOISE FLR | |
| 1000000 | V | 45.1 | 39.0 | 4.9 | 30.8 | 58.2 | 812.8 | 5000 | -15.8 | NOISE FLR | |
| 11490.000 | V | 32.8 | 39.5 | 5.6 | 30.8 | 47.1 | 226.5 | 500 | -6.9 | NOISE FLR | |
| 11490.000 | V | 44.4 | 39.5 | 5.6 | 30.8 | 58.7 | 861.0 | 5000 | -15.3 | NOISE FLR | |
| 1600000 | V | 33.3 | 39.1 | 6.7 | 29.6 | 49.5 | 298.5 | 500 | -4.5 | NOISE FLR | |
| 1600000 | V | 43.5 | 39.1 | 6.7 | 29.6 | 59.7 | 966.1 | 5000 | -14.3 | NOISE FLR | |
| 17235.000 | V | 33.0 | 42.7 | 9.4 | 29.5 | 55.7 | 606.3 | 500 | **1.7** | NOISE FLR | * |
| 17235.000 | V | 44.8 | 42.7 | 9.4 | 29.5 | 67.5 | 2358.7 | 5000 | -6.5 | NOISE FLR | * |
| | | | | | | | | | | | |
| 3830.000 | H | 42.2 | 30.6 | 2.8 | 31.9 | 43.7 | 152.5 | 500 | -10.3 | AVE | |

 

| Frequency (MHz) | Polarity H/V | SA Level (QP) (dBµV) | Ant. Corr. (dB/m) | Cable Corr. (dB) | Amp Gain (dB) | Corr. Level dBµV/m | Corr. Level µV/m | Limit µV/m | Margin (dB) | Notes | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3830.000 | H | 52.1 | 30.6 | 2.8 | 31.9 | 53.6 | 476.9 | 5000 | -20.4 | PEAK | |
| 800000 | H | 33.3 | 37.3 | 6.3 | 31.0 | 45.9 | 197.2 | 500 | -8.1 | NOISE FLR | |
| 800000 | H | 43.3 | 37.3 | 6.3 | 31.0 | 55.9 | 623.7 | 5000 | -18.1 | NOISE FLR | |
| 1000000 | H | 33.1 | 39.0 | 4.9 | 30.8 | 46.2 | 204.2 | 500 | -7.8 | NOISE FLR | |
| 1000000 | H | 45.1 | 39.0 | 4.9 | 30.8 | 58.2 | 812.8 | 5000 | -15.8 | NOISE FLR | |
| 11490.000 | H | 32.8 | 39.5 | 5.6 | 30.8 | 47.1 | 226.5 | 500 | -6.9 | NOISE FLR | |
| 11490.000 | H | 44.4 | 39.5 | 5.6 | 30.8 | 58.7 | 861.0 | 5000 | -15.3 | NOISE FLR | |
| 1600000 | H | 33.3 | 39.1 | 6.7 | 29.6 | 49.5 | 298.5 | 500 | -4.5 | NOISE FLR | |
| 1600000 | H | 43.5 | 39.1 | 6.7 | 29.6 | 59.7 | 966.1 | 5000 | -14.3 | NOISE FLR | |
| 17235.000 | H | 33.0 | 42.7 | 9.4 | 29.5 | 55.7 | 606.3 | 500 | **1.7** | NOISE FLR | * |
| 17235.000 | H | 44.8 | 42.7 | 9.4 | 29.5 | 67.5 | 2358.7 | 5000 | -6.5 | NOISE FLR | * |

* No detectable readings were measured where indicated as “Noise Flr.” Noise floor readings above 16 GHz were taken at a 1 meter test distance. Emissions were scanned to 40 GHz. No detectable readings were measured where indicated as “Noise Flr.”

 