8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com

May 23, 2007

TIMCO Engineering Inc.
849 NW State Road 45
Newberry, Florida 32669

Gentlemen:

The attached documentation is provided in support of a formal submission to your organization for a mobile approval of an intentional unlicensed transmitter. On behalf of our client, Aegis Labs has included an application for a Grant of Equipment Authorization pursuant to Subpart C of part 15 of FCC Rules (47 CFR) regarding intentional radiators. The data within the test report demonstrates the equipment was tested in a manner described under Part 2 and 15 of the Code of Federal Regulations.

This is a submittal for modular approval of the Matchport B/G (FCC ID: R68MTCHDRCT), which is a Wireless Device Server that provides a network-enabling solution based on the IEEE 802.11b/g wireless standard.

It was tested as a standalone device with a U.S. Robotics 5.00dBi Antenna (PN: USR5481) continuously transmitting and receiving form the antenna port.

If there are any additional questions or if further information is needed, please contact us at your earliest convenience.

Sincerely,

Brian Mueller
Aegis Labs, Inc.
Test Technician
Enclosure (1 Emissions Test Report + Exhibits)

Modular Approval
Test Report
And Application for Grant of Equipment Authorization

*TEST REPORT PERTAINING TO:*

| Equipment Under Test | Model Number(s) | FCC ID |
|---|---|---|
| Wireless Device Server | Matchport B/G | R68MTCHDRCT |

| CONFIGURATION |
|---|
| 802.11b & 802.11g module with a<br>U.S. Robotics 5dBi Reverse SMA Antenna (MN: USR5481) |

*MEASUREMENTS PERFORMED IN ACCORDANCE WITH THE FOLLOWING STANDARD (S)*

| Regulatory Standard(s) |
|---|
| 47 CFR Part 15, Subpart C Section 15.247<br><br>Test Method:<br>ANSI C63.4: 2003 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 |

ACCREDITED

Certificate Number: 1111.01

**PREPARED FOR:**
Lantronix Inc.
15353 Barranca Parkway
Irvine, California 92618

Contact(s): Mr. Michael Simonsen

**PREPARED BY:**
Aegis Labs, Inc.
8 Rancho Circle
Lake Forest, CA 92630
Agent(s): Mr. Rick Candelas
Mr. Brian Mueller
Mr. Johnny Candelas

Test Report #: LANTR-070125F

Test Report Revision: A1

| | REPORT BODY | APPENDICES | | TOTAL PAGES |
|---|---|---|---|---|
| | | *A* | *B* | |
| PAGES | 14 | 45 | 1 | 60 |

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# 1.0 REGULATORY COMPLIANCE GUIDELINES

Aegis Labs, Inc. operates as both a Nevada and California Corporation with no organizational or financial relationship with any company, institution, or private individual. Testing and engineering functions provided by Aegis Labs were furnished by RF technicians and engineers with accredited qualifications and training credentials to carry out their duties.

The object of this report was to publish verifiable test results of an EUT subjected to the tests outlined in the standard listed on the cover page of this report.

## 1.1 Guidelines For Testing To Emissions Standards

This standard for EMC emission requirements apply to electrical equipment for Information Technology Equipment (ITE). Compliance to these standards and in combination with the other standards listed in this test report can be used to demonstrate presumption of compliance with the protection requirements of the appropriate agency standard.

The purpose of this standard is to specify minimum requirements for emissions regarding electromagnetic compatibility (EMC) and protect the radio frequency spectrum 9 kHz. – 400 GHz. from unwanted interference generated from electrical/digital systems that intentionally or unintentionally generated RF energy. The emissions standards, normative documents and/or publications were used to conduct all tests performed on the equipment herein referred to as “Equipment Under Test”.

## 2.0 SUMMARY OF TEST RESULTS

### *802.11b Mode (2400-2483.5 MHz)*

| EMISSIONS STANDARD | | | |
|---|---|---|---|
| **FCC Part 15 Section** | **Description** | **Results** | **Comments** |
| 15.247(a)(2) | The minimum 6dB bandwidth shall be at least 500 kHz. | PASSED | 2412 MHz = 10.08 MHz<br>2437 MHz = 10.17 MHz<br>2462 MHz = 10.33 MHz |
| 15.247(b)(3) | The maximum peak output power of the intentional radiator shall not exceed 1 watt. | PASSED | 2412 MHz = 16.80 dBm = 47.86 mW<br>2437 MHz = 16.40 dBm = 43.65 mW<br>2462 MHz = 16.64 dBm = 46.13 mW |
| 15.247(b)(5) | The intentional radiator shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines per Section 1.1307(b)(1). | PASSED | Refer to MPE Calculations Exhibit |
| 15.247(c) | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. | PASSED | See Data Sheets |
| 15.247(c) | Radiated emissions, which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). All others must be < -20dBc. | PASSED | See Data Sheets |
| 15.247(d) | The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. | PASSED | 2412 MHz = -17.67 dB<br>2437 MHz = -15.17 dB<br>2462 MHz = -15.67 dB |
| 15.207 | AC Conducted Emissions | PASSED | See Data Sheets |
| 15.209 | Radiated Emissions (30-1000 MHz) | PASSED | See Data Sheets |

2.0 Summary of Test Results (Continued)

***802.11g Mode (2400-2483.5 MHz)***

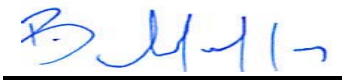
| EMISSIONS STANDARD | | | |
|---|---|---|---|
| **FCC Part 15 Section** | **Description** | **Results** | **Comments** |
| 15.247(a)(2) | The minimum 6dB bandwidth shall be at least 500 kHz. | PASSED | 2412 MHz = 16.58 MHz<br>2437 MHz = 16.67 MHz<br>2462 MHz = 16.83 MHz |
| 15.247(b)(3) | The maximum peak output power of the intentional radiator shall not exceed 1 watt. | PASSED | 2412 MHz = 19.83 dBm = 95.94 mW<br>2437 MHz = 19.60 dBm = 91.20 mW<br>2462 MHz = 19.70 dBm = 93.33 mW |
| 15.247(b)(5) | The intentional radiator shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines per Section 1.1307(b)(1). | PASSED | Refer to MPE Calculations Exhibit |
| 15.247(c) | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. | PASSED | See Data Sheets |
| 15.247(c) | Radiated emissions, which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). All others must be < -20dBc. | PASSED | See Data Sheets |
| 15.247(d) | The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. | PASSED | 2412 MHz = -17.83 dB<br>2437 MHz = -17.00 dB<br>2462 MHz = -19.33 dB |
| 15.207 | AC Conducted Emissions | PASSED | See Data Sheets |
| 15.209 | Radiated Emissions (30-1000 MHz) | PASSED | See Data Sheets |

**ANALYSIS AND CONCLUSIONS**

Based upon the measurement results we find that this equipment is within the limits of the standard listed on the cover page of this test report. All results are based on a test of one sample. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

Approval Signatories

**Test and Report Completed By:**



**05/10/07**

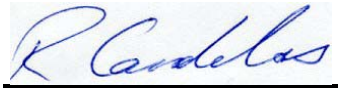
**Brian Mueller** **Date:**
**Test Technician**
**Aegis Labs, Inc.**

**Report Reviewed By:**

**05/23/07**

**Johnny Candelas** **Date:**
**Test Technician**
**Aegis Labs, Inc.**

**Report Approved By:**



**05/29/07**

**Rick Candelas** **Date:**
**Quality Assurance & EMC Lab Manager**
**Aegis Labs, Inc.**

## 3.0 ADMINISTRATIVE DATA AND TEST DESCRIPTION

| | |
|---|---|
| **DEVICE TESTED:** | ITE Type: Wireless Device Server<br>Model Number(s): Matchport B/G<br>Serial Number: None<br>MAC ID: 00:20:4A:9E:00:A8<br>FCC ID: R68MTCHDRCT |
| | |
| **DATE EUT RECEIVED:** | April 26th, 2007 |
| **TEST DATE(S):** | April 26th, May 3rd – 4th, May 07, 2007 |
| | |
| **ORIGIN OF TEST SAMPLE(S):** | Production |
| | |
| **EQUIPMENT CLASS:** | EUT tested as CLASS B device |
| | |
| **RESPONSIBLE PARTY:** | Lantronix Inc.<br>15353 Barranca Parkway<br>Irvine, CA 92618 |
| | |
| **CLIENT CONTACT:** | Mr. Michael Simonsen |
| **MANUFACTURER:** | Lantronix Inc. |
| | |
| **TEST LOCATION:** | Aegis Labs, Inc.<br>32231 Trabuco Creek Road<br>Trabuco Canyon, CA 92678<br>Open Area Test Site: #1 & #2 |
| | |
| **ACCREDITATION CERTIFICATE(s):** | A2LA Certificate Number: 1111.01, Valid through February 28, 2008 |
| | |
| **PURPOSE OF TEST:** | To demonstrate compliance with the standards as described in Sections 1.0 & 2.0 of this report. |
| | |
| **UNCERTAINTY BUDGET:** | Proficiency Testing and Uncertainty Calculations for all tests indicated in this report have been conducted in accordance with ISO 17025: 2005 requirements Section 5.4.6, and 5.9. Uncertainty Budgets and Proficiency Test results available upon request. |
| | |
| **STATEMENT OF CALIBRATION:** | All accredited equipment calibrations were performed by Liberty Labs, Inc. and World Cal. with typical calibration uncertainty estimates derived from ISO Guide to the determination of uncertainties with a Coverage Factor of k=2 for 95% level of confidence. |

## 4.0 DESCRIPTION OF EUT CONFIGURATION

### 4.1 EUT Description

| Equipment Under Test (EUT) | |
|---|---|
| **Trade Name:** | Wireless Device Server |
| **Model Number:** | Matchport B/G |
| **Frequency Range:** | 802.11b/g = 2400 – 2483.5 MHz |
| **Type of Transmission:** | Direct Sequence Spread Spectrum |
| **Transfer Rate:** | 1/5.5/11 Mbps for 802.11b mode<br>6/36/54 Mbps for 802.11g mode |
| **Number of Channels:** | 802.11b mode (2400-2483.5 MHz) = 11<br>802.11g mode (2400-2483.5 MHz) = 11 |
| **Modulation Type:** | DBPSK, DQPSK, CCK, OFDM |
| **Antenna Type:** | External Swivel Antenna with Reverse SMA connector |
| **Antenna Gain (See Note 2):** | 2.4 GHz = 5.00 dBi |
| **Transmit Output Power:** | Ch. 1-11 14dBm Average (Typical) for 802.11b mode<br>Ch. 1-11: 12dBm Average (Typical) for 802.11g mode<br>Please see Appendix A (Data Sheets) for actual output power. |
| **Power Supply:** | 3.3VDC input from external 120VAC Adapter |
| **Number of External Test Ports Exercised:** | 1 Antenna Port, 1 Ethernet Port, 2 Serial Ports |

The Wireless Device Server provides a network-enabling solution based on the IEEE 802.11b/g wireless standard.

It was tested as a standalone device with a U.S. Robotics (MN: USR5481) antenna continuously transmitting and receiving form the antenna port.

**NOTE 1:** For a more detailed description, please refer to the manufacture's specifications or User's Manual.

**NOTE 2:** The EUT was tested with a U.S. Robotics antenna. (Refer to the antenna specifications exhibits).

## 4.2 EUT Configuration

The EUT was tested as a standalone device connected to a remotely located Dell computer via its serial port 1 & 1 Ethernet port. The Dell computer was then connected to a Dell monitor, a Dell keyboard and Logitech mouse via its video, keyboard and mouse ports respectively. A U.S. Robotics external antenna (MN: USR5481) was connected to the EUT's antenna ports via its reverse SMA antenna connector. Data for the U.S. Robotics antenna can be found in Appendix A (Data Sheets).

The low, middle, and high channels were tested in 802.11b/g mode. The EUT was placed in either continuous transmit or continuous receive mode by a program provided by the manufacturer (*Linktest*).

4.3 List of EUT, Sub-Assemblies and Host Equipment

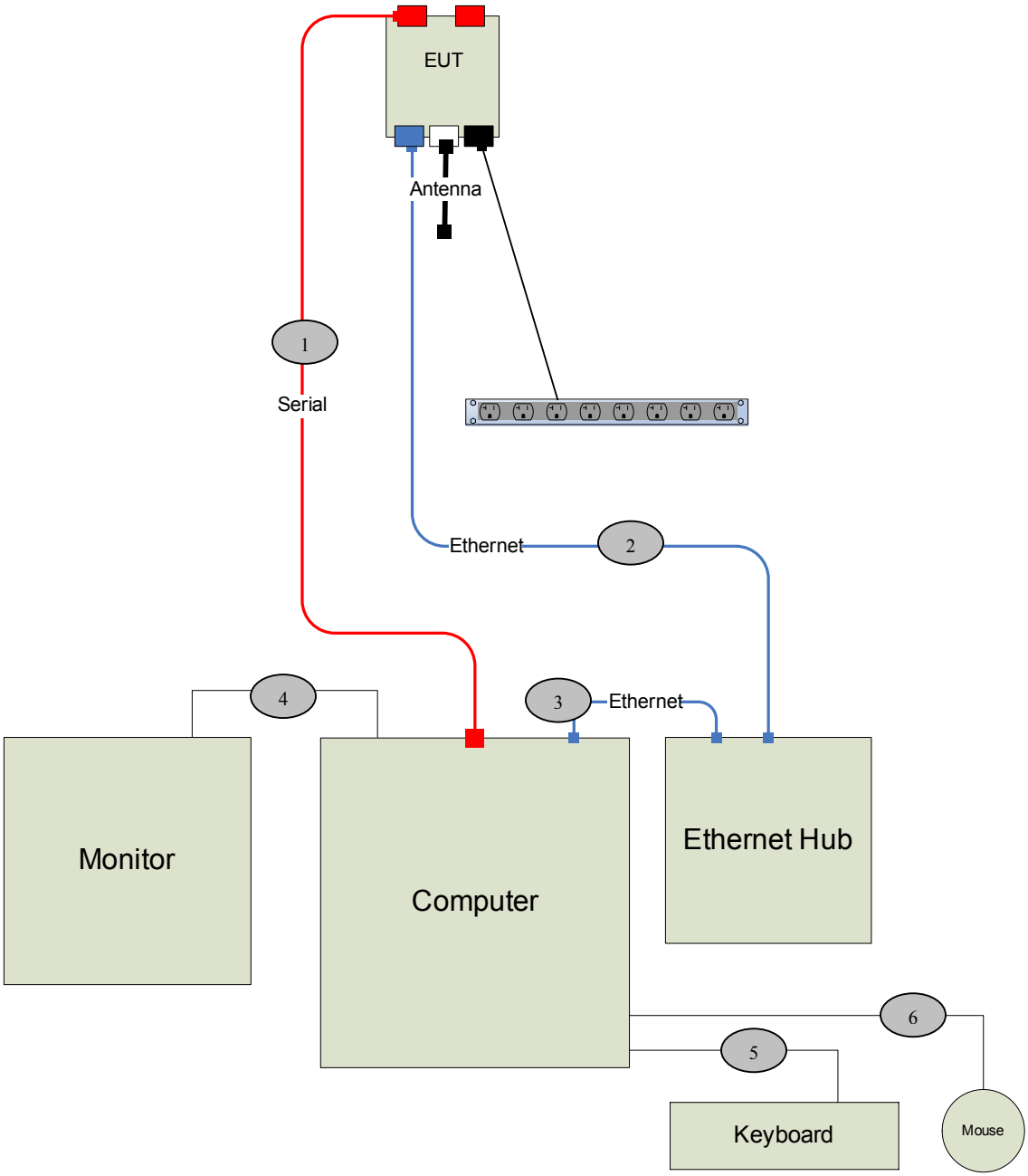
| Equipment Under Test | | | | |
|---|---|---|---|---|
| **Manufacturer** | **Equipment Name** | **Model or Part Number** | **Serial Number** | **MAC ID** |
| Lantronix Inc. | Wireless Device Server | Matchport B/G | None | 00:20:4A:9E:00:A8 |

| EUT Sub Assemblies | | | |
|---|---|---|---|
| **Manufacturer** | **Equipment Name** | **Model or Part Number** | **Serial Number** |
| U.S. Robotics | External Antenna | USR5481 | 1WBVX5LF0224 |
| Group West | Power Supply | 8UR-3.6-1000 | N/A |

| Remotely Located Support Equipment | | | |
|---|---|---|---|
| **Manufacturer** | **Equipment Name** | **Model or Part Number** | **Serial Number** |
| Dell | Host Computer | XPS T450 | 4ZFAW |
| Dell | Monitor | E550 | MY-07753T-46632-9BR-23D1 |
| Dell | Keyboard | RT7D5JTW | 37171 03H S341 |
| Logitech | Mouse | M-S3S | LZK13810013 |
| Linksys | Router | WRTS4G5 V.2 | CGN30E436355 |

NOTE: All the power cords of the above support equipment are standard and non-shielded.

## 4.4 I/O Cabling Diagram and Description



## 4.4 I/O Cabling Diagram and Description (continued)

| Signal Line Cable Description | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Cable** | **Length** | **Construction** | **Source Connector** | **Destination Connector** | **Bundled Length** | **Ferrite Attached** | **Note** |
| 1 | 10.0m | Serial Cable | EUT's Port 1: Metallic DB-9 | Host Computer: Metallic DB-9 | N/A | N/A | N/A |
| 2 | 10.0m | Round, Un-Shielded Twisted Pair (CAT 5) | EUT's Ethernet Port: Plastic RJ-45 | Lantronix Hub: Plastic RJ-45 | N/A | N/A | N/A |
| 3 | 1.5m | Round, Un-Shielded Twisted Pair (CAT 5) | Lantronix Hub: Plastic RJ-45 | Host Computer: Plastic RJ-45 | N/A | N/A | N/A |
| 4 | 1.5m | Round, Braid & Foil Shielded | Host Computer: Metallic DB-15 | Monitor: Hardwired | N/A | N/A | N/A |
| 5 | 1.5m | Round, Braid & Foil Shielded | Host Computer: Metallic 8-pin Mini DIN | Keyboard: Hardwired | N/A | N/A | N/A |
| 6 | 1.5m | Round, Braid & Foil Shielded | Host Computer: Metallic 8-pin Mini DIN | Mouse: Hardwired | N/A | N/A | N/A |

## 4.5 EMC Test Hardware and Software Measurement Equipment

| TEST EQUIPMENT LIST - Emissions | | | | | |
|---|---|---|---|---|---|
| **Equipment Name** | **Manufacturer** | **Model Number** | **Serial Number** | **Calibration Due Date** | **Maintenance Calibration Cycle** |
| Spectrum Analyzer | Agilent | 8565EC | 3946A00245 | 07/24/07 | 1 Year |
| Antenna - Horn | EMCO | 3115 | 2230 | 05/15/07 | 1 Year |
| Preamp | Miteq | JS42-01001800-25-10P | 815980 | 09/21/07 | 1 Year |
| 28 Foot Coax | Semflex | S1L29BFS1348 | 608 | 07/26/07 | 1 Year |
| 2.4 GHz Notch Filter | Micro-Tronics | BRM50702-02 | 003 | NCR | NCR |
| Antenna - 18-26.5 GHz Pre-amplified Horn | Aegis Labs, Inc. | H042 | SLK-35-3W | 02/08/08 | 1 Year |
| Antenna - 26.5-40 GHz Pre-amplified Horn | Aegis Labs, Inc. | H028 | GM1260-10 | 02/08/08 | 1 Year |
| EMI Receiver - RF Section | Hewlett Packard | 8546A | 3325A00137 | 04/26/08 | 1 Year |
| EMI Receiver - RF Filter Section | Hewlett Packard | 85460A | 3325A00138 | 04/26/08 | 1 Year |
| Antenna - Biconical | EMCO | 3110 | 9108-1421 | 07/25/07 | 1 Year |
| Antenna - Log Periodic | ETS | 3148 | 4947 | 07/25/07 | 1 Year |
| Power Meter | Anritsu | ML2487A | 6K00001785 | 05/30/07 | 1 Year |
| Wide Bandwidth Sensor | Anritsu | MA2491A | 31193 | 05/30/07 | 1 Year |
| 12dB Attenuator | Narda | 4779-12 | 203 | 07/09/07 | 2 Years |
| Temperature/Humidity Monitor | Dickson | TH550 | 7255185 | 04/13/08 | 1 Year |

## 5.0 CONDITIONS DURING EMISSIONS MEASUREMENTS

### 5.1 General

All measurements were made according to the procedures defined in or referred to by the standard listed on the cover page of this report. The measurements were made in the operating mode producing the largest emissions consistent with normal operation and connected to the minimum configuration of auxiliary devices.

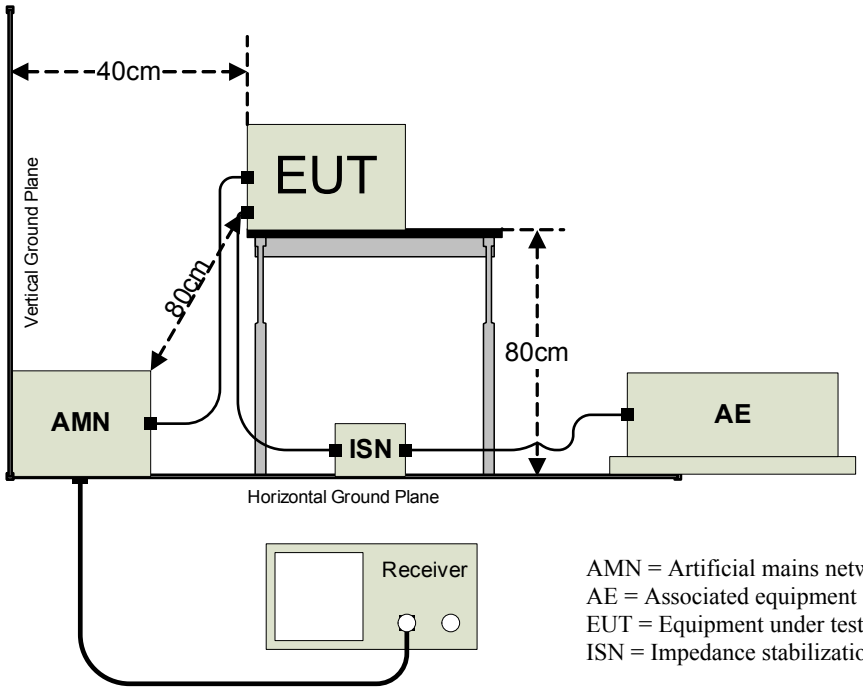
### 5.2 Conducted Emissions Test Setup

The following was the test configuration.

EUT signal cables that hung closer than 40 cm to the horizontal metal ground plane were folded back and forth forming a bundle 30 cm to 40 cm long. The power cord of the EUT was also bundled in the center and plugged into one of the artificial mains network (AMN). All peripheral equipment was powered from a second AMN via a multiple outlet strip placed at a distance on 10cm from each other. The AMN and ISN were positioned 80cm from the EUT. Signal cables that were not connected to an AE were terminated using the correct termination. If applicable, the current probe was placed at 0.1 m from the ISN.

Peak, quasi-peak and/or average detectors were used for testing performed between 150 kHz and 30 MHz. A swept frequency scan was performed for both Line 1 and Line 2. The six highest readings were compared against the limit and recorded in the data sheet along with a snapshot image of the sweep scan. The graphical scans in Appendix A only reflect peak readings while the tabulated data sheets reflect peak, average, and/or quasi-peak measurements.

Climatic Conditions:
The EUT was tested within its intended operating and climatic conditions.



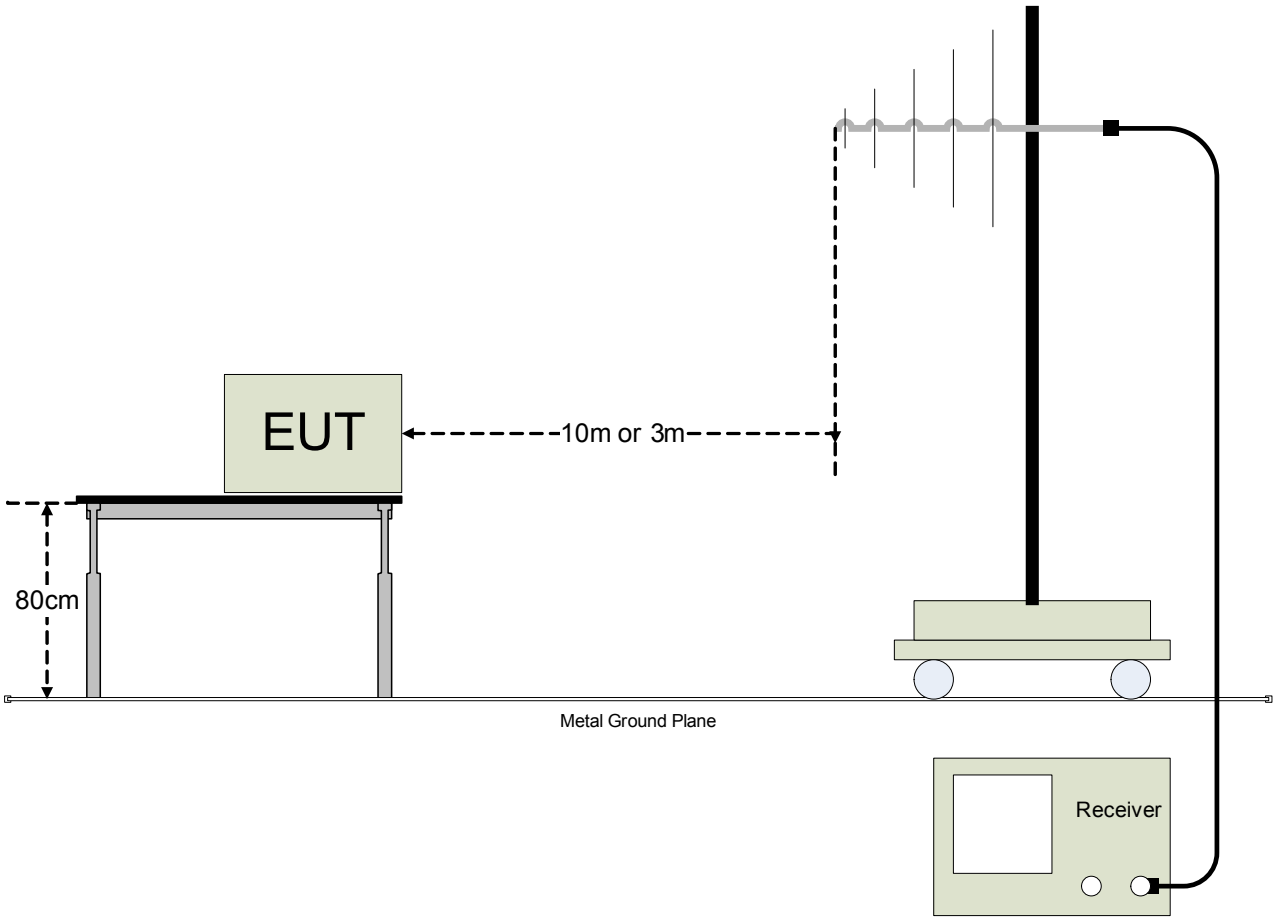

AMN = Artificial mains network
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

## 5.3 Radiated Emissions Test Setup

The Open Area Test Site (OATS) was used for radiated emission testing. The receiving (Rx) antenna(s) was placed 10m from the nearest side of the EUT facing the Rx antenna. The EUT (if floor-standing) was placed directly on the flush-mounted 360 degree rotating turntable. The EUT (if table-top) was placed directly on an 80cm high non-metallic table, and the table was placed on the rotating turntable. During the initial EMI scan, all the suspect frequencies, i.e.; harmonics, broadband signals were checked with the Rx broadband antennas in both vertical and horizontal polarities. The biconical Rx, log periodic Rx, and horn Rx antennas were used from 30MHz – 299.99MHz, 300MHz – 1000MHz, and 1GHz – 18GHz respectively.

Upon completion of all harmonic and broadband measurements, the balance of any remaining frequencies was checked between 30MHz – 18GHz. Any signals appearing within 20 dB of the classification limit was measured. Each signal was maximized by first rotating the turntable at least 360 degrees and recording the azimuth in the data sheet. Lastly, the Rx antenna was raised and/or lowered to maximize the signal elevation. If the measured signal was obtained using the peak detector and that signal appeared within 3 dB of the regulatory limit line, then the same signal was re-measured using the quasi-peak detector on the EMI receiver. Both meter readings if necessary were recorded on the data sheet.

Climatic Conditions:
The EUT was tested within its intended operating and climatic conditions.



# APPENDIX A

# *TEST DATA*

## AC POWER PORT - CONDUCTED EMISSIONS TEST RESULTS

| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 04/26/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | RC |
| **SERIAL NUMBER:** | None | **SITE #:** | 1 |
| **CONFIGURATION:** | Tested with Group West Power Adaptor | **TEMPERATURE:** | 24 deg. C |
| | | **HUMIDITY:** | 40% |
| | | **TIME:** | 2:30 PM |

| | |
|---|---|
| **Description:** | Conducted Power RF Emissions (150 kHz – 30 MHz) |
| **Results:** | **PASSED** Limits |
| **Note:** | Conducted Emissions Measurements were performed on the EUT with the power source set at the following voltage.<br>• 120VAC / 60Hz |

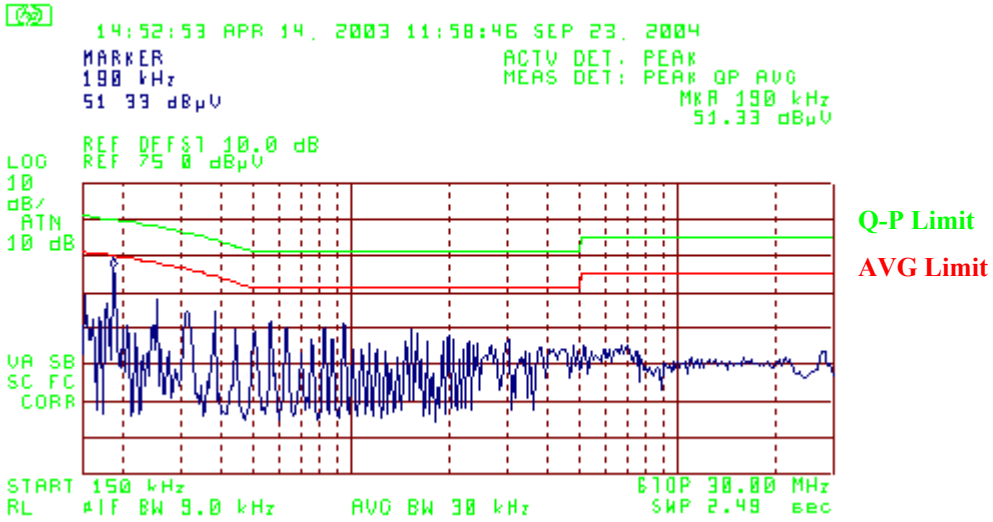
| **Conducted Limits** | | |
|---|---|---|
| **Frequency (MHz)** | **Quasi-Peak Limit (dBuV)** | **Average Limit (dBuV)** |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

*Decreases with the logarithm of the frequency.

AC Power Port – Conducted Emissions Test Results (Continued)

***Group West Power Adapter @ 120VAC / 60Hz (LANTR-070125-04)***

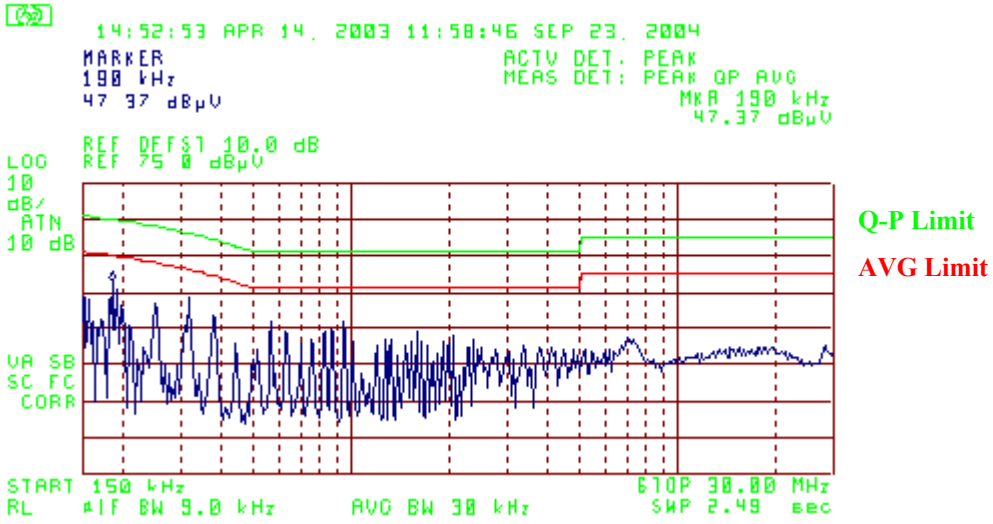
| FCC Part 15 CLASS B CONDUCTED EMISSIONS – LINE 1 | | | | | | |
|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Detector (PK/QP/AV)* | *Average Limit (dBuV)* | *Average Delta(dB)* | *Quasi-Peak Limit (dBuV)* | *Quasi-Peak Delta(dB)* |
| 0.1500 | 43.68 | PK | 56.00 | -12.32 | 66.00 | -22.32 |
| 0.1800 | 41.93 | PK | 55.14 | -13.21 | 65.14 | -23.21 |
| 0.1900 | 51.33 | PK | 54.86 | -3.53 | 64.86 | -13.53 |
| 0.2600 | 42.42 | PK | 52.86 | -10.44 | 62.86 | -20.44 |
| 0.3200 | 39.26 | PK | 51.14 | -11.88 | 61.14 | -21.88 |
| 0.3800 | 39.28 | PK | 49.43 | -10.15 | 59.43 | -20.15 |



AC Power Port – Conducted Emissions Test Results (Continued)

***Group West Power Adapter @ 120VAC / 60Hz (LANTR-070125-04)***

| FCC Part 15 CLASS B CONDUCTED EMISSIONS – LINE 2 | | | | | | |
|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Detector (PK/QP/AV)* | *Average Limit (dBuV)* | *Average Delta(dB)* | *Quasi-Peak Limit (dBuV)* | *Quasi-Peak Delta(dB)* |
| 0.1500 | 43.31 | PK | 56.00 | -12.69 | 66.00 | -22.69 |
| 0.1600 | 42.68 | PK | 55.71 | -13.03 | 65.71 | -23.03 |
| 0.1900 | 47.37 | PK | 54.86 | -7.49 | 64.86 | -17.49 |
| 0.2000 | 45.51 | PK | 54.57 | -9.06 | 64.57 | -19.06 |
| 0.2500 | 41.46 | PK | 53.14 | -11.68 | 63.14 | -21.68 |
| 0.3200 | 43.14 | PK | 51.14 | -8.00 | 61.14 | -18.00 |



## RADIATED EMISSIONS TEST RESULTS

| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 05/07/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | BM |
| **SERIAL NUMBER:** | None | **SITE #:** | 2 |
| **CONFIGURATION:** | Tested with a U.S. Robotics 5 dBi antenna | **TEMPERATURE:** | 13 deg. C |
| | | **HUMIDITY:** | 62% RH |
| | | **TIME:** | 9:00 PM |

| | |
|---|---|
| **Description:** | Radiated RF Emissions (30 MHz – 1000 MHz) |
| **Results:** | **PASSED** Horizontal and Vertical Antenna Polarizations Class B Limits |
| **Note:** | During preliminary scans, there wasn't any difference which channel or data rate was used with the EUT; therefore only 802.11b mode at Channel 1 with a data rate of 1 Mbps was used for final testing. |

| **Radiated Limits** | |
|---|---|
| **Frequency (MHz)** | **Quasi-Peak Limit (dBuV)** |
| 30-88 | 40 |
| 88-216 | 43.52 |
| 216-960 | 46.02 |
| 960-1000 | 54 |

Radiated Emissions Sample Calculations

Corrected Meter Reading = Meter Reading + F +C - D

Where, F = Antenna Factor
C = Cable Factor
G = Amplifier Gain
D = Distance Factor (if applicable)

Therefore, the equation for determining the Corrected Meter Reading Limit (CML) is:

CML = Specification Limit - F - C + D

Radiated Emissions Test Results (Continued)

***U.S. Robotics @ 120VAC/60Hz (LANTR-070125-13)***

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *10 Meter Distance Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* |
| 125.00 | 11.17 | 400 | 180 | | | 2.46 | 11.35 | 10.46 | 35.44 | 43.50 | -8.06 |
| 150.00 | 8.56 | 400 | 180 | | | 2.53 | 12.20 | 10.46 | 33.75 | 43.50 | -9.75 |
| 225.01 | 6.74 | 400 | 45 | | | 2.75 | 16.30 | 10.46 | 36.25 | 46.00 | -9.75 |
| 250.00 | 16.13 | 400 | 315 | 11.46 | Q | 2.91 | 17.30 | 10.46 | 42.13 | 46.00 | -3.87 |
| 319.98 | 12.78 | 300 | 315 | | | 3.13 | 14.94 | 10.46 | 41.30 | 46.00 | -4.70 |
| 375.00 | 6.37 | 400 | 180 | | | 3.35 | 14.90 | 10.46 | 35.08 | 46.00 | -10.93 |
| 385.00 | 8.87 | 400 | 0 | | | 3.39 | 15.02 | 10.46 | 37.74 | 46.00 | -8.26 |
| 500.03 | 7.81 | 400 | 0 | | | 3.84 | 19.00 | 10.46 | 41.11 | 46.00 | -4.89 |
| 630.00 | 5.66 | 400 | 135 | | | 4.30 | 19.44 | 10.46 | 39.86 | 46.00 | -6.14 |

| RADIATED EMISSIONS - Vertical Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *10 Meter Distance Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* |
| 30.01 | 12.07 | 100 | 180 | 9.57 | Q | 2.81 | 12.80 | 10.46 | 35.64 | 40.00 | -4.36 |
| 34.99 | 10.00 | 100 | 180 | | | 2.75 | 11.65 | 10.46 | 34.86 | 40.00 | -5.14 |
| 125.00 | 11.51 | 100 | 180 | | | 2.46 | 11.30 | 10.46 | 35.73 | 43.50 | -7.77 |
| 149.98 | 8.81 | 100 | 135 | | | 2.53 | 11.70 | 10.46 | 33.50 | 43.50 | -10.00 |
| 200.00 | 6.84 | 100 | 225 | | | 2.68 | 15.60 | 10.46 | 35.58 | 43.50 | -7.92 |
| 220.02 | 6.31 | 100 | 90 | | | 2.74 | 16.96 | 10.46 | 36.47 | 46.00 | -9.53 |
| 250.00 | 14.12 | 100 | 90 | 11.90 | Q | 2.91 | 18.40 | 10.46 | 43.67 | 46.00 | -2.33 |
| 300.01 | 7.14 | 100 | 315 | | | 3.05 | 14.20 | 10.46 | 34.85 | 46.00 | -11.15 |
| 320.00 | 6.42 | 100 | 45 | | | 3.13 | 15.64 | 10.46 | 35.65 | 46.00 | -10.35 |
| 375.04 | 7.98 | 100 | 90 | | | 3.35 | 15.20 | 10.46 | 36.99 | 46.00 | -9.01 |
| 385.01 | 8.08 | 100 | 45 | | | 3.39 | 15.52 | 10.46 | 37.45 | 46.00 | -8.55 |
| 479.97 | 6.82 | 100 | 180 | | | 3.77 | 18.06 | 10.46 | 39.11 | 46.00 | -6.89 |
| 500.04 | 8.61 | 100 | 45 | | | 3.84 | 17.90 | 10.46 | 40.81 | 46.00 | -5.19 |
| 505.20 | 10.22 | 200 | 90 | | | 3.86 | 18.15 | 10.46 | 42.69 | 46.00 | -3.31 |
| 625.03 | 7.15 | 100 | 135 | | | 4.28 | 19.70 | 10.46 | 41.59 | 46.00 | -4.41 |

NOTE: The measurements were taken at 3 meters and extrapolated to 10 meters.

## RADIATED EMISSIONS TEST RESULTS

| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 05/03/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | BM |
| **SERIAL NUMBER:** | None | **SITE #:** | 2 |
| **CONFIGURATION:** | Tested in **802.11b (2400-2483.5 MHz) mode** with a U.S. Robotics 5dBi antenna. | **TEMPERATURE:** | 17 deg. C |
| | | **HUMIDITY:** | 40% RH |
| | | **TIME:** | 5:00 PM |

| | |
|---|---|
| **Description:** | Radiated RF Emissions (1 GHz – 18 GHz) |
| **Results:** | **PASSED** Horizontal and Vertical Antenna Polarizations Class B Limits |
| **Note:** | Radiated Emissions Measurements were performed on the EUT with power supply set at the following voltage and frequency.<br>• 120VAC / 60 Hz. |

| **Unwanted Spurious Emissions Limits** | | | |
|---|---|---|---|
| **Frequency (MHz)** | **Field Strength (uV/m)** | **Field Strength (dBuV/m) (Emissions in the restricted bands)** | **Field Strength (dBm/MHz) (Emissions outside the restricted bands)** |
| Above 960 | 500 | 54.00 (Average)<br>74.00 (Peak) | < -20 dBc |

Radiated Emissions Sample Calculations

Corrected Meter Reading = Meter Reading + F +C - D

Where, F = Antenna Factor
C = Cable Factor
G = Amplifier Gain
D = Distance Factor (if applicable)

Therefore, the equation for determining the Corrected Meter Reading Limit (CML) is:

CML = Specification Limit - F - C + D

Radiated Emissions Test Results (Continued)

*Fundamental Measurements in **802.11b mode (2400-2483.5 MHz)***
*Channels 1, 6, & 11*
***Continuous TX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-08*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2412.00 | 64.83 | 100 | 225 | | | 1.99 | 31.31 | 98.13 | | | **Ch. 1** |
| 2412.00 | | | | 61.09 | A | 1.99 | 31.31 | 94.39 | | | |
| 2437.00 | 61.83 | 100 | 225 | | | 2.00 | 31.36 | 95.19 | | | **Ch. 6** |
| 2437.00 | | | | 58.28 | A | 2.00 | 31.36 | 91.64 | | | |
| 2462.00 | 63.50 | 125 | 225 | | | 2.01 | 31.42 | 96.93 | | | **Ch. 11** |
| 2462.00 | | | | 55.99 | A | 2.01 | 31.42 | 89.42 | | | |

| RADIATED EMISSIONS – Vertical Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2412.00 | 77.50 | 100 | 225 | | | 1.99 | 30.19 | 109.68 | | | **Ch. 1** |
| 2412.00 | | | | 69.64 | A | 1.99 | 30.19 | 101.82 | | | |
| 2437.00 | 78.33 | 100 | 270 | | | 2.00 | 30.22 | 110.56 | | | **Ch. 6** |
| 2437.00 | | | | 74.62 | A | 2.00 | 30.22 | 106.85 | | | |
| 2462.00 | 77.17 | 100 | 270 | | | 2.01 | 30.25 | 109.44 | | | **Ch. 11** |
| 2462.00 | | | | 73.63 | A | 2.01 | 30.25 | 105.90 | | | |

NOTE: Fundamental signals measured to calculate the band edge field strengths using the “Marker Delta Method”.

Radiated Emissions Test Results (Continued)

*Band Edge Field Strength Measurements in **802.11b mode (2400-2483.5 MHz)***
*Channels 1 & 11*
***Continuous TX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-08*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2390.00 | | | | | | | | 45.63 | 74.00 | -28.37 | **Ch. 1** |
| 2390.00 | | | | | A | | | 32.39 | 54.00 | -21.61 | |
| 2400.00 | 30.67 | 100 | 225 | | | 1.98 | 31.28 | 63.93 | 78.13 | -14.19 | |
| 2483.50 | | | | | | | | 44.27 | 74.00 | -29.73 | **Ch. 11** |
| 2483.50 | | | | | A | | | 33.42 | 54.00 | -20.58 | |

| RADIATED EMISSIONS – Vertical Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2390.00 | | | | | | | | 57.18 | 74.00 | -16.82 | **Ch. 1** |
| 2390.00 | | | | | A | | | 39.82 | 54.00 | -14.18 | |
| 2400.00 | 33.00 | 100 | 225 | | | 1.98 | 30.18 | 65.16 | 89.68 | -24.52 | |
| 2483.50 | | | | | | | | 56.78 | 74.00 | -17.22 | **Ch. 11** |
| 2483.50 | | | | | A | | | 49.90 | 54.00 | -4.10 | |

NOTE: The "Band Edge Field Strength" was calculated using the "Fundamental" and "Conducted Band Edge" measurements per the "Marker-Delta Method" with the following formula:

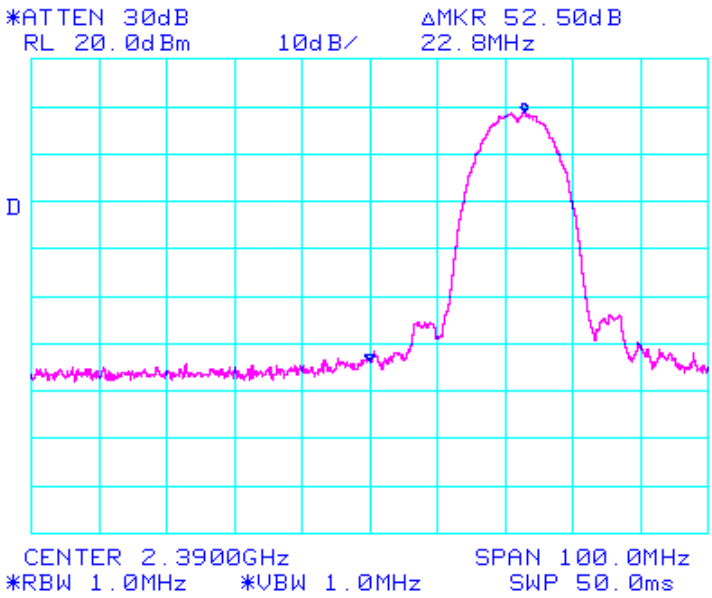
BE = Fm – Δm

Where
BE = Band Edge Field Strength
Fm = Measured Fundamental (Peak or Average)
Δm = Measured Conducted Band Edge Delta (Peak or Average)

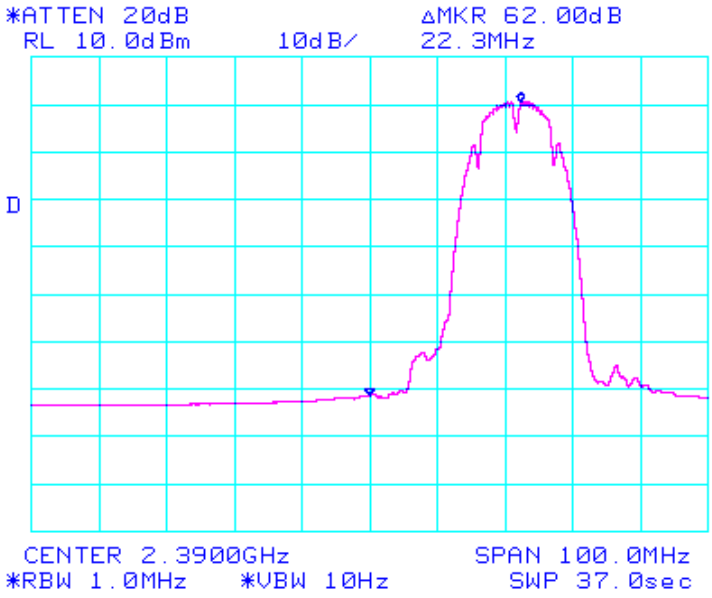
## Radiated Emissions Test Results (Continued)

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz band edge **PEAK DELTA** (LANTR-070125-02a01) | RC |



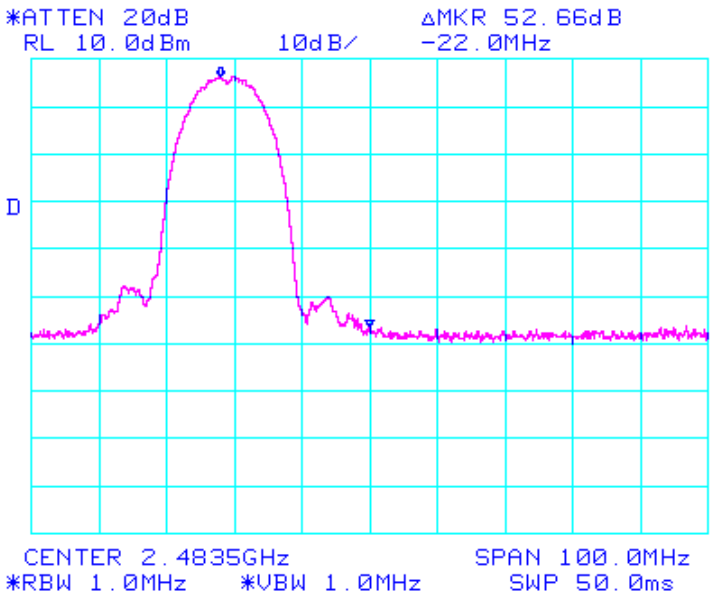

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz band edge **AVERAGE DELTA** (LANTR-070125-02a02) | RC |



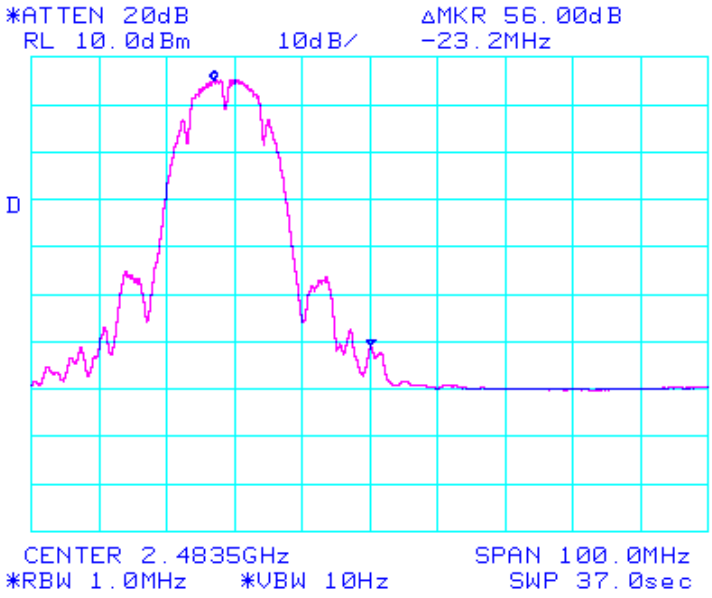
## Radiated Emissions Test Results (Continued)

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz band edge **PEAK DELTA** (LANTR-070125-02a03) | RC |




| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz band edge **AVERAGE DELTA** (LANTR-070125-02a04) | RC |



Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements in **802.11b mode (2400-2483.5 MHz)***
*Channels 1, 6, & 11*
***Continuous TX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-09*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.00 | 53.00 | 100 | 180 | | | 46.31 | 2.87 | 33.66 | 43.22 | 74.00 | -30.78 | Ch. 1 |
| 4824.00 | | | | 40.47 | A | 46.31 | 2.87 | 33.66 | 30.69 | 54.00 | -23.31 | |
| 4873.99 | 60.83 | 100 | 225 | | | 46.31 | 2.89 | 33.70 | 51.11 | 74.00 | -22.89 | Ch. 6 |
| 4873.99 | | | | 55.14 | A | 46.31 | 2.89 | 33.70 | 45.42 | 54.00 | -8.58 | |
| 4924.00 | 59.67 | 100 | 225 | | | 46.31 | 2.90 | 33.74 | 50.00 | 74.00 | -24.00 | Ch. 11 |
| 4924.00 | | | | 53.94 | A | 46.31 | 2.90 | 33.74 | 44.27 | 54.00 | -9.73 | |

| RADIATED EMISSIONS - Vertical Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.01 | 53.00 | 100 | 180 | | | 46.31 | 2.87 | 32.52 | 42.09 | 74.00 | -31.91 | Ch. 1 |
| 4824.01 | | | | 41.37 | A | 46.31 | 2.87 | 32.52 | 30.46 | 54.00 | -23.54 | |
| 9648.01 | 51.33 | 100 | 225 | | | 44.57 | 4.15 | 35.01 | 45.91 | 56.99 | -11.08 | |
| 4873.99 | 61.33 | 100 | 135 | | | 46.31 | 2.89 | 32.57 | 50.48 | 74.00 | -23.52 | Ch. 6 |
| 4873.99 | | | | 53.48 | A | 46.31 | 2.89 | 32.57 | 42.63 | 54.00 | -11.37 | |
| 4924.05 | 59.00 | 100 | 135 | | | 46.31 | 2.90 | 32.62 | 48.21 | 74.00 | -25.79 | Ch. 11 |
| 4924.05 | | | | 52.49 | A | 46.31 | 2.90 | 32.62 | 41.70 | 54.00 | -12.30 | |

Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements in **802.11b mode (2400-2483.5 MHz)***
*Channels 1, 6, & 11*
***Continuous RX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-09*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.00 | 52.83 | 100 | 180 | | | 46.31 | 2.87 | 33.66 | 43.05 | 74.00 | -30.95 | Ch. 1 |
| 4824.00 | | | | 40.47 | A | 46.31 | 2.87 | 33.66 | 30.69 | 54.00 | -23.31 | |
| 4874.00 | 52.00 | 100 | 180 | | | 46.31 | 2.89 | 33.70 | 42.28 | 74.00 | -31.72 | Ch. 6 |
| 4874.00 | | | | 39.74 | A | 46.31 | 2.89 | 33.70 | 30.02 | 54.00 | -23.98 | |
| 4924.00 | 53.17 | 100 | 180 | | | 46.31 | 2.90 | 33.74 | 43.50 | 74.00 | -30.50 | Ch. 11 |
| 4924.00 | | | | 40.25 | A | 46.31 | 2.90 | 33.74 | 30.58 | 54.00 | -23.42 | |

| RADIATED EMISSIONS - Vertical Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.00 | 52.17 | 100 | 180 | | | 46.31 | 2.87 | 32.52 | 41.26 | 74.00 | -32.74 | Ch. 1 |
| 4824.00 | | | | 40.38 | A | 46.31 | 2.87 | 32.52 | 29.47 | 54.00 | -24.53 | |
| 4874.00 | 51.67 | 100 | 180 | | | 46.31 | 2.89 | 32.57 | 40.82 | 74.00 | -33.18 | Ch. 6 |
| 4874.00 | | | | 39.60 | A | 46.31 | 2.89 | 32.57 | 28.75 | 54.00 | -25.25 | |
| 4924.00 | 52.83 | 100 | 180 | | | 46.31 | 2.90 | 32.62 | 42.04 | 74.00 | -31.96 | Ch. 11 |
| 4924.00 | | | | 40.19 | A | 46.31 | 2.90 | 32.62 | 29.40 | 54.00 | -24.60 | |

## RADIATED EMISSIONS TEST RESULTS

| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 05/03/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | BM |
| **SERIAL NUMBER:** | None | **SITE #:** | 2 |
| **CONFIGURATION:** | Tested in **802.11g (2400-2483.5 MHz) mode** with a U.S. Robotics 5dBi antenna. | **TEMPERATURE:** | 17 deg. C |
| | | **HUMIDITY:** | 40% RH |
| | | **TIME:** | 5:00 PM |

| | |
|---|---|
| **Description:** | Radiated RF Emissions (1 GHz – 18 GHz) |
| **Results:** | **PASSED** Horizontal and Vertical Antenna Polarizations Class B Limits |
| **Note:** | Radiated Emissions Measurements were performed on the EUT with power supply set at the following voltage and frequency.<br>• 120VAC / 60 Hz. |

| **Unwanted Spurious Emissions Limits** | | | |
|---|---|---|---|
| **Frequency (MHz)** | **Field Strength (uV/m)** | **Field Strength (dBuV/m) (Emissions in the restricted bands)** | **Field Strength (dBm/MHz) (Emissions outside the restricted bands)** |
| Above 960 | 500 | 54.00 (Average)<br>74.00 (Peak) | < -20 dBc |

Radiated Emissions Sample Calculations

Corrected Meter Reading = Meter Reading + F +C - D

Where, F = Antenna Factor
C = Cable Factor
G = Amplifier Gain
D = Distance Factor (if applicable)

Therefore, the equation for determining the Corrected Meter Reading Limit (CML) is:

CML = Specification Limit - F - C + D

Radiated Emissions Test Results (Continued)

*Fundamental Measurements in **802.11g mode (2400-2483.5 MHz)***
*Channels 1, 6, & 11*
***Continuous TX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-08*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2412.00 | 62.33 | 100 | 225 | | | 1.99 | 31.31 | 95.63 | | | **Ch. 1** |
| 2412.00 | | | | 54.04 | A | 1.99 | 31.31 | 87.34 | | | |
| 2437.00 | 60.50 | 100 | 225 | | | 2.00 | 31.36 | 93.86 | | | **Ch. 6** |
| 2437.00 | | | | 52.51 | A | 2.00 | 31.36 | 85.87 | | | |
| 2462.00 | 61.17 | 100 | 225 | | | 2.01 | 31.42 | 94.60 | | | **Ch. 11** |
| 2462.00 | | | | 52.04 | A | 2.01 | 31.42 | 85.47 | | | |

| RADIATED EMISSIONS – Vertical Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2412.00 | 75.33 | 100 | 225 | | | 1.99 | 30.19 | 107.51 | | | **Ch. 1** |
| 2412.00 | | | | 67.63 | A | 1.99 | 30.19 | 99.81 | | | |
| 2437.00 | 76.00 | 100 | 225 | | | 2.00 | 30.22 | 108.23 | | | **Ch. 6** |
| 2437.00 | | | | 67.01 | A | 2.00 | 30.22 | 99.24 | | | |
| 2462.00 | 75.00 | 100 | 225 | | | 2.01 | 30.25 | 107.27 | | | **Ch. 11** |
| 2462.00 | | | | 66.12 | A | 2.01 | 30.25 | 98.39 | | | |

NOTE: Fundamental signals measured to calculate the band edge field strengths using the “Marker Delta Method”.

Radiated Emissions Test Results (Continued)

*Band Edge Field Strength Measurements in **802.11g mode (2400-2483.5 MHz)***
*Channels 1 & 11*
***Continuous TX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-08*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2390.00 | | | | | | | | 51.80 | 74.00 | -22.20 | **Ch. 1** |
| 2390.00 | | | | | A | | | 38.01 | 54.00 | -15.99 | |
| 2400.00 | 38.00 | 100 | 225 | | | 1.98 | 31.28 | 71.26 | 75.63 | -4.36 | |
| 2483.50 | | | | | | | | 57.26 | 74.00 | -16.74 | **Ch. 11** |
| 2483.50 | | | | | A | | | 34.81 | 54.00 | -19.19 | |

| RADIATED EMISSIONS – Vertical Antenna Polarization | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 2390.00 | | | | | | | | 63.68 | 74.00 | -10.32 | **Ch. 1** |
| 2390.00 | | | | | A | | | 50.48 | 54.00 | -3.52 | |
| 2400.00 | 48.67 | 100 | 225 | | | 1.98 | 30.18 | 80.83 | 87.51 | -6.68 | |
| 2483.50 | | | | | | | | 69.93 | 74.00 | -4.07 | **Ch. 11** |
| 2483.50 | | | | | A | | | 47.73 | 54.00 | -6.27 | |

NOTE: The "Band Edge Field Strength" was calculated using the "Fundamental" and "Conducted Band Edge" measurements per the "Marker-Delta Method" with the following formula:

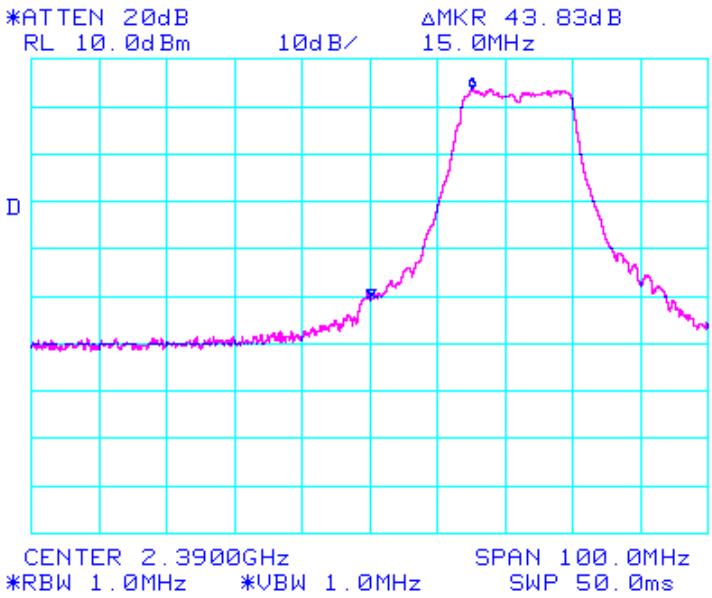
BE = Fm – Δm

Where
BE = Band Edge Field Strength
Fm = Measured Fundamental (Peak or Average)
Δm = Measured Conducted Band Edge Delta (Peak or Average)

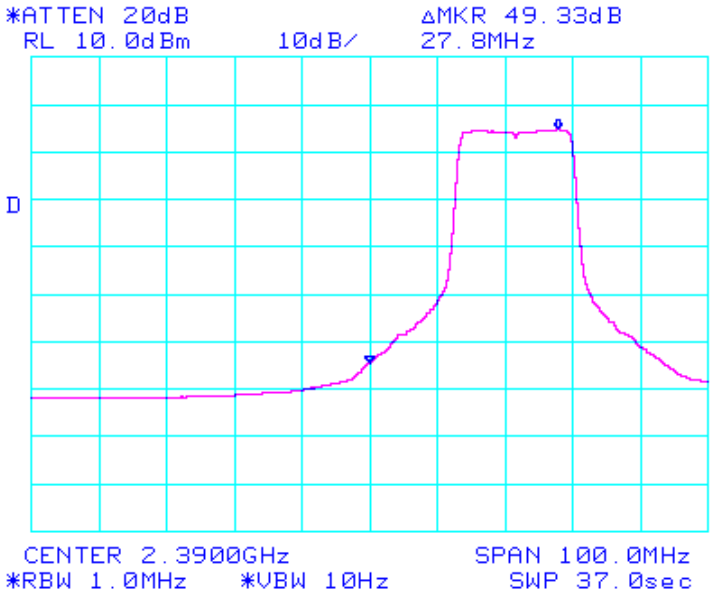
## Radiated Emissions Test Results (Continued)

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz band edge **PEAK DELTA** (LANTR-070125-03a01) | RC |



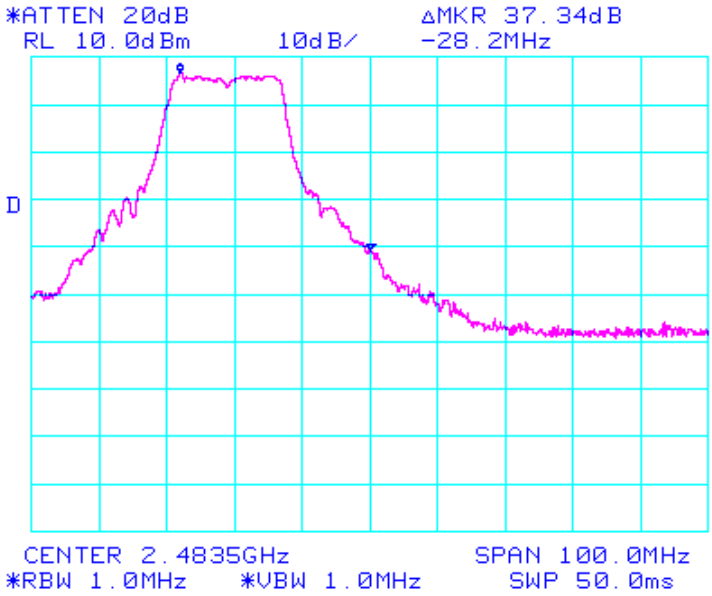

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz band edge **AVERAGE DELTA** (LANTR-070125-03a02) | RC |



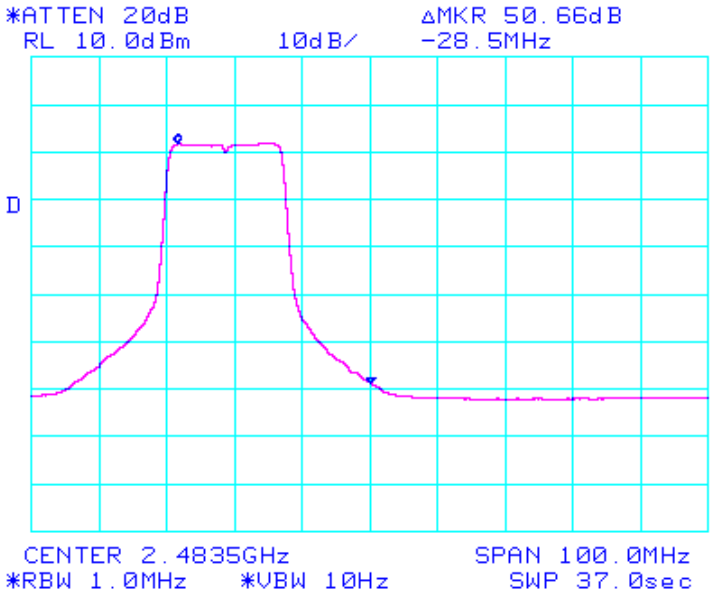
## Radiated Emissions Test Results (Continued)

Plots Showing Out-Of-Band Emissions (Peak RBW=VBW=1MHz; Average RBW = 1MHz, VBW = 10Hz)

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.4835 GHz band edge **PEAK DELTA** (LANTR-070125-03a03) | RC |




| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.4835 GHz band edge **AVERAGE DELTA** (LANTR-070125-03a04) | RC |



Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements in **802.11g mode (2400-2483.5 MHz)***
*Channels 1, 6, & 11*
***Continuous TX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-09*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.00 | 59.83 | 100 | 225 | | | 46.31 | 2.87 | 33.66 | 50.05 | 74.00 | -23.95 | **Ch. 1** |
| 4824.00 | | | | 46.79 | A | 46.31 | 2.87 | 33.66 | 37.01 | 54.00 | -16.99 | |
| 4873.99 | 59.00 | 100 | 225 | | | 46.31 | 2.89 | 33.70 | 49.28 | 74.00 | -24.72 | **Ch. 6** |
| 4873.99 | | | | 46.16 | A | 46.31 | 2.89 | 33.70 | 36.44 | 54.00 | -17.56 | |
| 4924.00 | 60.67 | 100 | 225 | | | 46.31 | 2.90 | 33.74 | 51.00 | 74.00 | -23.00 | **Ch. 11** |
| 4924.00 | | | | 47.52 | A | 46.31 | 2.90 | 33.74 | 37.85 | 54.00 | -16.15 | |

| RADIATED EMISSIONS - Vertical Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.01 | 57.83 | 100 | 135 | | | 46.31 | 2.87 | 32.52 | 46.92 | 74.00 | -27.08 | **Ch. 1** |
| 4824.01 | | | | 44.58 | A | 46.31 | 2.87 | 32.52 | 33.67 | 54.00 | -20.33 | |
| 4873.99 | 59.00 | 100 | 135 | | | 46.31 | 2.89 | 32.57 | 48.15 | 74.00 | -25.85 | **Ch. 6** |
| 4873.99 | | | | 45.79 | A | 46.31 | 2.89 | 32.57 | 34.94 | 54.00 | -19.06 | |
| 4924.05 | 57.17 | 100 | 135 | | | 46.31 | 2.90 | 32.62 | 46.38 | 74.00 | -27.62 | **Ch. 11** |
| 4924.05 | | | | 43.83 | A | 46.31 | 2.90 | 32.62 | 33.04 | 54.00 | -20.96 | |

Radiated Emissions Test Results (Continued)

*Spurious Emissions Measurements in **802.11g mode (2400-2483.5 MHz)***
*Channels 1, 6, & 11*
***Continuous RX** at MAIN Antenna port with **U.S. Robotics Antenna***
*Aegis Labs, Inc. File #: LANTR-070125-09*

| RADIATED EMISSIONS - Horizontal Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.00 | 53.00 | 100 | 180 | | | 46.31 | 2.87 | 33.66 | 43.22 | 74.00 | -30.78 | Ch. 1 |
| 4824.00 | | | | 40.16 | A | 46.31 | 2.87 | 33.66 | 30.38 | 54.00 | -23.62 | |
| 4874.00 | 52.50 | 100 | 180 | | | 46.31 | 2.89 | 33.70 | 42.78 | 74.00 | -31.22 | Ch. 6 |
| 4874.00 | | | | 39.46 | A | 46.31 | 2.89 | 33.70 | 29.74 | 54.00 | -24.26 | |
| 4924.00 | 52.17 | 100 | 180 | | | 46.31 | 2.90 | 33.74 | 42.50 | 74.00 | -31.50 | Ch. 11 |
| 4924.00 | | | | 40.00 | A | 46.31 | 2.90 | 33.74 | 30.33 | 54.00 | -23.67 | |

| RADIATED EMISSIONS - Vertical Antenna Polarization | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Freq. (MHz)* | *Meter Reading (dBuV)* | *Antenna Height (cm)* | *Azimuth (degrees)* | *Quasi pk or AVG (dBuV)* | | *Preamp Factor (dB)* | *Cable Factor (dB)* | *Ant. Factor (dB)* | *Corrected Reading (dBuV)* | *Limits (dBuV)* | *Diff (dB) +=FAIL* | *Comments* |
| 4824.00 | 52.00 | 100 | 180 | | | 46.31 | 2.87 | 32.52 | 41.09 | 74.00 | -32.91 | Ch. 1 |
| 4824.00 | | | | 40.19 | A | 46.31 | 2.87 | 32.52 | 29.28 | 54.00 | -24.72 | |
| 4874.00 | 51.67 | 100 | 180 | | | 46.31 | 2.89 | 32.57 | 40.82 | 74.00 | -33.18 | Ch. 6 |
| 4874.00 | | | | 39.53 | A | 46.31 | 2.89 | 32.57 | 28.68 | 54.00 | -25.32 | |
| 4924.00 | 52.83 | 100 | 180 | | | 46.31 | 2.90 | 32.62 | 42.04 | 74.00 | -31.96 | Ch. 11 |
| 4924.00 | | | | 40.06 | A | 46.31 | 2.90 | 32.62 | 29.27 | 54.00 | -24.73 | |

## PEAK TRANSMIT POWER

| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 04/26/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | JC |
| **SERIAL NUMBER:** | None | **SITE #:** | 1 |
| **CONFIGURATION:** | Tested with a U.S. Robotics 5 dBi antenna. | **TEMPERATURE:** | 18 deg C |
| | | **HUMIDITY:** | 46% |
| | | **TIME:** | 8:30AM |

| | |
|---|---|
| **Description:** | The maximum peak output power of the intentional radiator shall not exceed 1 watt. |
| **Results:** | See Data Sheet |
| **Note:** | Conducted Emissions Measurements were performed on the EUT with power supply set at the following voltage and frequency.<br>• 120VAC / 60 Hz. |

| **Peak Transmit Power Limits** | |
|---|---|
| **Frequency (MHz)** | **Output Power (W)** |
| 2412-2462 | 1 |

Peak Transmit Power (Continued)

| Mode | Channel | Frequency (MHz) | Rate (Mbps) | Average Power (dBm) | Average Power (mW) | Peak Power (dBm) | Peak Power (mW) |
|---|---|---|---|---|---|---|---|
| **802.11b** | 1 | 2412 | 1 | 14.46 | 27.93 | 16.80 | 47.86 |
| **802.11b** | 1 | 2412 | 5.5 | 14.43 | 27.73 | 16.29 | 42.56 |
| **802.11b** | 1 | 2412 | 11 | 14.36 | 27.29 | 16.75 | 47.32 |
| **802.11b** | 6 | 2437 | 1 | 14.00 | 25.12 | 16.40 | 43.65 |
| **802.11b** | 6 | 2437 | 5.5 | 13.92 | 24.66 | 15.83 | 38.28 |
| **802.11b** | 6 | 2437 | 11 | 13.95 | 24.83 | 16.32 | 42.85 |
| **802.11b** | 11 | 2462 | 1 | 14.25 | 26.61 | 16.64 | 46.13 |
| **802.11b** | 11 | 2462 | 5.5 | 14.25 | 26.61 | 16.09 | 40.64 |
| **802.11b** | 11 | 2462 | 11 | 14.16 | 26.06 | 16.56 | 45.29 |
| | | | | | | | |
| **802.11g** | 1 | 2412 | 6 | 12.56 | 18.03 | 19.82 | 95.94 |
| **802.11g** | 1 | 2412 | 36 | 12.50 | 17.78 | 19.80 | 95.50 |
| **802.11g** | 1 | 2412 | 54 | 12.60 | 18.20 | 19.65 | 92.26 |
| **802.11g** | 6 | 2437 | 6 | 12.00 | 15.85 | 19.60 | 91.20 |
| **802.11g** | 6 | 2437 | 36 | 11.90 | 15.49 | 19.50 | 89.13 |
| **802.11g** | 6 | 2437 | 54 | 11.90 | 15.49 | 19.30 | 85.11 |
| **802.11g** | 11 | 2462 | 6 | 12.30 | 16.98 | 19.70 | 93.33 |
| **802.11g** | 11 | 2462 | 36 | 12.20 | 16.60 | 19.60 | 91.20 |
| **802.11g** | 11 | 2462 | 54 | 12.30 | 16.98 | 19.49 | 88.92 |

NOTE: The output power measurement is conducted.

## 6dB EMISSIONS BANDWIDTH

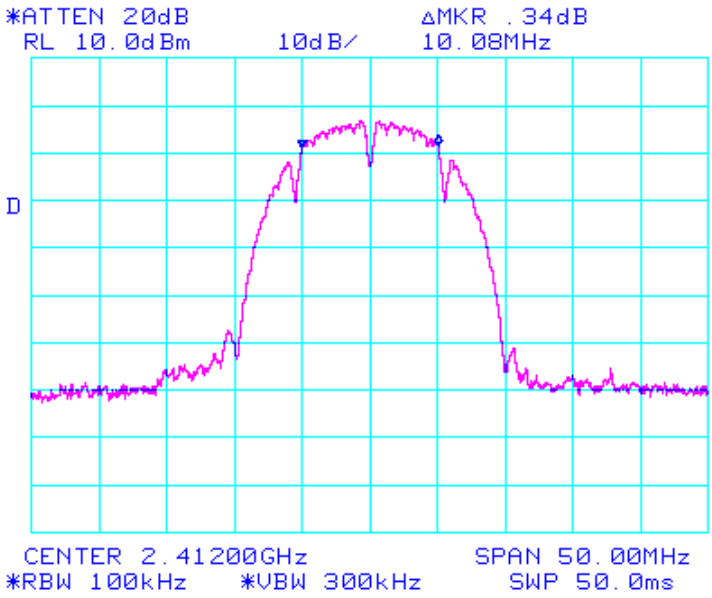
| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 04/26/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | RC |
| **SERIAL NUMBER:** | None | **SITE #:** | Chamber |
| **CONFIGURATION:** | Tested with a U.S. Robotics 5 dBi antenna. | **TEMPERATURE:** | N/A |
| | | **HUMIDITY:** | N/A |
| | | **TIME:** | N/A |

| | |
|---|---|
| **Description:** | The minimum 6 dB bandwidth shall be at least 500 kHz. |
| **Results:** | See Data Sheet |
| **Note:** | Conducted Emissions Measurements were performed on the EUT with power supply set at the following voltage and frequency.<br>• 120VAC / 60 Hz. |

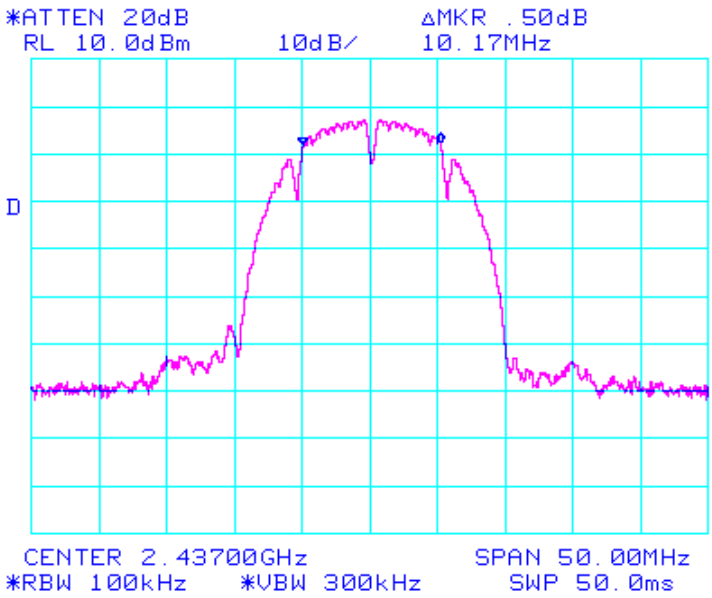
6 dB Emissions Bandwidth (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-02b1) | RC |



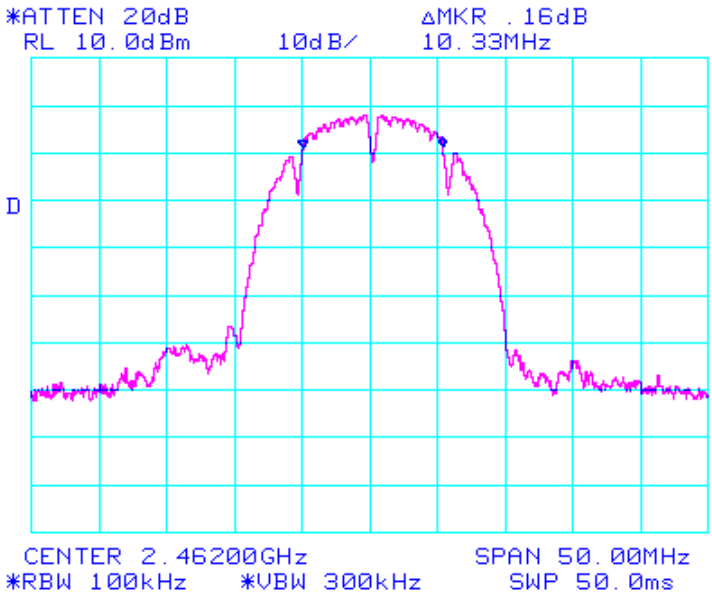

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-02b2) | RC |



6 dB Emissions Bandwidth (Continued)

***802.11b Mode***

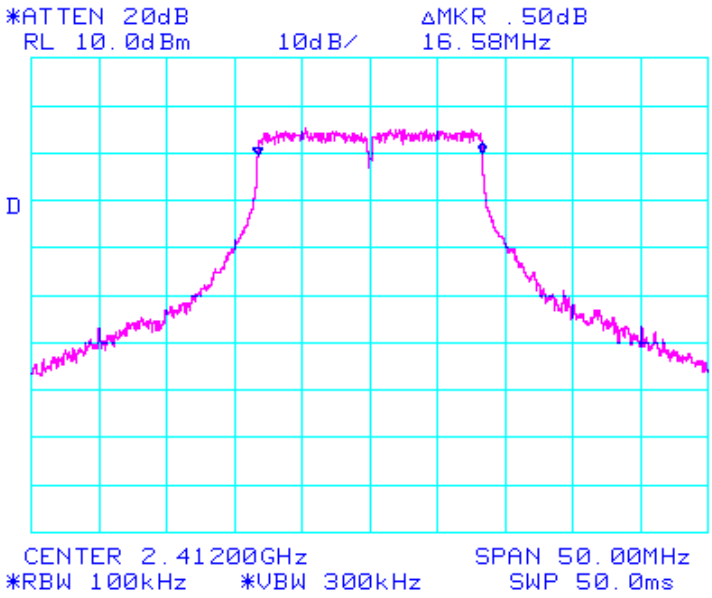
| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-02b3) | RC |



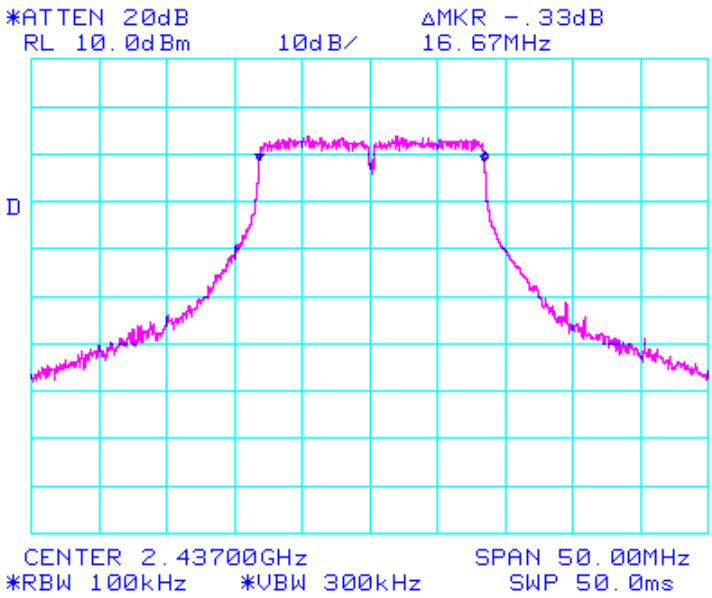
6 dB Emissions Bandwidth (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-03b1) | RC |



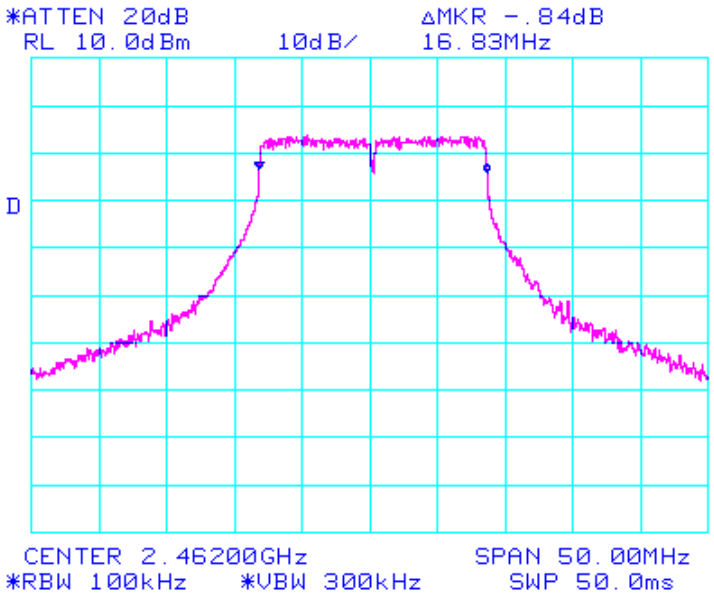

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-03b2) | RC |



6 dB Emissions Bandwidth (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-03b3) | RC |



## PEAK POWER SPECTRAL DENSITY

| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 06/05/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | JC |
| **SERIAL NUMBER:** | None | **SITE #:** | 1 |
| **CONFIGURATION:** | Tested with a U.S. Robotics 5 dBi antenna. | **TEMPERATURE:** | 22 deg C |
| | | **HUMIDITY:** | 56% |
| | | **TIME:** | 2:30 PM |

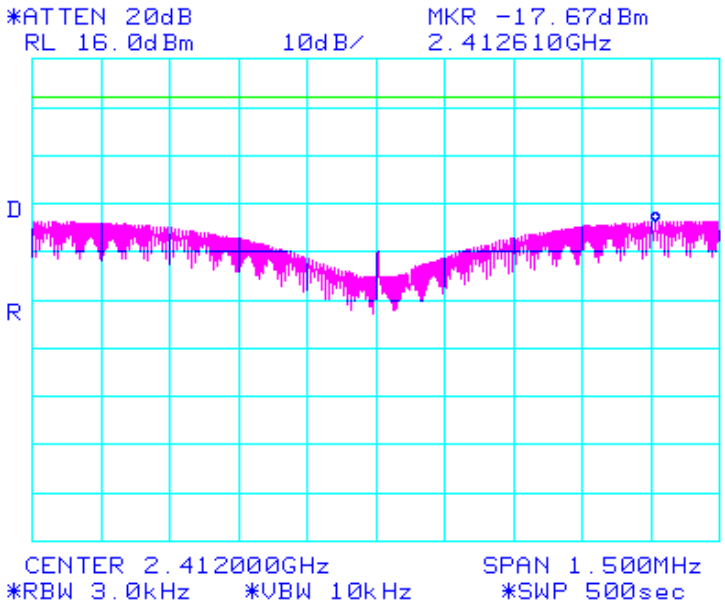
| | |
|---|---|
| **Description:** | The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. |
| **Results:** | See Data Sheet |
| **Note:** | Conducted Emissions Measurements were performed on the EUT with power supply set at the following voltage and frequency.<br>• 120VAC / 60 Hz. |

| **Peak Power Spectral Density Limits** | |
|---|---|
| Frequency (MHz) | Limit (dBm) |
| 2412-2462 | 8 |

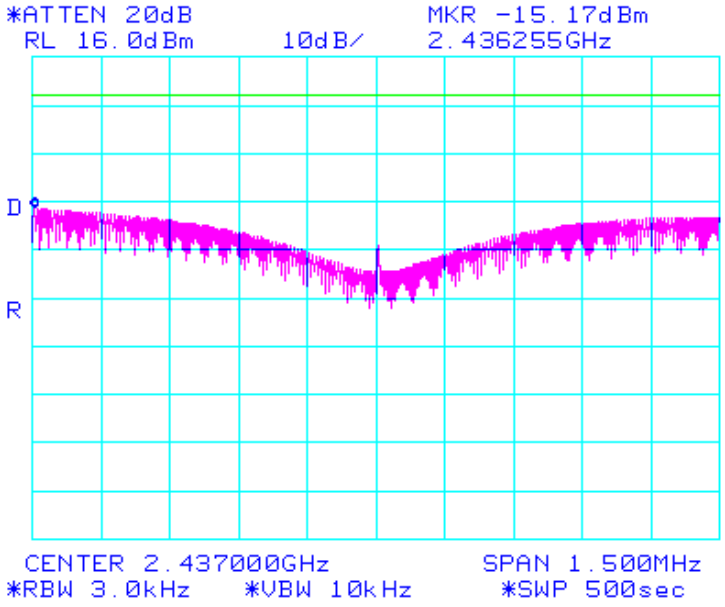
Peak Power Spectral Density (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 06/05/07 | 2.412 GHz<br>(LANTR-070125-02d1) | JC |



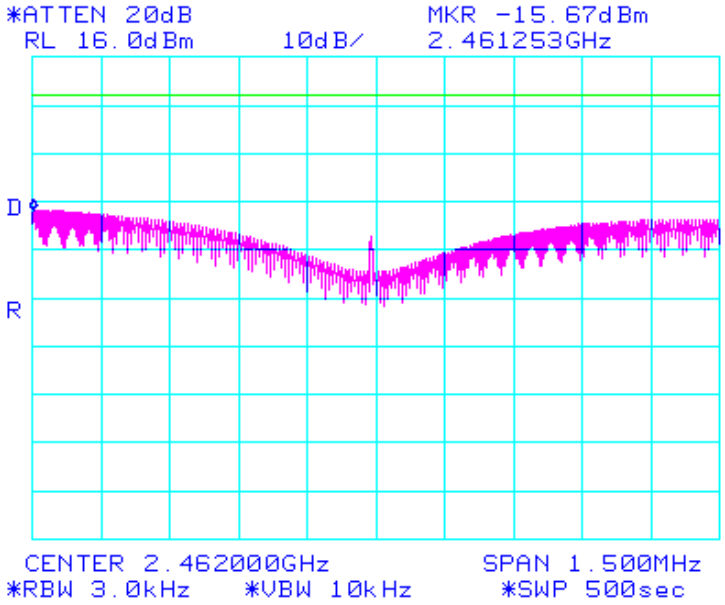

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 06/05/07 | 2.437 GHz<br>(LANTR-070125-02d2) | JC |



Peak Power Spectral Density (Continued)

***802.11b Mode***

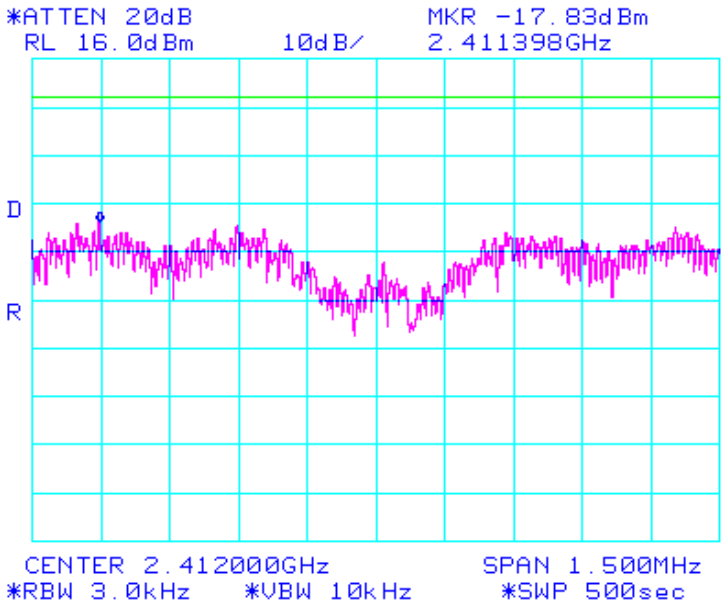
| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 06/05/07 | 2.462 GHz<br>(LANTR-070125-02d3) | JC |



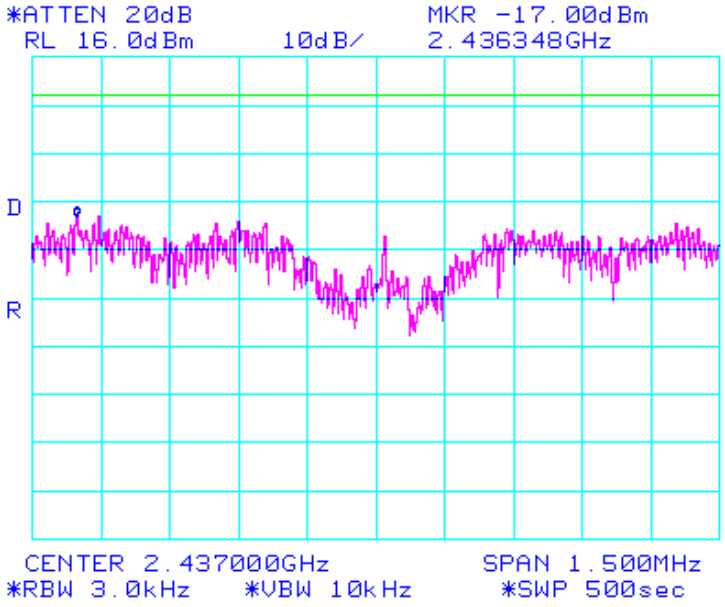
Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 06/05/07 | 2.412 GHz<br>(LANTR-070125-03d1) | JC |



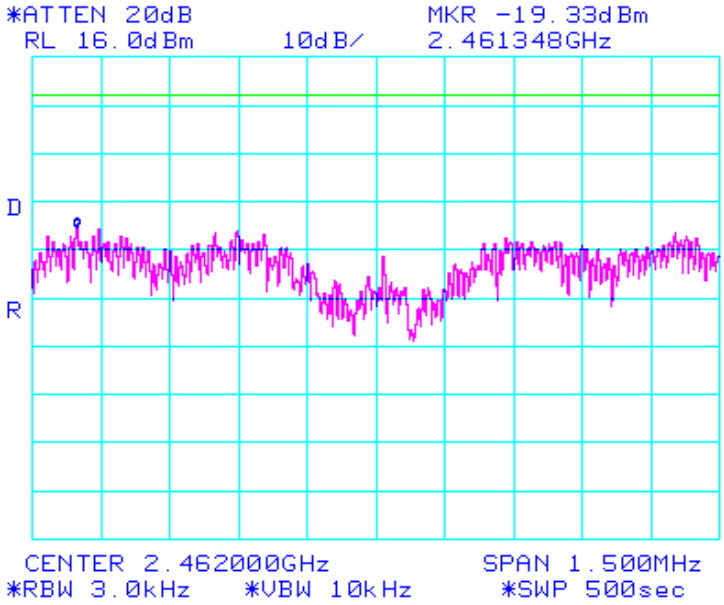

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 06/05/07 | 2.437 GHz<br>(LANTR-070125-03d2) | JC |



Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 06/05/07 | 2.462 GHz<br>(LANTR-070125-03d3) | JC |



## CONDUCTED OUT OF BAND EMISSIONS

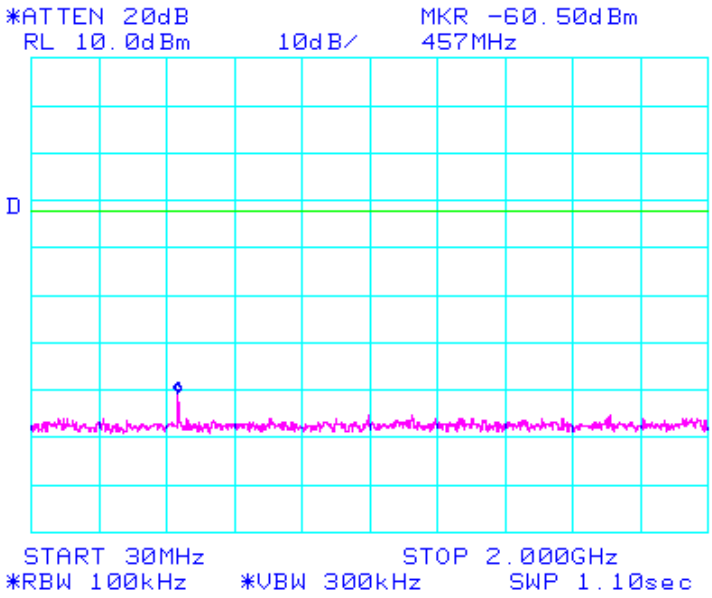
| | | | |
|---|---|---|---|
| **CLIENT:** | Lantronix Inc. | **DATE:** | 04/26/07 |
| **EUT:** | Wireless Device Server | **PROJECT NUMBER:** | LANTR-070125 |
| **MODEL NUMBER:** | Matchport B/G | **TEST ENGINEER:** | RC |
| **SERIAL NUMBER:** | None | **SITE #:** | Chamber |
| **CONFIGURATION:** | Tested with a U.S. Robotics 5 dBi antenna. | **TEMPERATURE:** | N/A |
| | | **HUMIDITY:** | N/A |
| | | **TIME:** | N/A |

| | |
|---|---|
| **Description:** | In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. |
| **Results:** | See Data Sheet |
| **Note:** | Conducted Emissions Measurements were performed on the EUT with power supply set at the following voltage and frequency.<br>• 120VAC / 60 Hz. |

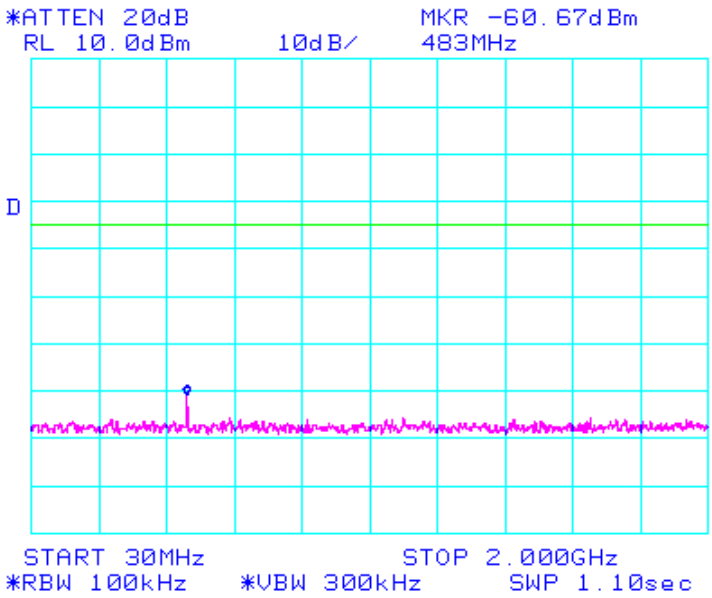
Peak Power Spectral Density (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-02e1) | RC |



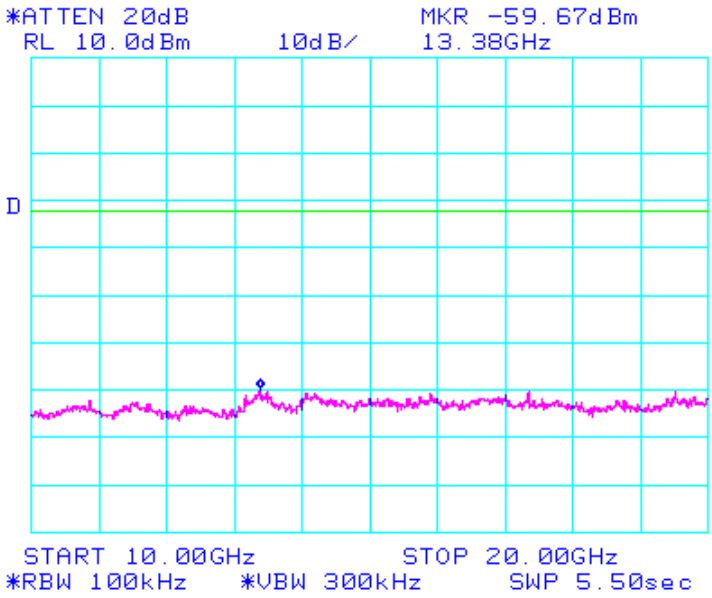

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-02e2) | RC |



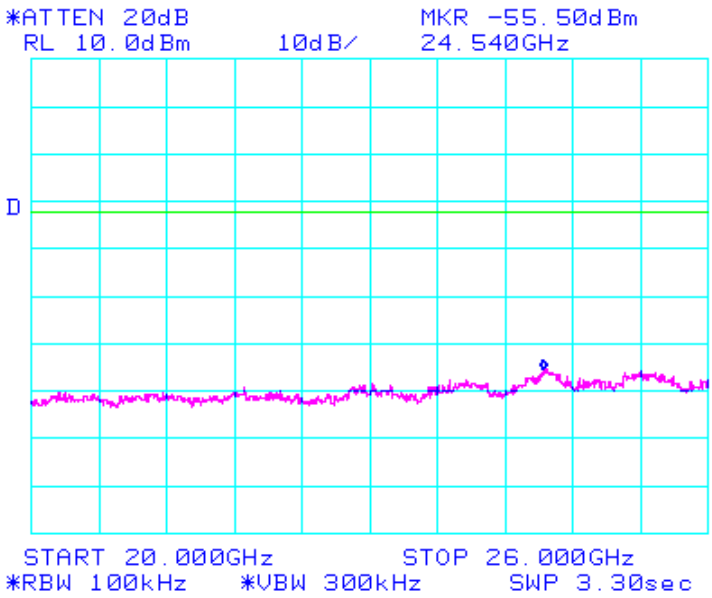
Peak Power Spectral Density (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-02e3) | RC |



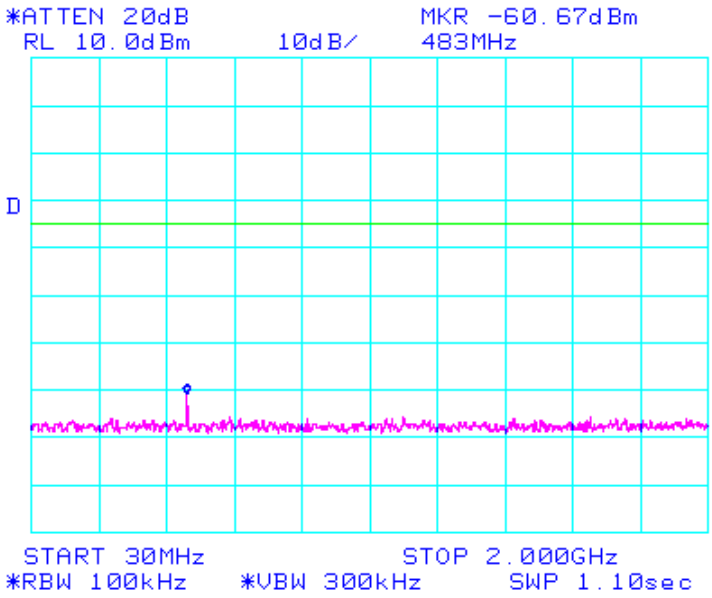

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-02e4) | RC |



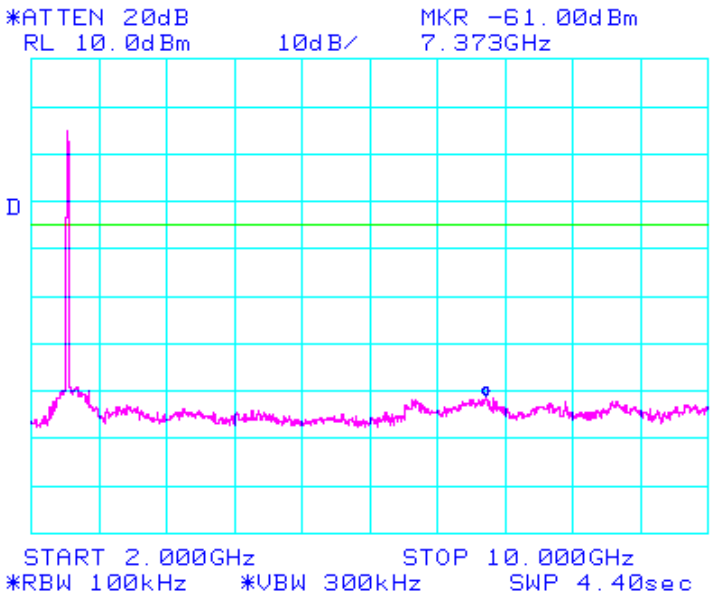
Peak Power Spectral Density (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-02e5) | RC |



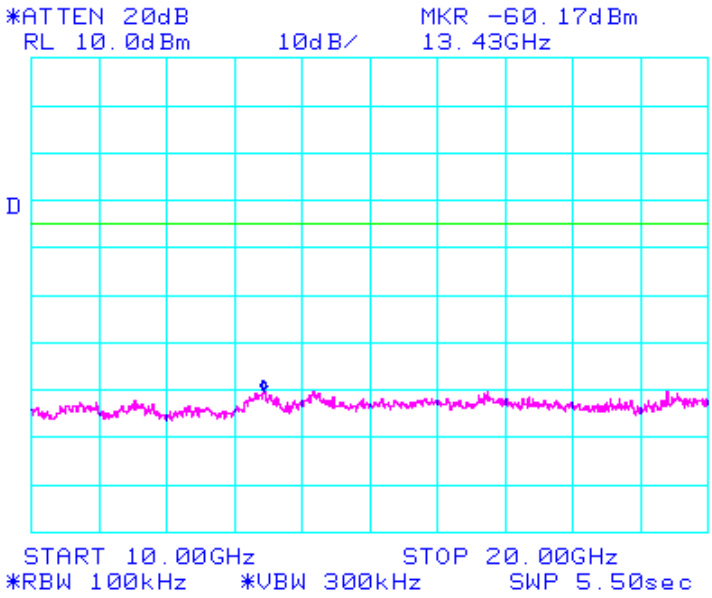

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-02e6) | RC |



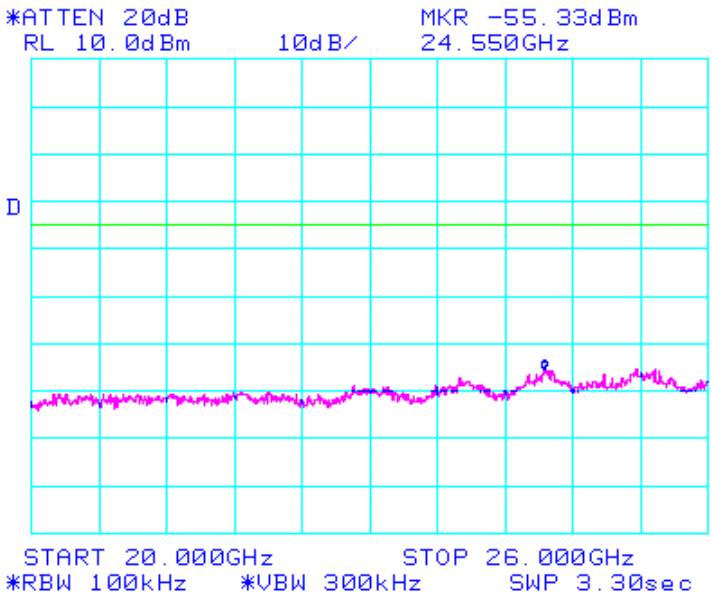
Peak Power Spectral Density (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-02e7) | RC |



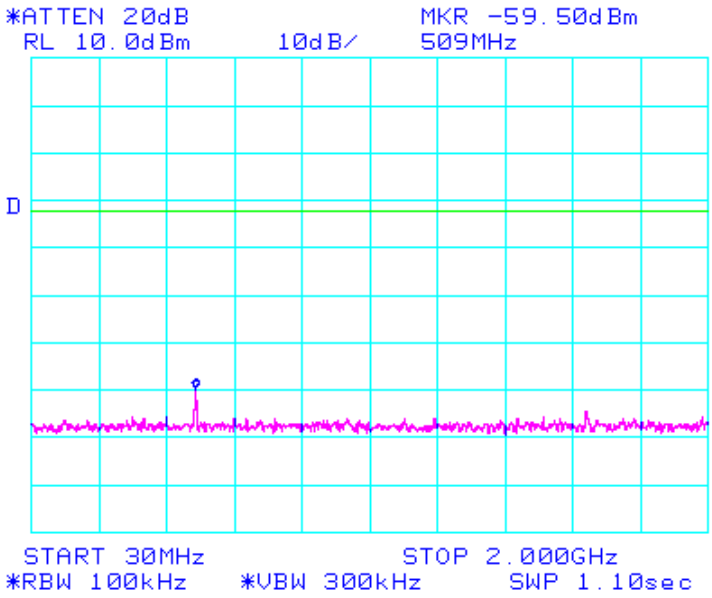

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-02e8) | RC |



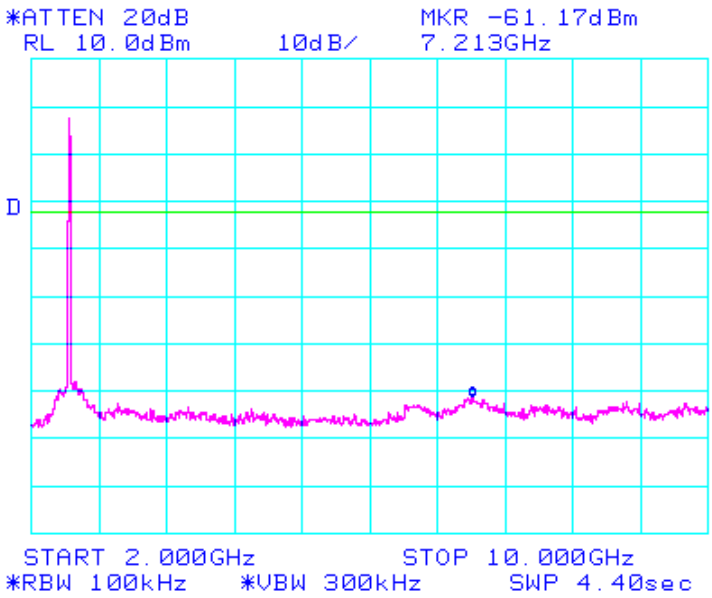
Peak Power Spectral Density (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-02e9) | RC |



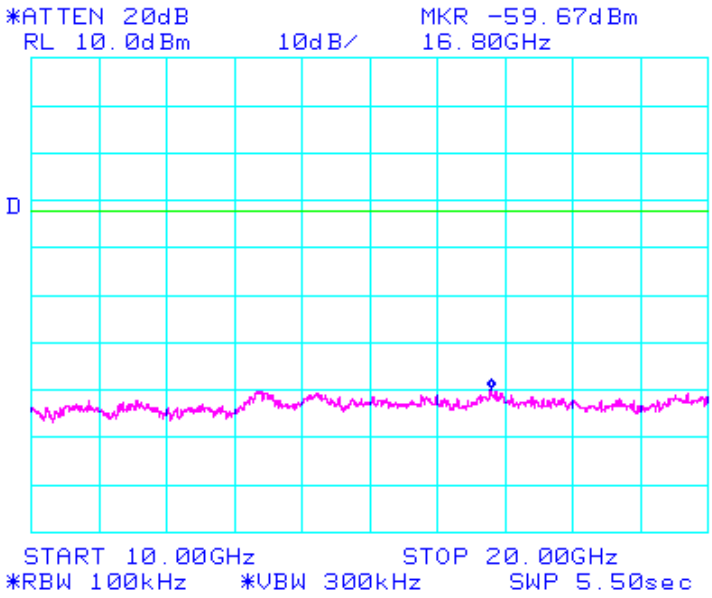

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-02e10) | RC |



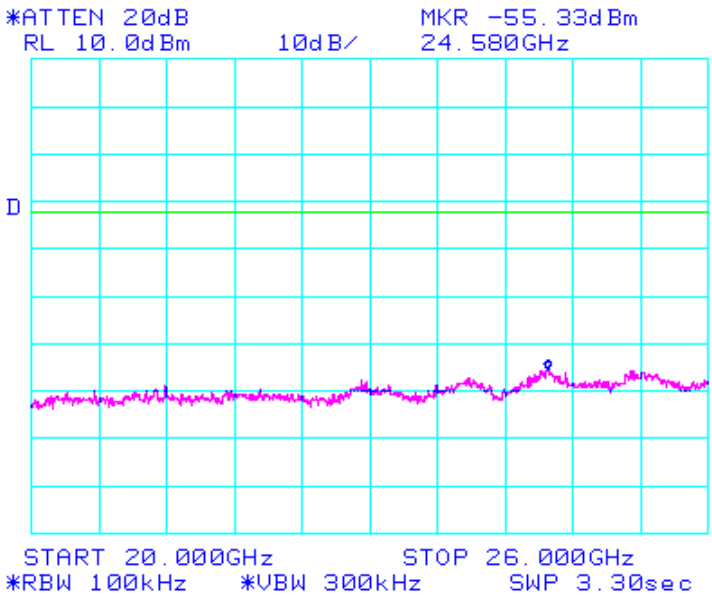
Peak Power Spectral Density (Continued)

***802.11b Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-02e11) | RC |



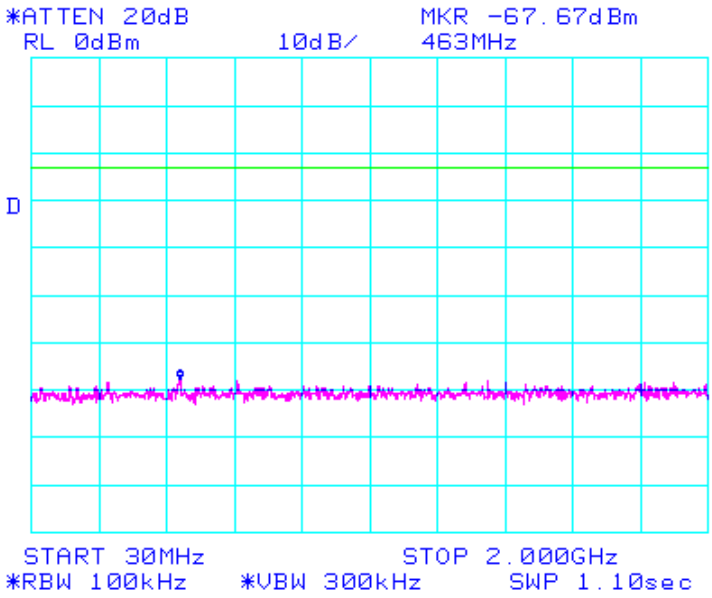

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-02e12) | RC |



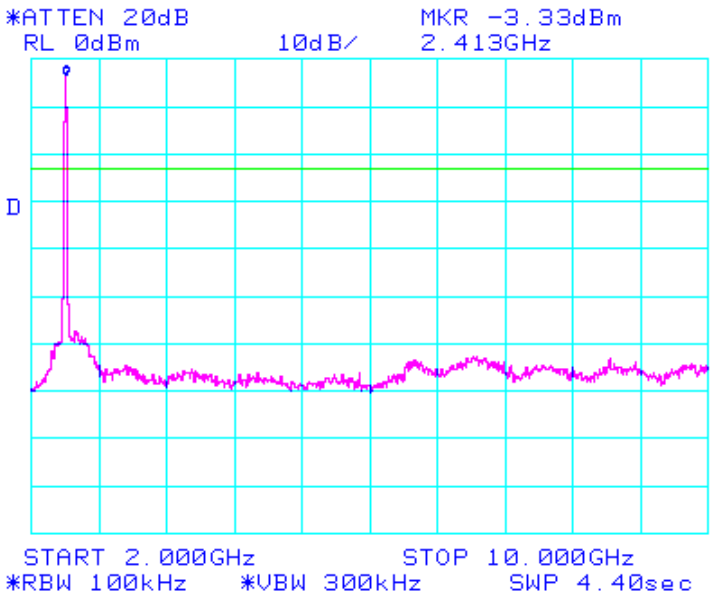
Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-03e1) | RC |



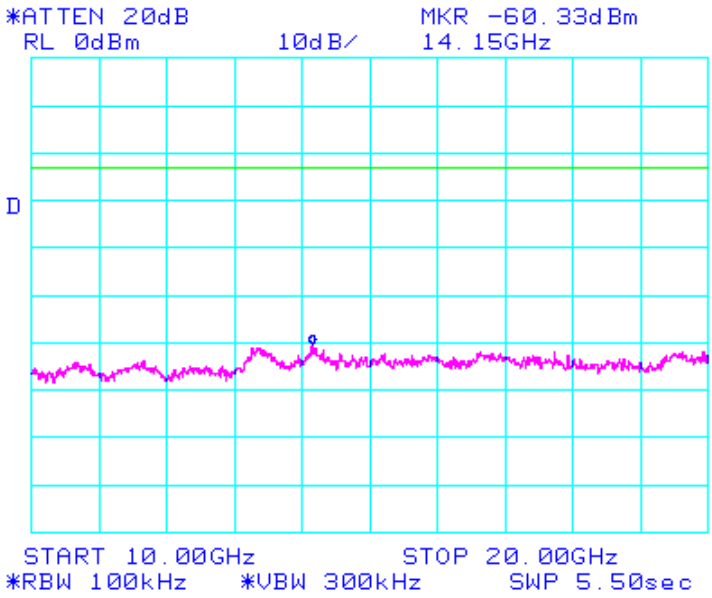

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-03e2) | RC |



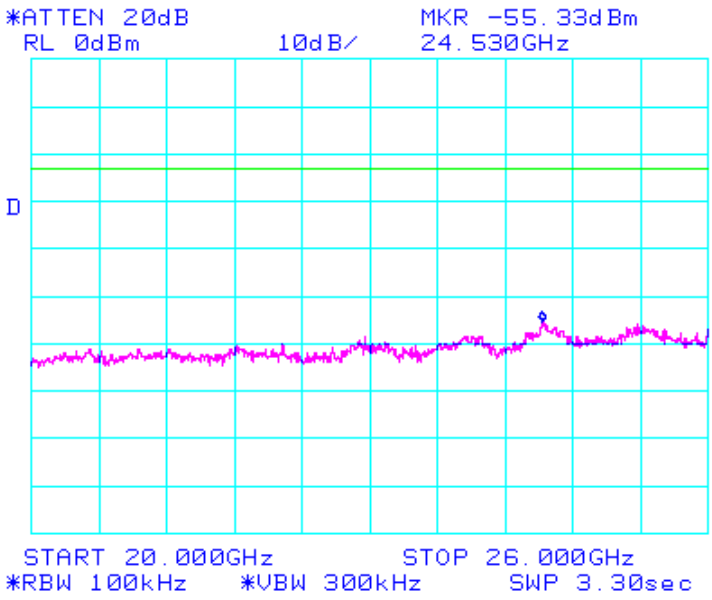
Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-03e3) | RC |



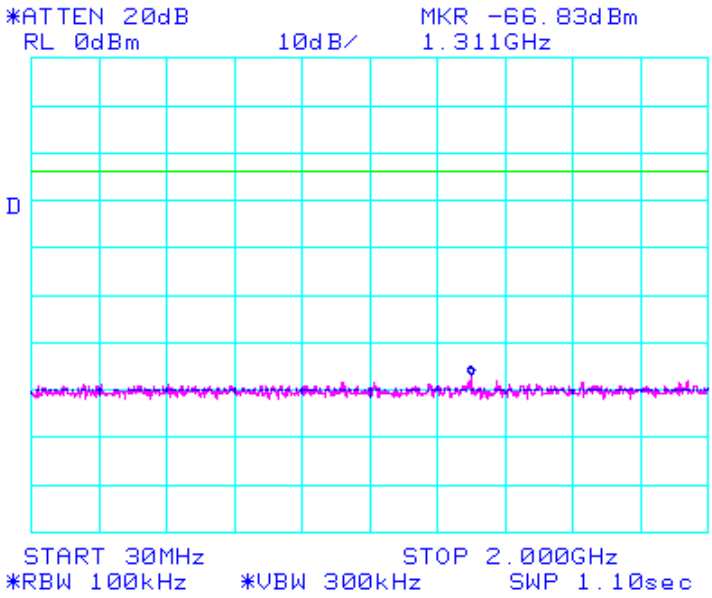

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.412 GHz<br>(LANTR-070125-03e4) | RC |



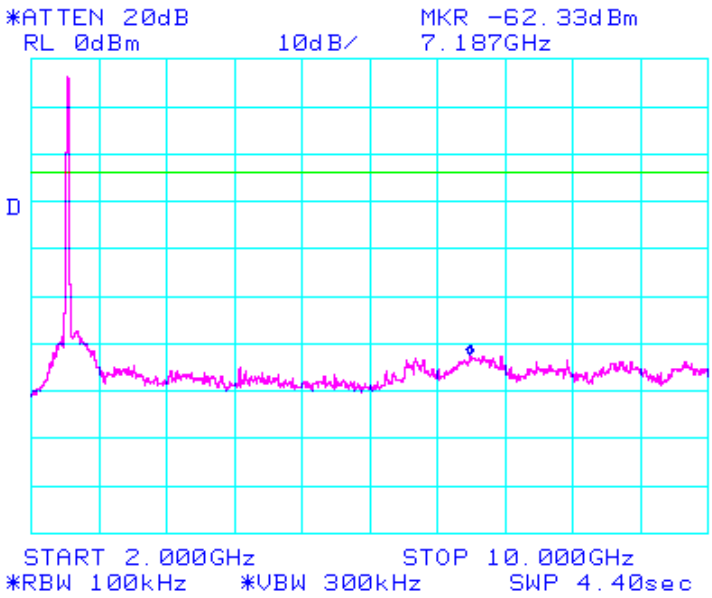
Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-03e5) | RC |



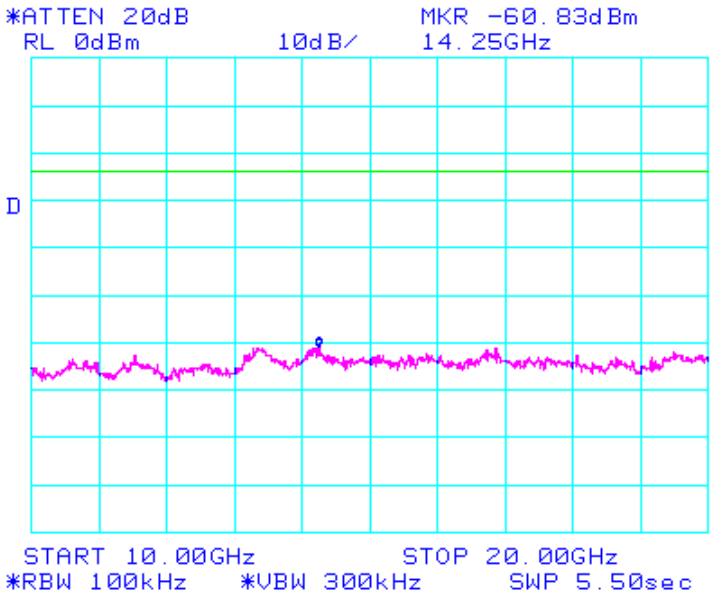

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-03e6) | RC |



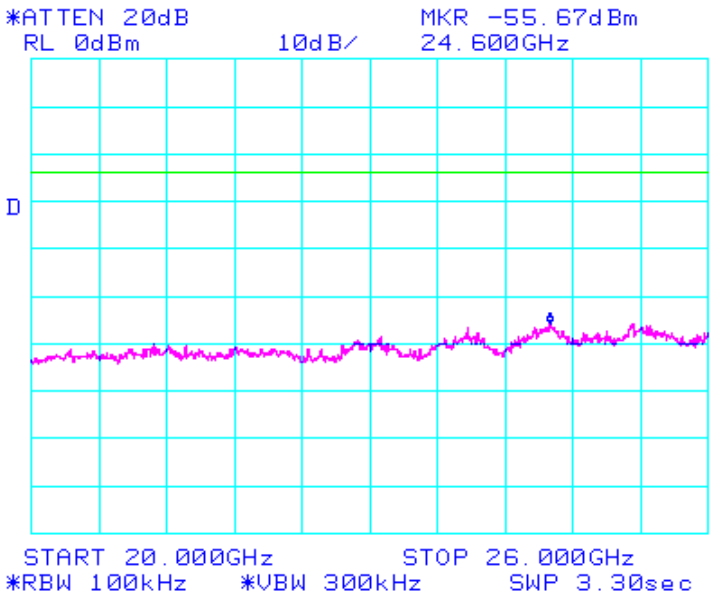
Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-03e7) | RC |



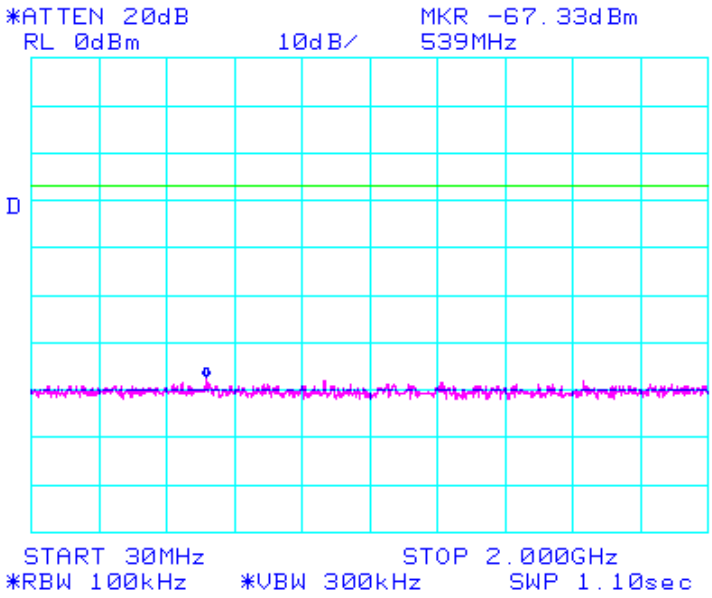

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.437 GHz<br>(LANTR-070125-03e8) | RC |



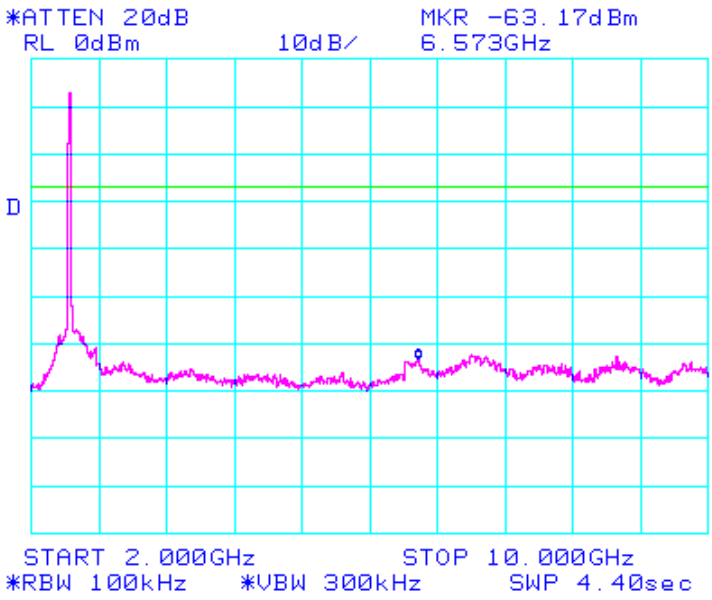
Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-03e9) | RC |



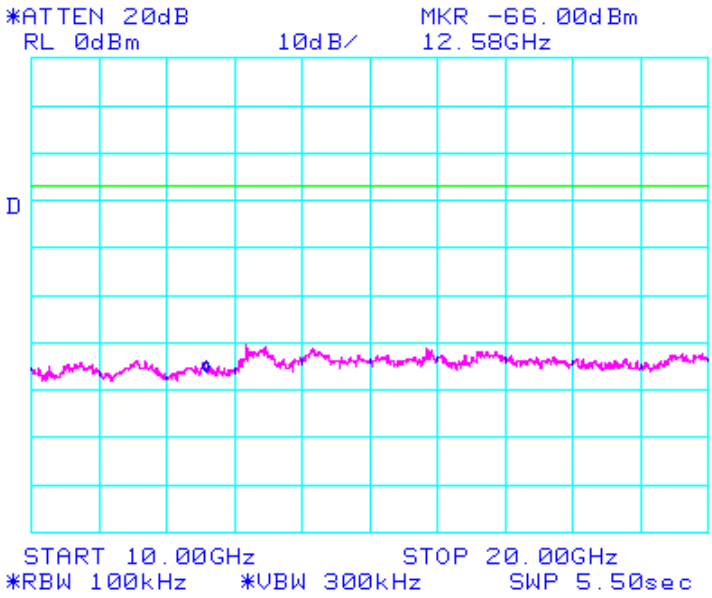

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-03e10) | RC |



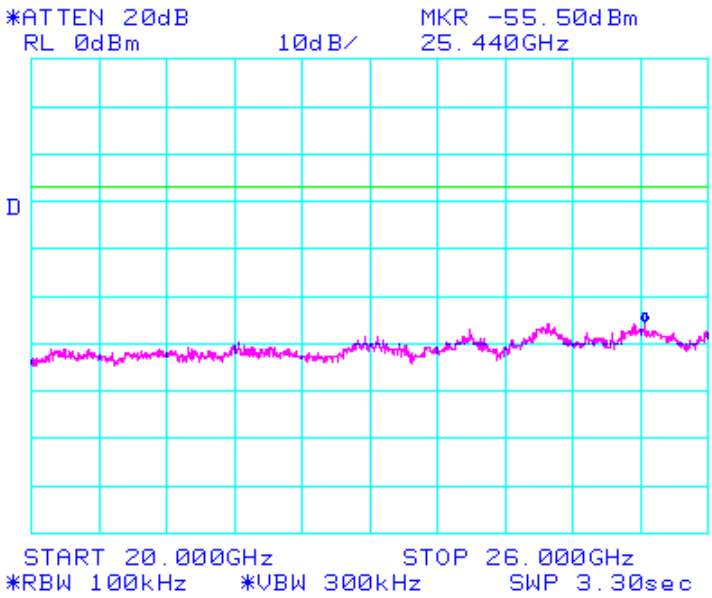
Peak Power Spectral Density (Continued)

***802.11g Mode***

| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-03e11) | RC |




| *Test Date* | *Data* | *Test Eng.* |
|---|---|---|
| 04/26/07 | 2.462 GHz<br>(LANTR-070125-03e12) | RC |



# APPENDIX B

## *MODIFICATIONS AND RECOMMENDATIONS*

| | |
|---|---|
| **1.0** | NONE |
| | |

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com

# *Exhibit I*

# *Antenna Information*

# Antenna Specifications

## USR5484

Key Applications - Connecting to 802.11b/802.11g wireless PCI cards to enhance range and to position the antenna away from the typically noisy behind-the-desktop location.

Specifications & Standards:

- Gain: 5dBi
- Nominal Impedance: 50 Ohms
- Frequency Range: 2.4 - 2.5 GHz
- VSWR: 1.92 max.
- Omni-directional
- Desktop or magnetic base for vertical attachment
- SMA straight plug reverse connector

## USR5481

Key Applications - Replacement antenna to extend the range of 802.11b/802.11g wireless routers, access points, and desktop adapters.

Specifications & Standards:

- Gain: 5dBi
- Nominal Impedance: 50 Ohms
- Frequency Range: 2.4 - 2.5 GHz
- VSWR: 1.92 max.
- Omni-directional
- Direct swivel attachment
- SMA plug reverse connector

## USR5482A

Key Applications - Provides broad, focused coverage for 802.11b/802.11g wireless routers and access points in buildings with large coverage areas and wireless hot spots. Also for outdoor applications (e.g. building-to-building connections). Allows direct path with better pattern coverage.

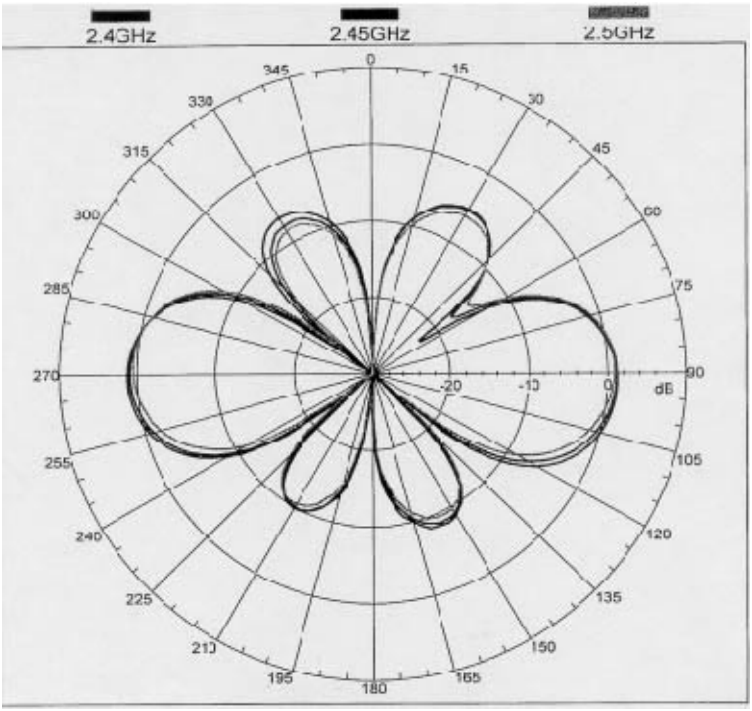
Specifications & Standards:

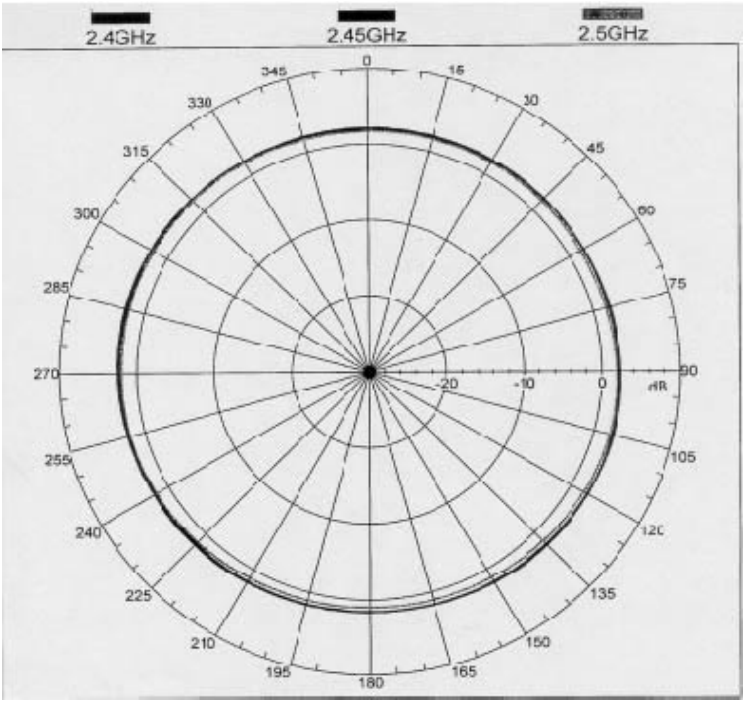
- Gain: 9dBi
- Nominal Impedance: 50 Ohms
- Frequency Range: 2.4 - 2.5 GHz
- VSWR: 1.92 max.
- Polarization - Linear
- Directional antenna
- Wall or pole mountable
- SMA plug reverse connector

U.S.Robotics®

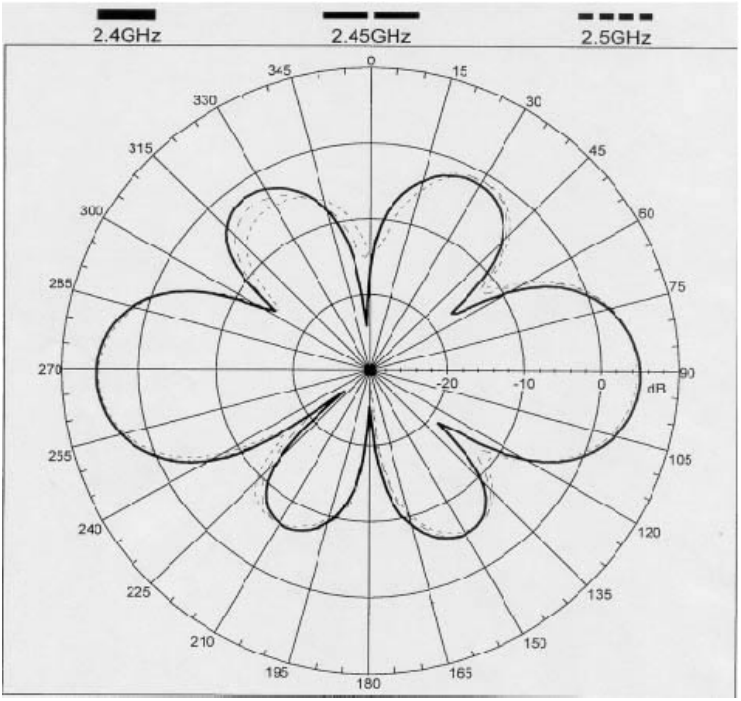
part number: R24.0527.00

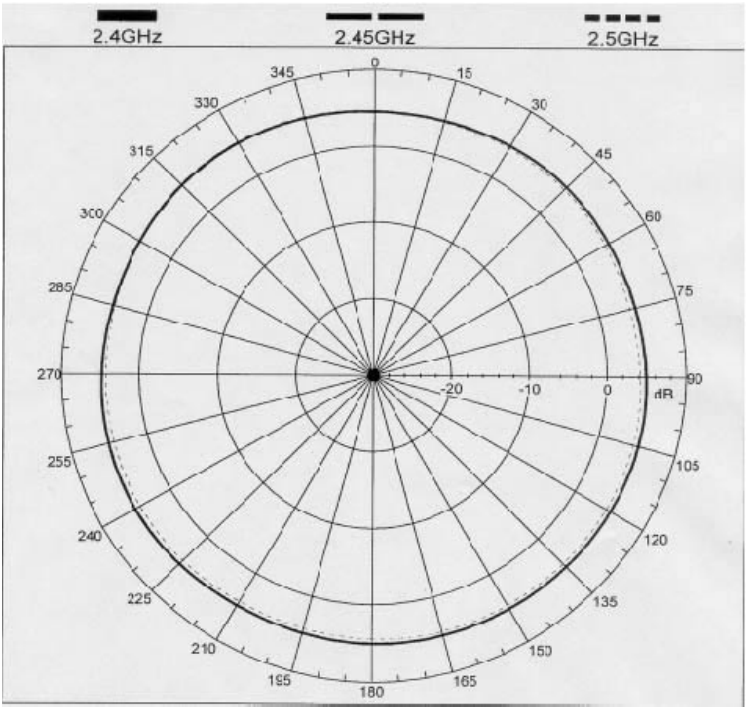
**USR5484 Scan Patterns**



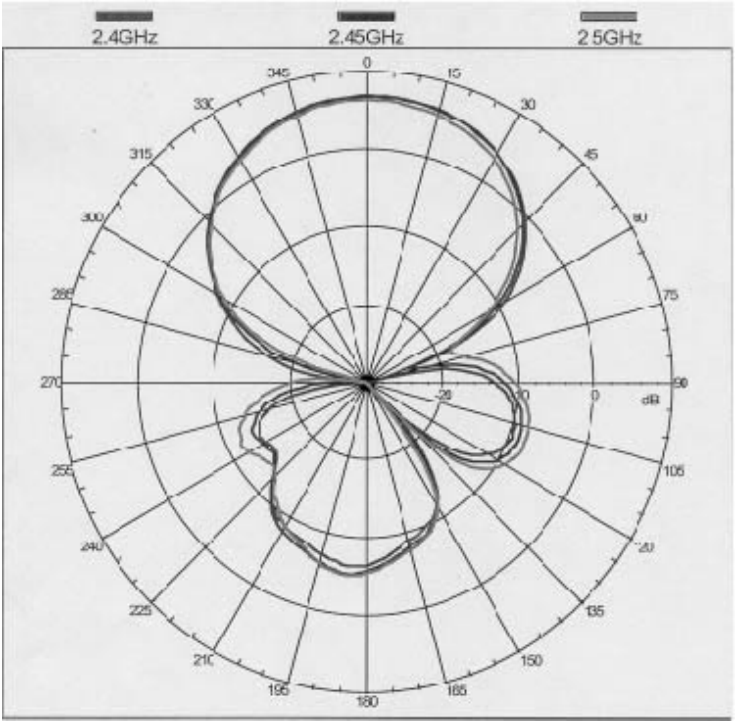



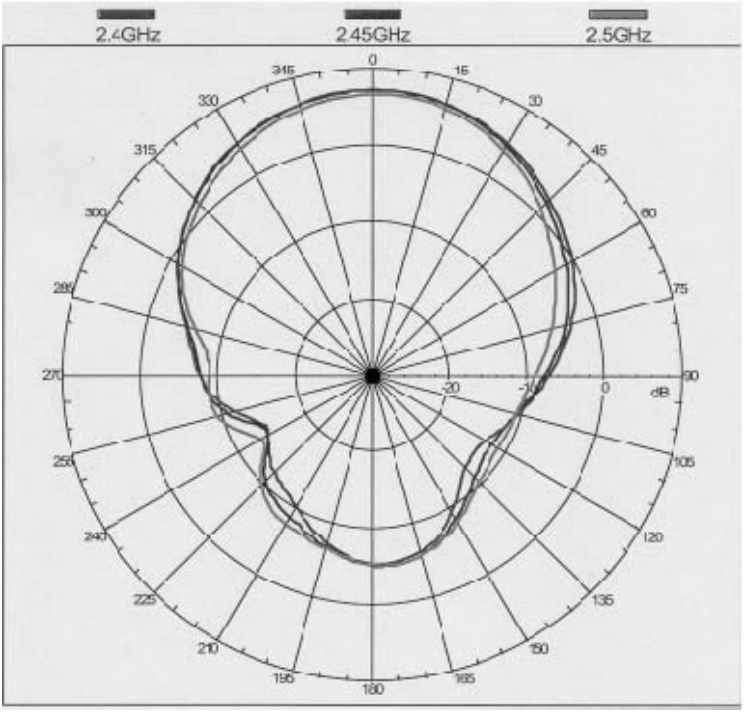
**USR5481 Scan Patterns**



**USR5482A Scan Patterns**



AEGIS LABS
8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com

# *Exhibit II*

# *Form 731*

# Timco Engineering, Inc.

## TCB Application Form 731

Rev 22 June 2004

| For Timco Use Only | |
|---|---|
| Job Number | |
| Scope | |
| Date Filed | |
| Conf. # | |
| Grant Note | |

Shaded areas are REQUIRED

**Item 1. Applicant's complete, legal business name:**

**Lantronix Inc.**

**Applicant's FCC Registration Number (FRN): 0010978799**

**Item 2. Applicant's mailing address:** *fill in fields, as appropriate*

**Line 1: 15353 Barranca Parkway**

**Line 2:**

**P.O. Box:**

**City: Irvine**

| **State:** | **Country (if foreign address):** | **Zip/Postal Code:** |
|---|---|---|
| **California** | | **92618** |

**Item 3. Applicant Contact Person:**

| | |
|---|---|
| **First Name: Michael** | **Last Name: Simonsen** |
| **Title: Mr.** | **Telephone:** |
| **E-mail: michael.simonsen@lantronix.com** | **Fax No.:** |

| **Item 4.** FCC ID consisting of: | **Grantee Code:** | **Equipment Product Code (14 characters maximum):** |
|---|---|---|
| | **R68** | **MTCHDRCT** *include "dashes" (-) where appropriate* |

**Item 5. Application Contact:** **All questions regarding the application will be directed to this contact. The Original Grant and Invoice will be sent to this contact.**

| | | | |
|---|---|---|---|
| **Firm Name:** **Aegis Labs, Inc** | **Telephone:** **(949) 454-8295** | **Ext.:** **257** | **Fax No.:** **(949) 459-7869** |
| **First Name: Brian** | **Middle Initial: K** | **Last Name: Mueller** | |
| **Address Line 1: 8 Rancho Circle** | **P.O. Box:** | | |
| **Address Line 2:** | **City: Lake Forest** | **Address Line 2:** | |
| **Country (if foreign address):** | **Zip/Postal Code: 92630** | | |
| **E-mail: brian@aegislabsinc.com** | **Telephone:(949) 454-8295** | **Fax:(949) 459-7869** | |

**Item 6. Test Firm Used to Take Measurements:**

| | | | |
|---|---|---|---|
| **Firm Name:** **Aegis Labs, Inc.** | **Telephone:** **(949) 454-8295** | **Ext.:** **257** | **Fax No.:** **(949) 459-7869** |
| **First Name: Brian** | **Middle Initial: K** | **Last Name: Mueller** | |
| **Address Line 1: 8 Rancho Circle** | | **P.O. Box:** | |
| **Address Line 2:** | **City: Lake Forest** | **State: CA** | |
| **Country (if foreign address):** | **Zip/Postal Code: 92630** | | |
| **E-mail: brian@aegislabsinc.com** | | | |
| **FCC Registered Test Site Number.** *Required for Part 15 and 18 applications.* | | | **97312** |

**Item 7.**

* Does this application include a request for **SHORT-TERM** confidentiality for any portion(s) of the data contained in this application pursuant to FCC DA 04-1705 dated 6/15/2004?

* Does this application include a request for confidentiality for any portion(s) of the data contained in this application pursuant to 47 CFR 0.459 of the Commission Rules?

SHORT-TERM request: ☐ Yes ☒ No

PERMANENT request: ☒ Yes ☐ No

**Item 8.** *Is this application for modular approval? ☒ Yes ☐ No

*If yes, please submit a cover letter addressing the modular approval requirements of DA 00-1407.*

**Item 9.** *Is this application for software defined radio authorization? ☐ Yes ☒ No

| **Item 10.** Equipment Class: *3-digits required* | Description of Product as it is marketed: |
|---|---|
| **DTS** | **Wireless Device Server** |

**Item 11. *Application is for:**

☒ Original Equipment

☐ Change in identification of presently authorized equipment:

Original FCC ID  Grant Date (MM/DD/YYYY)

☐ Class II permissive change or modification of presently authorized equipment

☐ Class III permissive change to software defined radio

*Note: this may only be filed for applications pertaining to Software Defined Radio*

| **Item 12. Is the equipment in this application:** | |
|---|---|
| * **(a)** a composite device subject to an additional equipment authorization? | ☐ Yes ☒ No |
| * **(b)** part of a system that operates with, or is marketed with, another device that requires an equipment authorization? | ☐ Yes ☒ No |
| ***If either of the above questions is answered "Yes" complete section 12 (c).*** | |
| **(c) The related application:**<br>☐ has been granted under the FCC ID listed to the right<br>☐ is in the process of being filed under the FCC ID listed to the right<br>☐ is pending with the FCC under the FCC ID listed to the right | **FCC ID** |

**Item 13. * Equipment will be operated under FCC Rule Part(s):**

**15.247**

**Item 14. EQUIPMENT SPECIFICATIONS:** *Where applicable*

| Frequency range in MHz | | Rated RF power output **IN WATTS** | Frequency tolerance | | Emission Designator (See 47 CFR 2.201 and 2.202) | Microprocessor model number |
|---|---|---|---|---|---|---|
| **Low Freq** | **High Freq** | | %, Hz, ppm | | | |
| **2412** | **2462** | **0.096** | | | | |
| | | | | | | |
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| | | | | | | |

**Read each certification carefully before answering and signing this application**

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312 (a) (1)), AND/OR FORFEITURE (U.S. TITLE 47, SECTION 503).

**(Continued on Next Page)**

**Item 15. APPLICANT/AGENT CERTIFICATION:**

I certify that I am authorized to sign this application. All of the statements herein and the exhibits attached hereto are true and correct to the best of my knowledge and belief. In accepting a Grant of Equipment Authorization issued by the TCB, under the authority of the FCC, as a result of the representations made in this application, the applicant is responsible for (1) labeling the equipment with the exact FCC ID specified in this application, (2) compliance statement labeling pursuant to the applicable rules, and (3) compliance of the equipment with the applicable technical rules. If the applicant is not the actual manufacturer of the equipment, appropriate arrangements have been made with the manufacturer to ensure that production units of this equipment will continue to comply with the FCC's technical requirements.

Authorizing an agent to sign this application is done solely at the applicant's discretion; however, the applicant remains responsible for all statements in this application.

If an agent has signed this application on behalf of the applicant, a written letter of authorization which includes information to enable the agent to respond to the above Section 5301 (Anti-Drug Abuse) Certification statement has been provided by the applicant. It is understood that the letter of authorization must be submitted to the FCC upon request, and that the FCC reserves the right to contact the applicant directly at any time.

***Signature of Authorized Applicant:** 

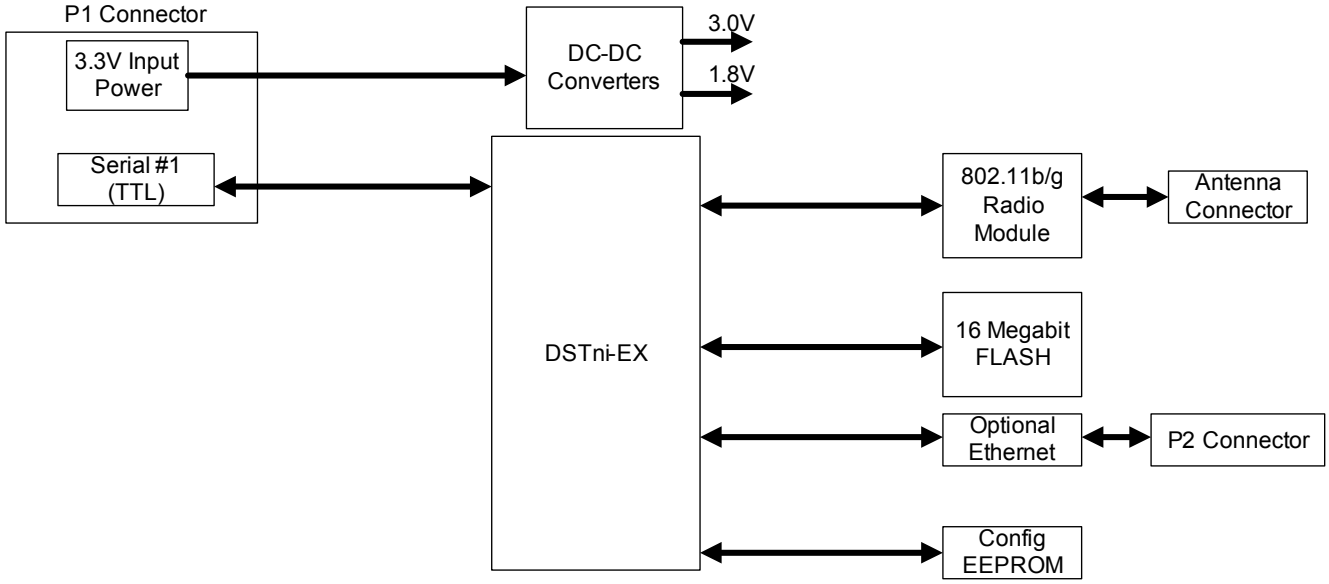
**Title of Authorized Signature:** Test Technician

**NOTE: An asterisk '*' preceding a field indicates it must be completed.**

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com

# *Exhibit III*

# *Block Diagram*


P1 Connector
3.3V Input Power
Serial #1 (TTL)
DC-DC Converters
3.0V
1.8V
DSTni-EX
802.11b/g Radio Module
Antenna Connector
16 Megabit FLASH
Optional Ethernet
P2 Connector
Config EEPROM

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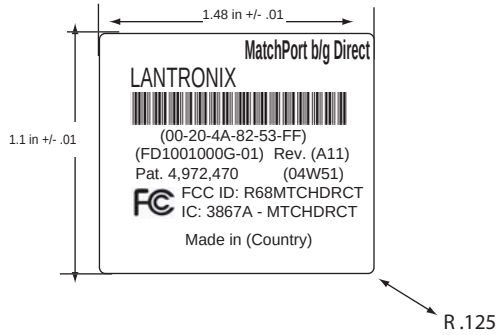
# *Exhibit IV*

# *Label Information*

Notes:
1. Text shown in parenthesis () are variable data, barcodes, or graphics.
2. All print text, style, graphics, and data are printed approximately as shown.
3. Barcodes are Code 128 Standards.

| Revision History | | |
|---|---|---|
| **Rev.** | **Description** | **Date** |
| A | Original issue | 01/12/07 |
| B | Update Dimensions | 03/08/07 |
| | | |




## Example:

| Product | Part number printed on label |
|---|---|
| FD1001000G-01 | FD1001000G-01 |
| | |
| | |
| | |
| | |
| | |
| | |


LANTRONIX®
15353 Barranca Parkway
Irvine, CA 92618
(949) 453-3990


LABEL SPEC., ETHERNET, FLEXPORT DIRECT W/FCC LOGO

| Size | DWG No. | Rev: |
|---|---|---|
| A | 461-089 | B |

| DRAWN BY: | DATE: | Scale | Filename | |
|---|---|---|---|---|
| Caroline Lé Ele | 01.12.07 | 1:1 | 461-089.ai | Sheet 1 of 1 |

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# *Exhibit V*

# *Letters*

LANTRONIX®

Date May 25, 2007

Equipment Authorization Division
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

To Whom It May Concern:

Please be advised that the Frequency Range listed 2.412 GHz to 2.472 GHz is correct due to this device FCC ID: R68MTCHDRCT, model number: MatchPort B/G being marketed globally. This device will be limited to channels 1 to 11, frequencies 2.412 GHz to 2.462 GHz in the U.S. The transmitted level is also fixed to 14 dBm +2.0 dBm/-1.5 dBm max. These parameters are done by the ability to program the internal FLASH Integrated Circuit for the U.S. SKU making this device only operate on these channels, frequency range, and transmitted level. The end user will not have the ability to change these device parameters beyond what is allowable in the U.S.

Thank you for your attention to this matter.

If you have any further questions or need additional information, please feel free to give me a call.

***Dated this 25 Day of May 20 07***

***By:*** _____ ***Daryl Miller***
***Signature*** ***Printed***

***Title: Senior Director of Engineering***

***On behalf of: Lantronix***

***Telephone: 949-453-7127***

15353 Barranca Parkway | Irvine | CA 92618 | USA | Tel: 949.453.3990 | Fax: 949.453.3995 | www.lantronix.com

LANTRONIX®

Date May 25, 2007

Equipment Authorization Division
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

FCC ID: R68MTCHDRCT
Product Name: MatchPort B/G

**Request for Confidentiality**

Pursuant to Sections 0.457 and 0.459 of the commission's rules, we hereby request that the following documents be held confidential:

- Schematics
- Block diagram
- Operational Description

These materials contain trade secrets and proprietary information and are not customarily released to the public. The public disclosure of this information might be harmful to the company and provide unjustified benefits to our competitors.

***Dated this 25 Day of May 20 07***

***By:*** _____ ***Daryl Miller***
***Signature*** ***Printed***

***Title: Senior Director of Engineering***

***On behalf of: Lantronix***

***Telephone: 949-453-7127***

15353 Barranca Parkway | Irvine | CA 92618 | USA | Tel: 949.453.3990 | Fax: 949.453.3995 | www.lantronix.com

LANTRONIX®

15353 Barranca Parkway
Irvine | CA 92618 | USA
Tel: 949.453.3990
Fax: 949.453.3995
www.lantronix.com

Date June 1, 2006

Equipment Authorization Division
Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046

**Anti-Drug Abuse Attestation**

Please accept this letter as an attestation on behalf of Lantronix, Inc. that to the best of our knowledge, information, and behalf, none of our officers, directors, or persons holding 5% or more of the outstanding stock shares, voting or non-voting, have been denied federal benefits under section 5301 of the Anti-Drug Abuse Act of 1988.21 U.S.C. 853(a).

If you have any further questions or need additional information, please feel free to give me a call at 949-450-9832.

***Dated this 01 Day of June 20 06***

***By:*** Patricia Selbo ***Patricia Selbo***
***Signature*** ***Printed***

***Title: Dir. Of Program Management***

***On behalf of: Lantronix***

***Telephone: 949-450-9832***

LANTRONIX®

15353 Barranca Parkway
Irvine | CA 92618 | USA
Tel: 949.453.3990
Fax: 949.453.3995
www.lantronix.com

Date June 1, 2006

Federal Communications Commission
7435 Oakland Mills road
Columbia, Maryland 21046
USA

**Authority to Act as Agent**

On our behalf, I appoint Aegis Labs, Inc., 22431 Antonio Parkway, B160-417, Rancho Santa Margarita, CA, 92688, to act as our agent in preparation of this application.

For instances where our authorized agent signs the application for certification on our behalf, I acknowledge that all responsibility for complying with the terms and conditions for certification still resides with Lantronix, Inc., 15353 Barranca Parkway, Irvine, CA, 92618.

Dated this: 01 Day of June, 2006

Agency Agreement expiration date: Typically 8-12 months

Signature: Patricia Selbo Printed: Patricia Selbo

Title: Dir. Of Program Management

On behalf of: Lantronix

Telephone: 949-450-9832

Fax: 949-453-3995

Email: trish.selbo@lantronix.com

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# TRANSMITTER MODULAR APPROVAL ATTESTATION

June 5, 2007

Federal Communications Commission

Re: Application Modular Approval Certification for FCC ID: R68MTCHDRCT

Gentlemen:

The following attestation addresses the eight requirements to support modular approval as required by the FCC Public Notice DA00-1407 "Part 15 Unlicensed Modular Transmitter Approval"

| | |
|---|---|
| 1 | The modular transmitter has its own RF shielding and does not rely upon the shielding provided by the device into which it is installed in order to comply with Part 15 limits. |
| 2 | The modular transmitter has buffered modulation/data inputs. All inputs to the modules are buffered through the radio circuitry. |
| 3 | The modular transmitter has its own power supply regulator. |
| 4 | The modular transmitter has an antenna that complies with section 15.203 and 15.204(c) of the FCC rules. It has a Reverse Polarity-SMA type of connector at the transmitter end and is soldered to the antenna (depending on OEM configuration). The antenna used with the module was tested with the module. |
| 5 | The modular transmitter was tested in a stand-alone configuration without a chassis during testing to show compliance with Part 15 emission limits. The transmitter module complies with the AC line conducted requirements found in Section 15.207. AC power lines. |
| 6 | The modular transmitter will be labeled with its own FCC ID. Also, the OEM host manufacturer will be informed to display a label referring to the enclosed module. The exterior label will read as follows: "Contains Transmitter Module FCC ID: XYZMODEL1" or "Contains FCC ID: XYZMODEL1". |
| 7 | The modular transmitter is manufactured so that the user cannot influence the operation of the transmitter that will operate outside of the scope of the regulations. |
| 8 | The modular transmitter meets the MPE calculations of 47 CFR 1.1307(b)(1). |

If there are any additional questions or if further information is needed, please contact us at your earliest convenience at (949) 454-8295.

Sincerely,

Brian Mueller
Aegis Labs, Inc.
Test Technician

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# *Exhibit VI*

# *MPE Calculations*

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# MPE Calculations

Systems operating under the provision of 47 CFR 1.1307(b)(1) shall be operated in a manor that ensures that the public is not exposed to radio frequency energy levels in excess of the FCC guidelines.

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). The MPE calculation for this exposure is shown below.

**Using the Antennas with highest output power:**

**The peak radiated output power (EIRP) is calculated as follows:**

| *Antenna* | *Frequency (GHz)* | *Power input to the antenna (P) (dBm)* | *Power gain of the antenna (G) (dBi)* | *EIRP (P+G) (dBm)* | *EIRP $Log^{-1(dBm/10)}$ (mW)* |
|---|---|---|---|---|---|
| U.S. Robotics (PN: USR5481) | 2.4 | 19.82 | 5.00 | 24.82 | 303.39 |

EIRP = P + G
Where
P = Power input to the antenna (mW).
G = Power gain of the antenna (dBi)

**The numeric gain (G) of the antenna with a gain specified in dB is determined by:**

| *Antenna* | *Frequency (GHz)* | *Antenna Gain (G) (dBi)* | *Numeric Antenna Gain $Log^{-1(dBm/10)}$ (dB)* |
|---|---|---|---|
| U.S. Robotics (PN: USR5481) | 2.4 | 5.00 | 3.16 |

$G = Log^{-1}$ (dB antenna gain/10)

**Power density at the specific separation:**

| *Antenna* | *Frequency (GHz)* | *Power input to the antenna (P) (mW)* | *Numeric Power Gain of the Antenna (G) (dB)* | *Maximum Power Spectral Density $S=PG/(4R^2\pi)$ ($mW/cm^2$)* | *Maximum Power Spectral Density Limit ($mW/cm^2$)* |
|---|---|---|---|---|---|
| U.S. Robotics (PN: USR5481) | 2.4 | 95.94 | 3.16 | 0.060 | 1.00 |

$S = PG/(4R^2\pi)$
Where
S = Maximum power density ($mW/cm^2$)
P = Power input to the antenna (mW).
G = Numeric power gain of the antenna
R = Distance to the center of the radiation of the antenna (20cm = limit for MPE)

The maximum permissible exposure (MPE) for the general population is $1mW/cm^2$.

The power density at 20cm does not exceed the $1mW/cm^2$ limit. Therefore, the exposure condition is compliant with FCC rules.

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# *Exhibit VII*

# *Photographs*

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***Front View***

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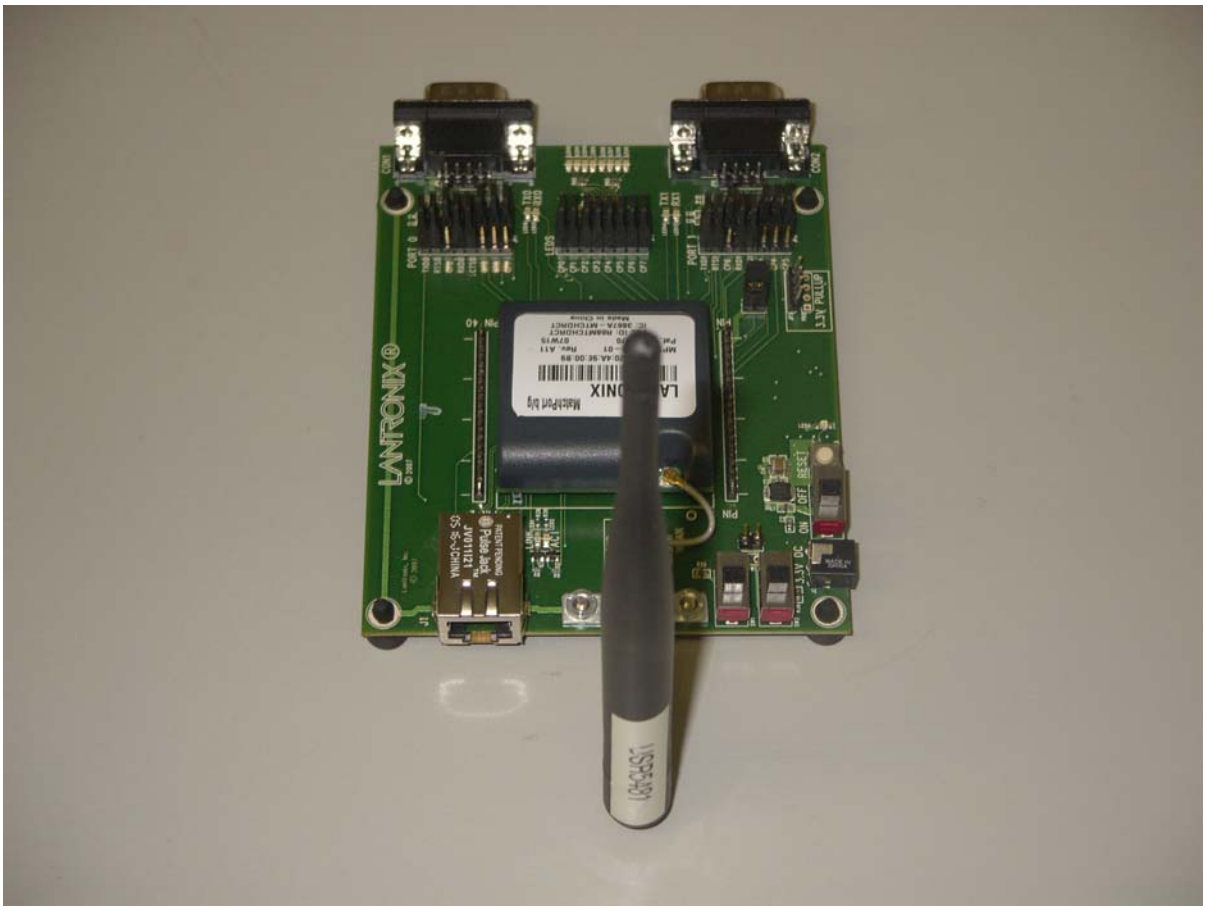


***Back View***

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com


***Front View***
***(Ant Removed)***

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# *Board Top View*

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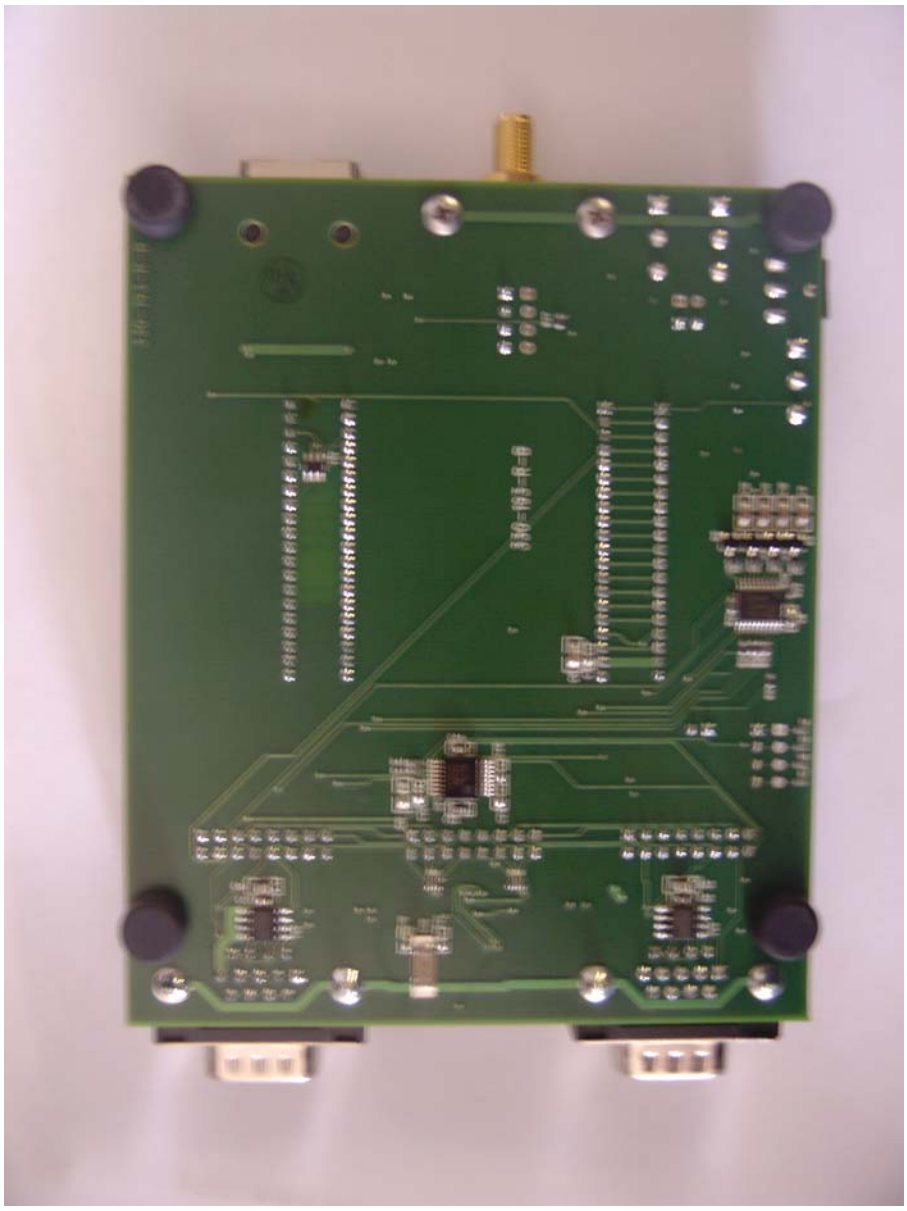

***Board Bottom View***

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com


# *Board Top View*
# *"Antenna Port Removed"*

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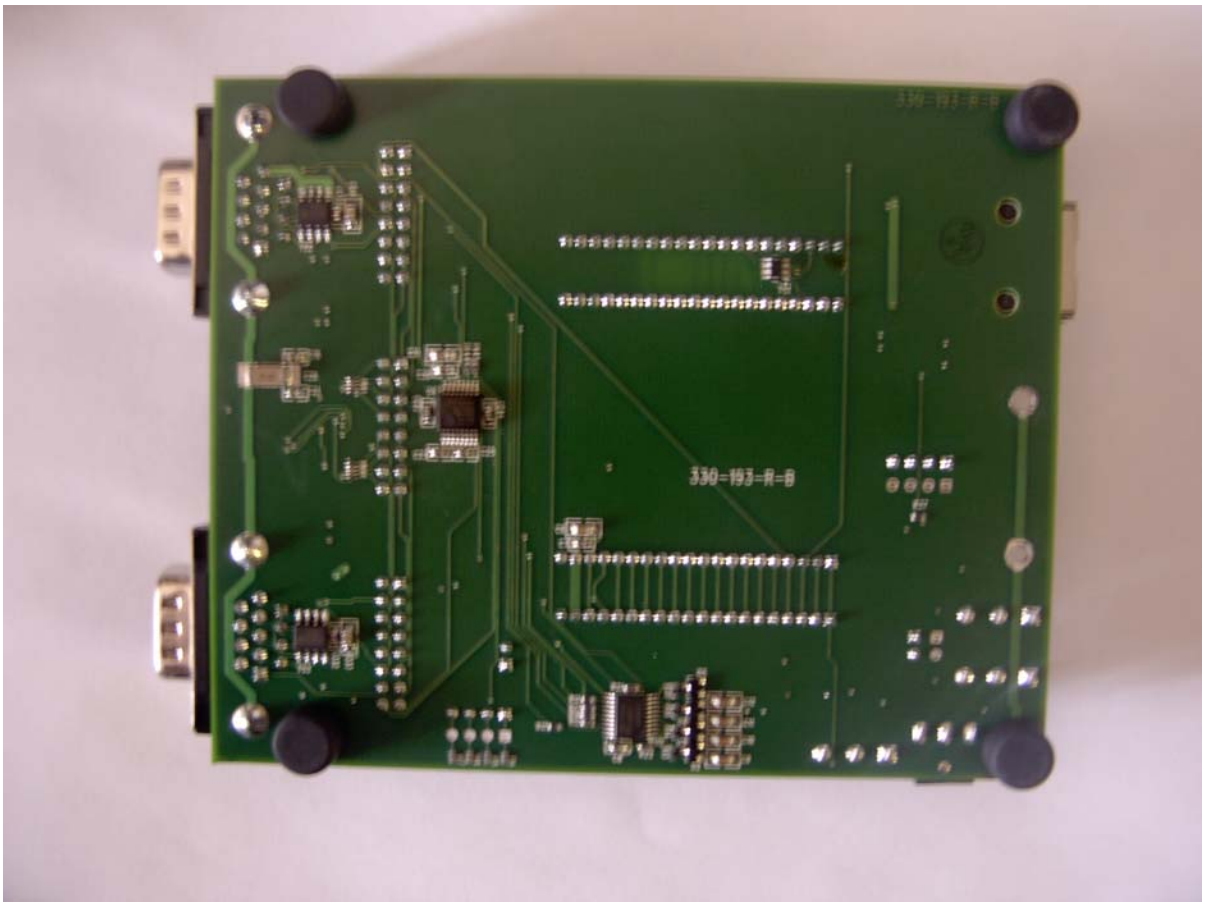
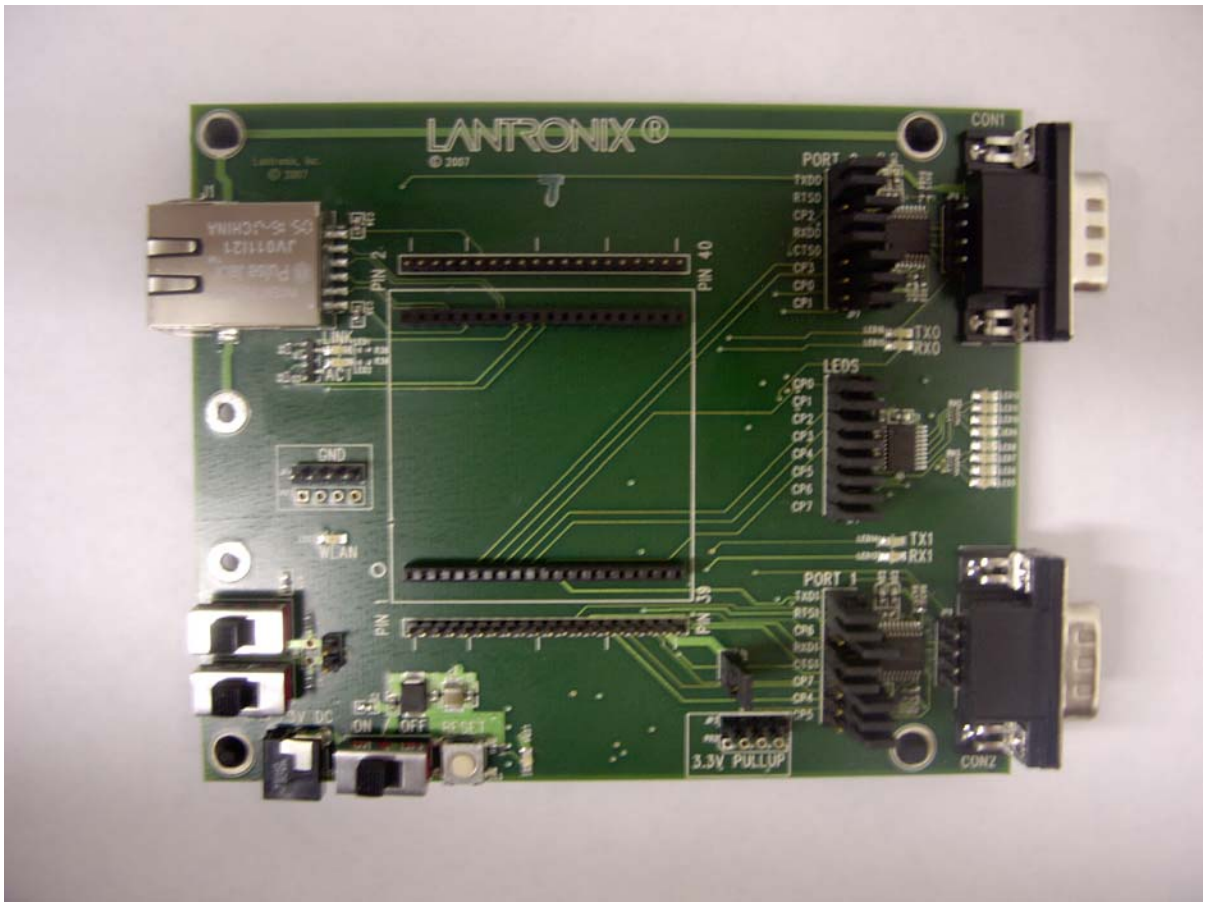



***Board Bottom View***
***"Antenna Port Removed"***

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com




***Board Top View***
***"Module Removed***
***Antenna Port Removed"***

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***Top View***
***"Module"***

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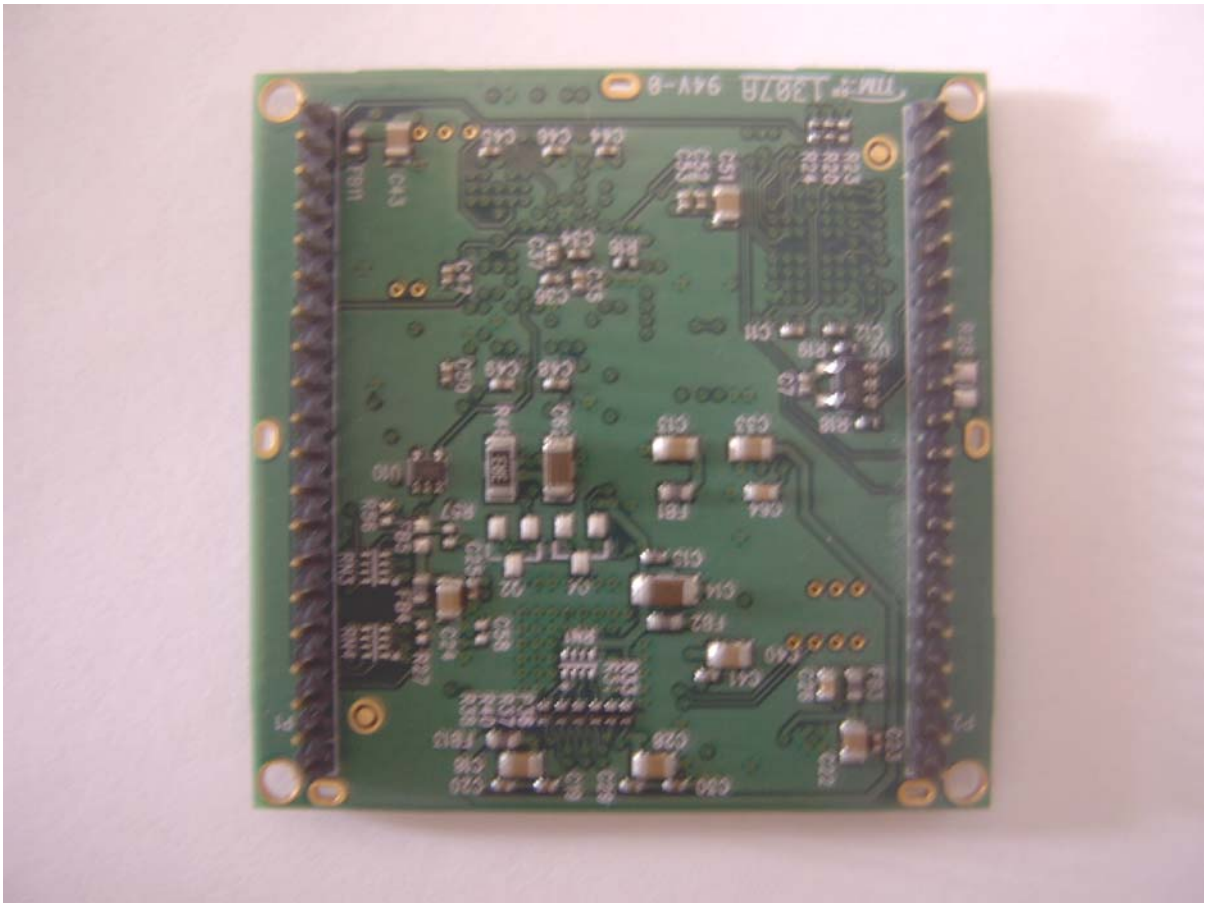
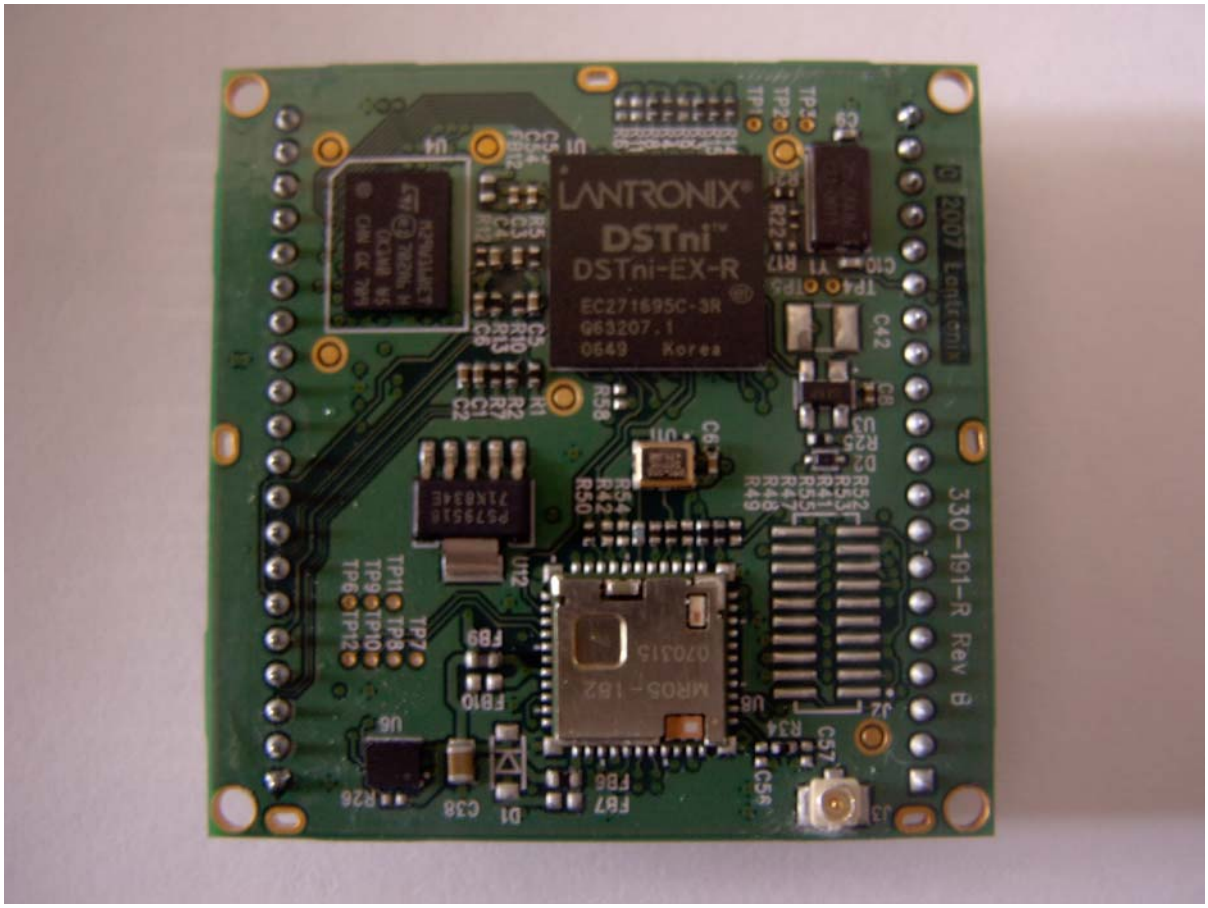


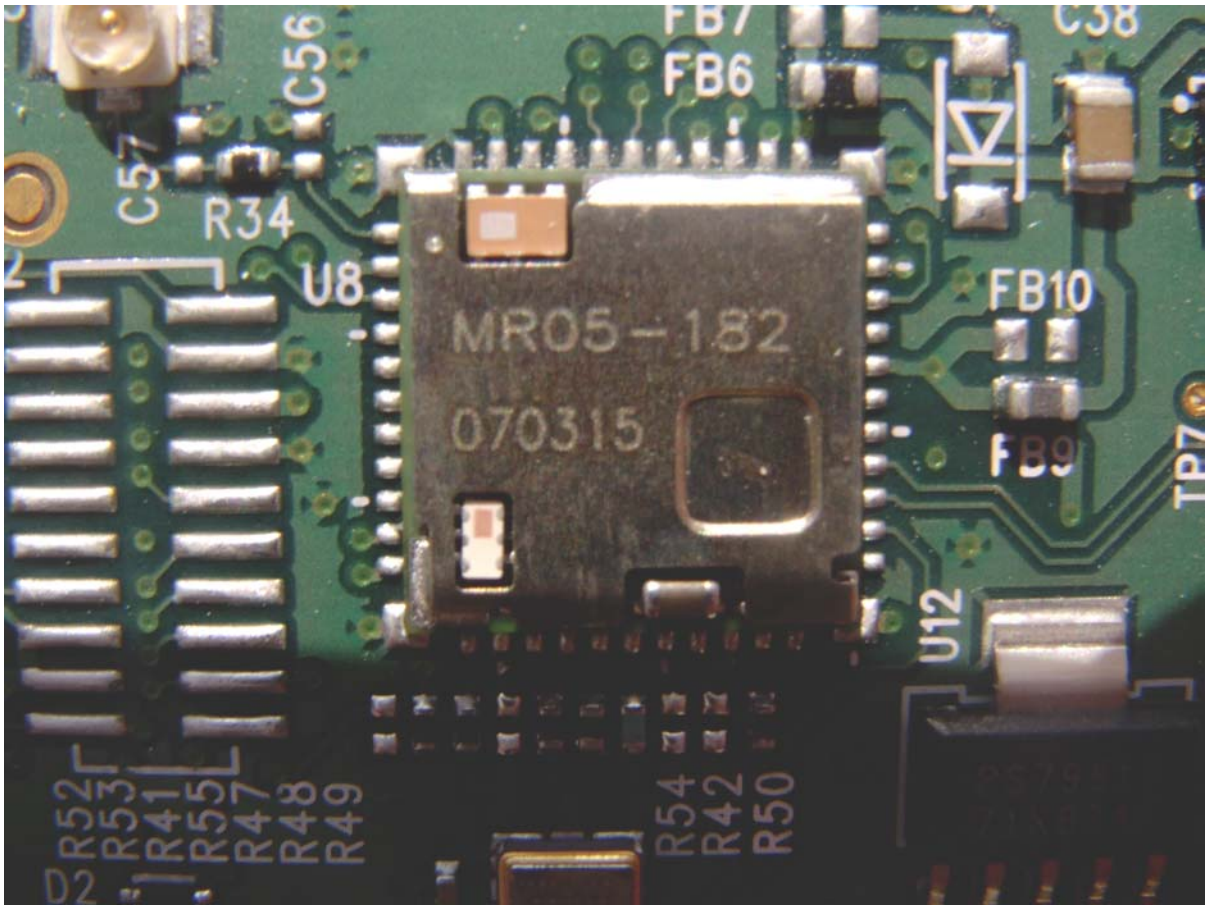
***Bottom View***
***"Module"***

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com



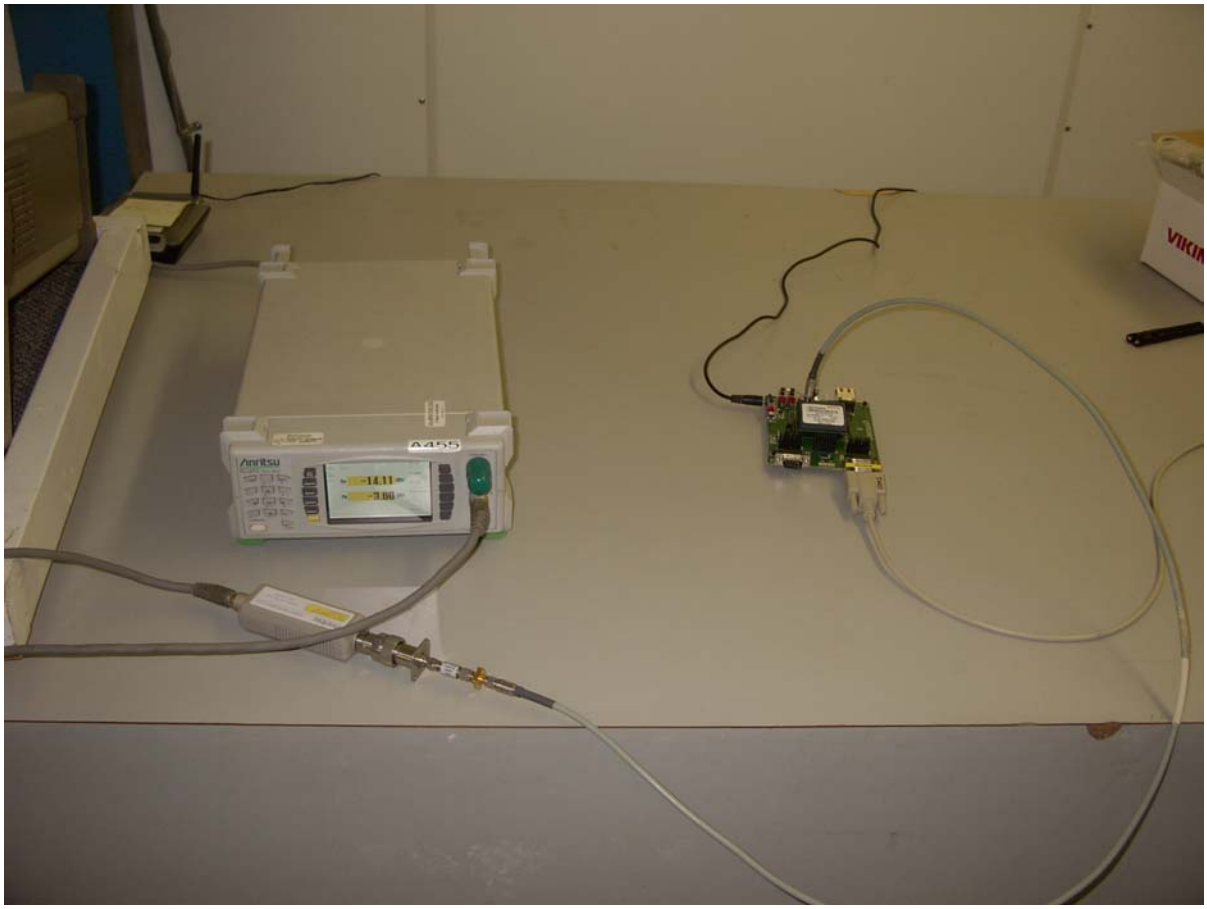

***Top View***
***"Module Shield Removed"***

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com



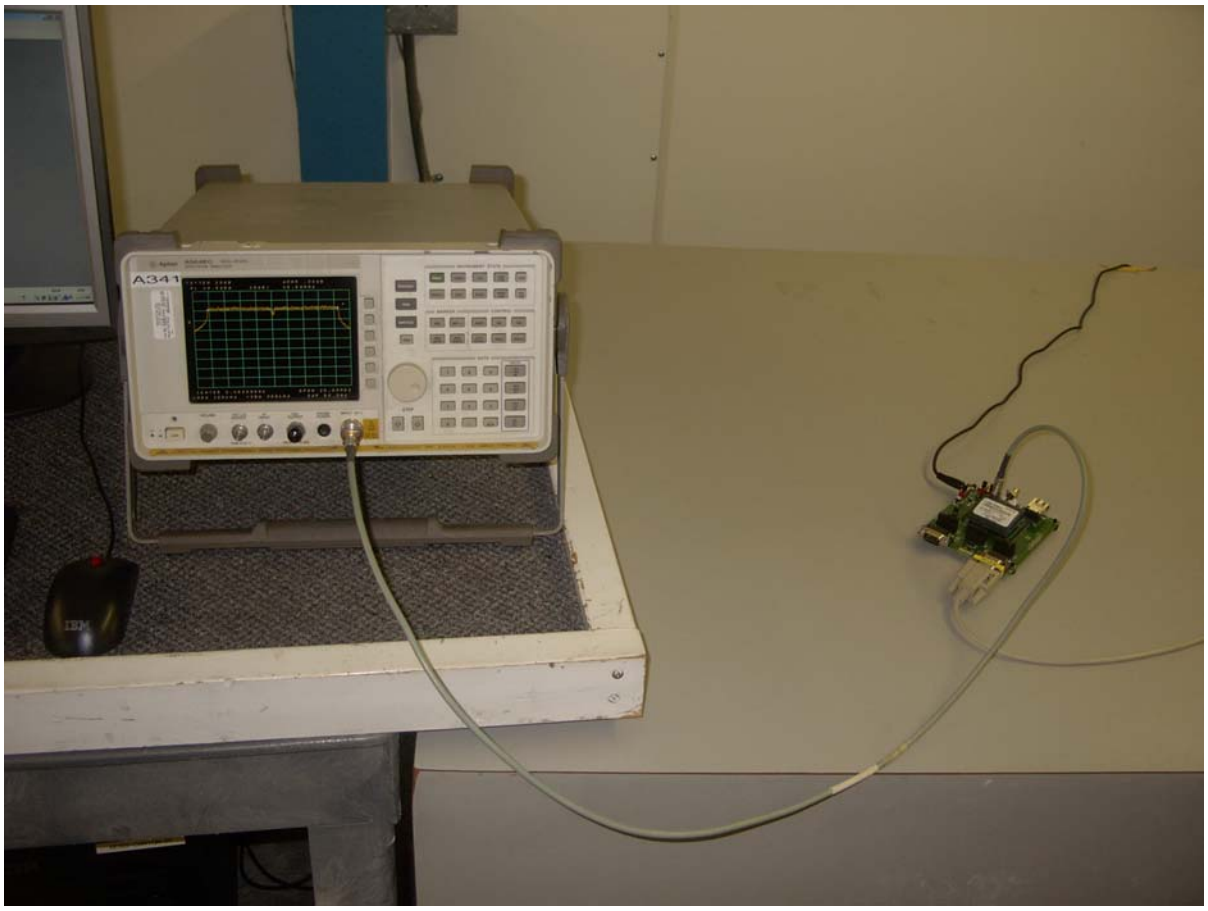

***Top View***
***"Module's Transmitter"***

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com




# *Maximum Peak Output Power Measurement Setup*

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com




# *Conducted Emissions at Antenna Terminal Setup*

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# *AC Conducted Emissions Measurement (Front View) Setup*

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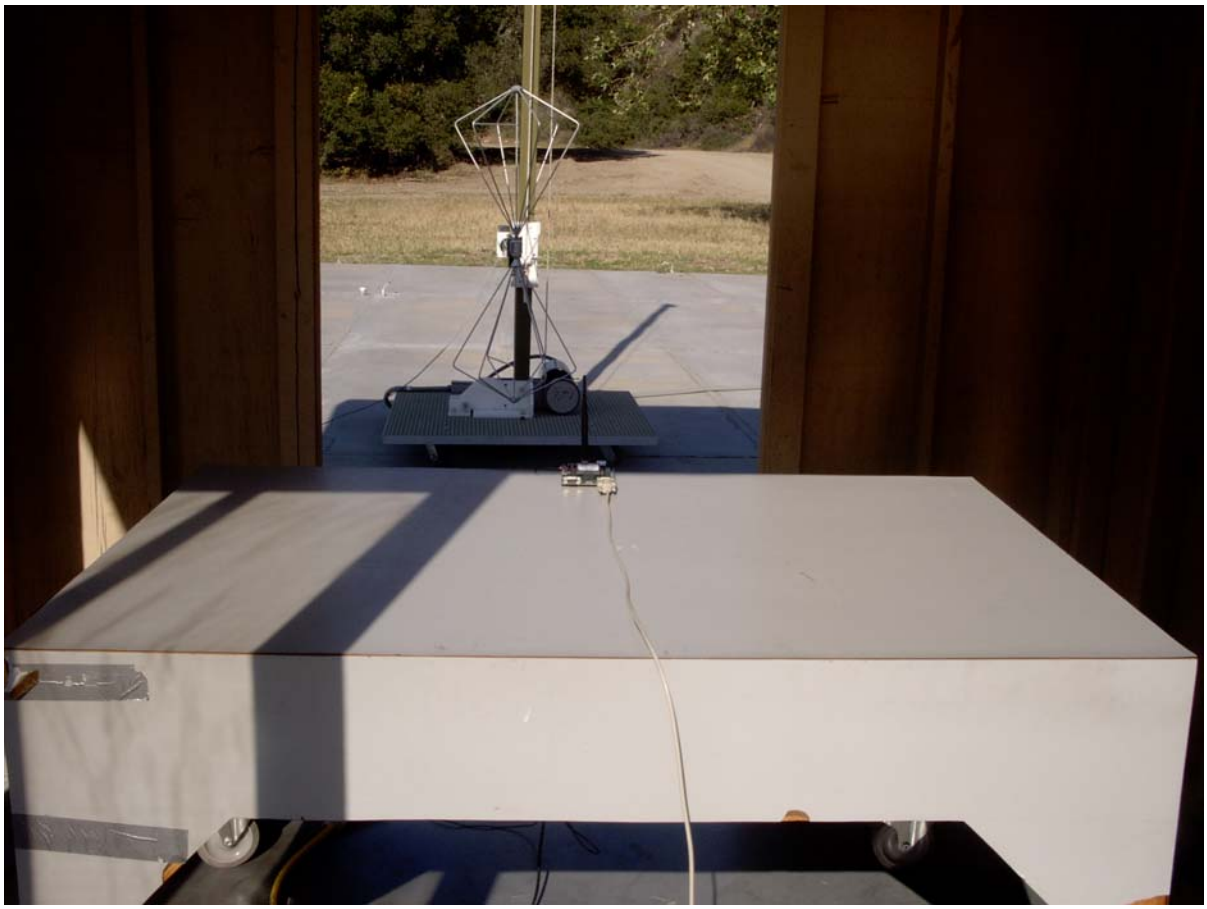
# *AC Conducted Emissions Measurement (Side View) Setup*

8 RANCHO CIRCLE, LAKE FOREST, CA 92630 T (949)454-8295 F (949)829-6903 AegisLabsInc.com



# *Radiated Emissions Measurement (Front View) Setup*

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# *Radiated Emissions Measurement (Rear View) Setup*

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# *Exhibit VIII*

# *Theory of Operation*

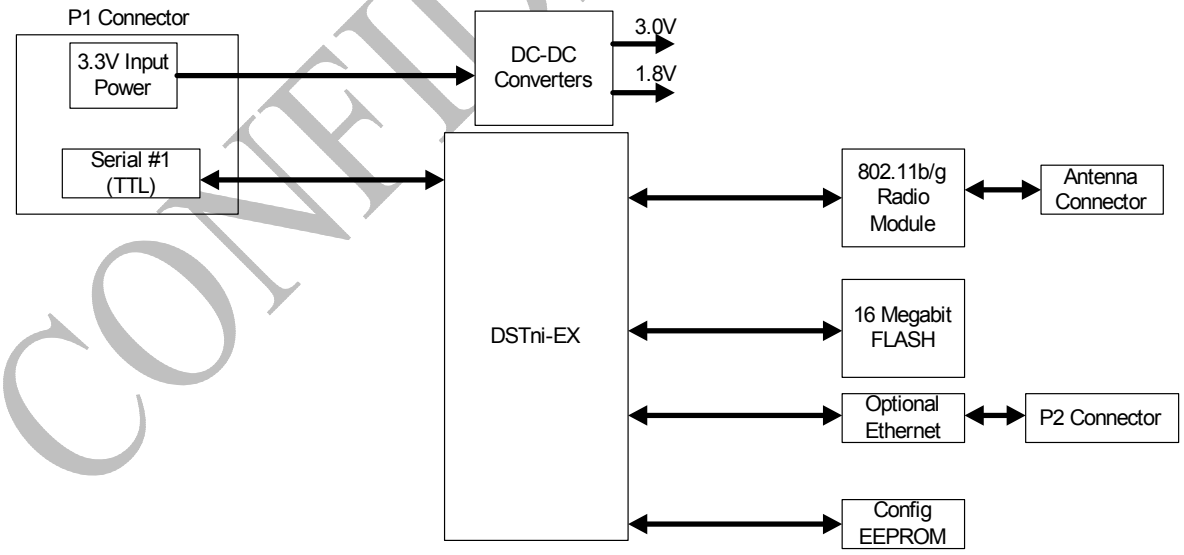
# DESCRIPTION OF THE LANTRONIX MATCHPORT B/G

## 1. GENERAL

The MatchPort B/G Device Server connects serial devices to Wireless Ethernet networks. This module is an embedded device that is expected to be installed on a board inside of our customers unit. It supports up to 230Kbaud serial data(TTL) and 802.11b/g Wireless on the network interface. The serial interface is expected to be connected to an external RS232 or RS485 transceiver or directly to another UART device. It contains a Flash ROM for easy software upgrades. A future option is for 10/100Mb/s MDI/MDI-X Wired Ethernet.



**MatchPort B/G Block Diagram**



## 2. TECHNICAL CHARACTERISTICS

A. Power Supply: Input 3.3 Vdc +/-10%
B. Hardware Features

- One serial port with RTS/CTS (TTL signaling) supporting up to 230Kbaud.
- Wireless IEEE 802.11b, IEEE 802.11g
- Frequency Range: 2.412 – 2.484 GHz
- Data Rates: 1,2,5.5,11Mbps (802.11b)
- Data Rates: 6,9,12,18,24,36,48,54Mbps (802.11g)
- Modulations: OFDM, DSSS, DBPSK, DQPSK, CCK , 16QAM, 64QAM
- Security: WEP 64/128, WPA – PSK, TKIP, AES end-to-end encryption
- Number of Channels: 14
- Transmit Power Output: up to 14 dBm +2.0 dBm/ -1.5 dBm
- One optional 10/100 Ethernet port is available for future expansion. Magnetics will be external to unit.

C. Firmware Features

- Cobos based with our industrial protocols supported (Standard Tunneling, Modbus, DF1, SRTP)
- Additional protocols phased in (Ethernet IP, Bacnet, Profinet, etc…).
- Serial port pass-thru functionality can be a subsequent firmware if not ready at time of release.
- Consideration for port to EVOS

D. Compliant Standards FCC, IC, CE for Declaration of Conformity:

a. **Safety**: UL 60950-1, CSA 22.2. No 60950-1-03, EN 60950-1
b. **Electromagnetic Emissions**:

FCC Part 15 Class B
IC RSS-210
EN 300328
AS-NZS 4771
EN 301-489-1/17
EN 61000-6-3: 2001 Class b
EN 55022: 1998 + A1: 2000 + A2: 2003 Class B

c. Electromagnetic Immunity: EN 61000-6-2: 2001 Immunity standard for Industrial Environments

?????

FCC Part 18
ICES-001
AS-NZS 4251.2
AS-NZS 61000-6-2
EN 55024: 1998 + A1: 2001 + A2: 2003 Information Technology Equipment-Immunity Characteristics
EN 61000-4-2: 1995 + A2: 2001 Electro-Static Discharge
EN 61000-4-3: 1995 + A1: 2003 Radiated Immunity
EN 61000-4-4: 1995 Electrical Fast Transient
EN 61000-4-5: 1995 Power Supply Surge
EN 61000-4-6: 1996 Conducted Immunity
EN 61000-4-8: 1993 Magnetic Field
EN 61000-4-11: 1994 Voltage Dips & Interrupts

**d. Harmonics & Flicker**:

EN 61000-3-2: 2000 + A2: 2005
EN 61000-3-3: 1995 + A1: 2001

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# *Exhibit IX*

# *Schematics*

| REV | COMMENT | ECO | AUTHOR | DATE |
|---|---|---|---|---|
| A | Initial Release | N/A | MS | 12/11/06 |
| B | Moved JTAG from Radio to EX | | MS | 1/11/07 |

NOTE: PCB NUMBER 330-191 SHALL BE ETCHED ON ONE SIDE OF THE PCB AND SILKSCREENED ON THE OTHER

LANTRONIX CONFIDENTIAL MS

Title: **FLEXPORT DIRECT**

Size: B | Document Number: **330-191-SCH-R** | Rev: B

Date: Wednesday, January 31, 2007 | Sheet 1 of 6

DATA0, 1, 3, 4, 5, 11 Generate
RCR Configuration
D15 - D10 = Product Family
D9 - D3 = Hardware Configuration
D2 - D0 = Software Class

Run Traces (TX+, TX-), (RX+,RX-), and (RXP, RXN) parallel to each other. Place (RXP, RXN), (RX+, RX-) and related circuitry over an adjacent GND plane

ADDR12 clears CSBE bit in DCR causing UCE/LCE to be used for even/odd access.

Install PU to ADDR17 to enable Ethernet boot

DNP - Do Not Populate

U1

DSTni-EX

Run Traces XIN & XOUT parallel to each other and as short as possible. Do not cross power or ground plane splits. Connections to pins D13, D14 and E14 shall be as short as possible

XOUT resistor may be adjusted to reduce EMI and allow reliable startup

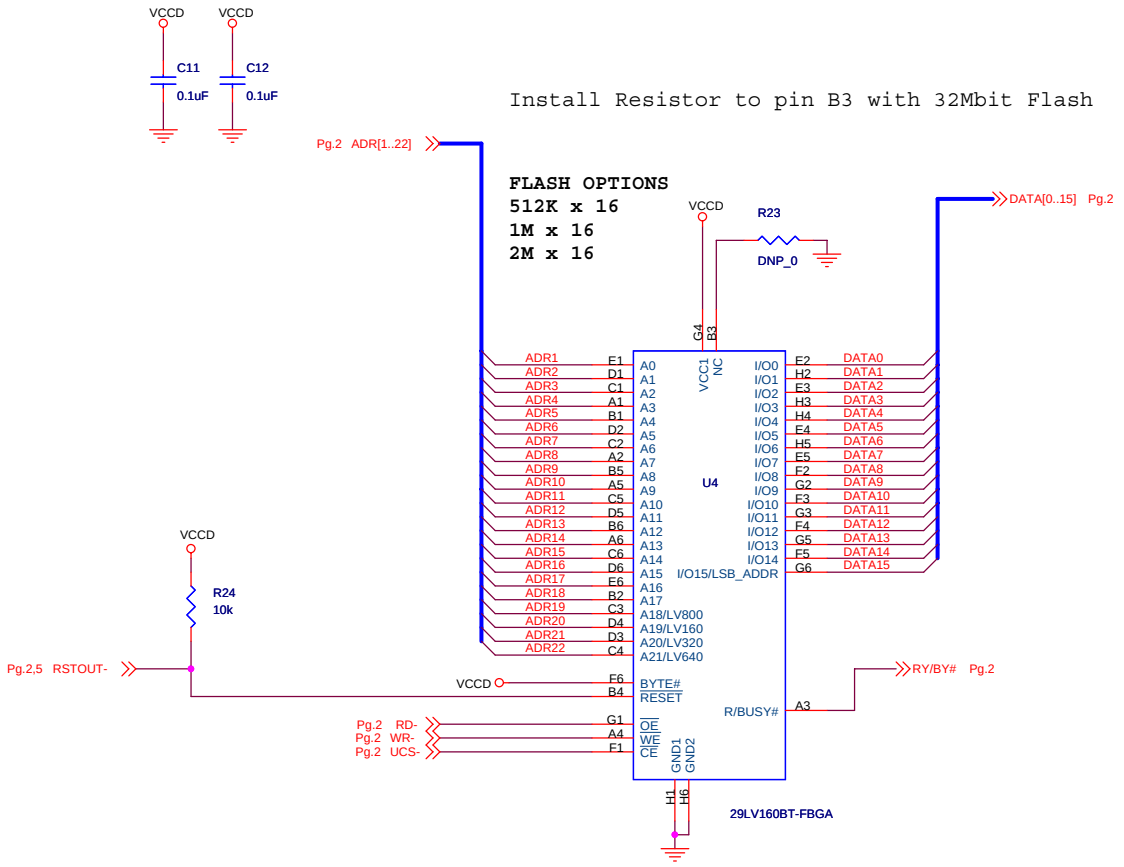
I2C TM 2k x 8 SET UP EEPROM

LANTRONIX CONFIDENTIAL MS

Title: FLEXPORT DIRECT, PROCESSOR

Size B | Document Number 330-191-SCH-R | Rev B

Date: Wednesday, January 31, 2007 | Sheet 2 of 6

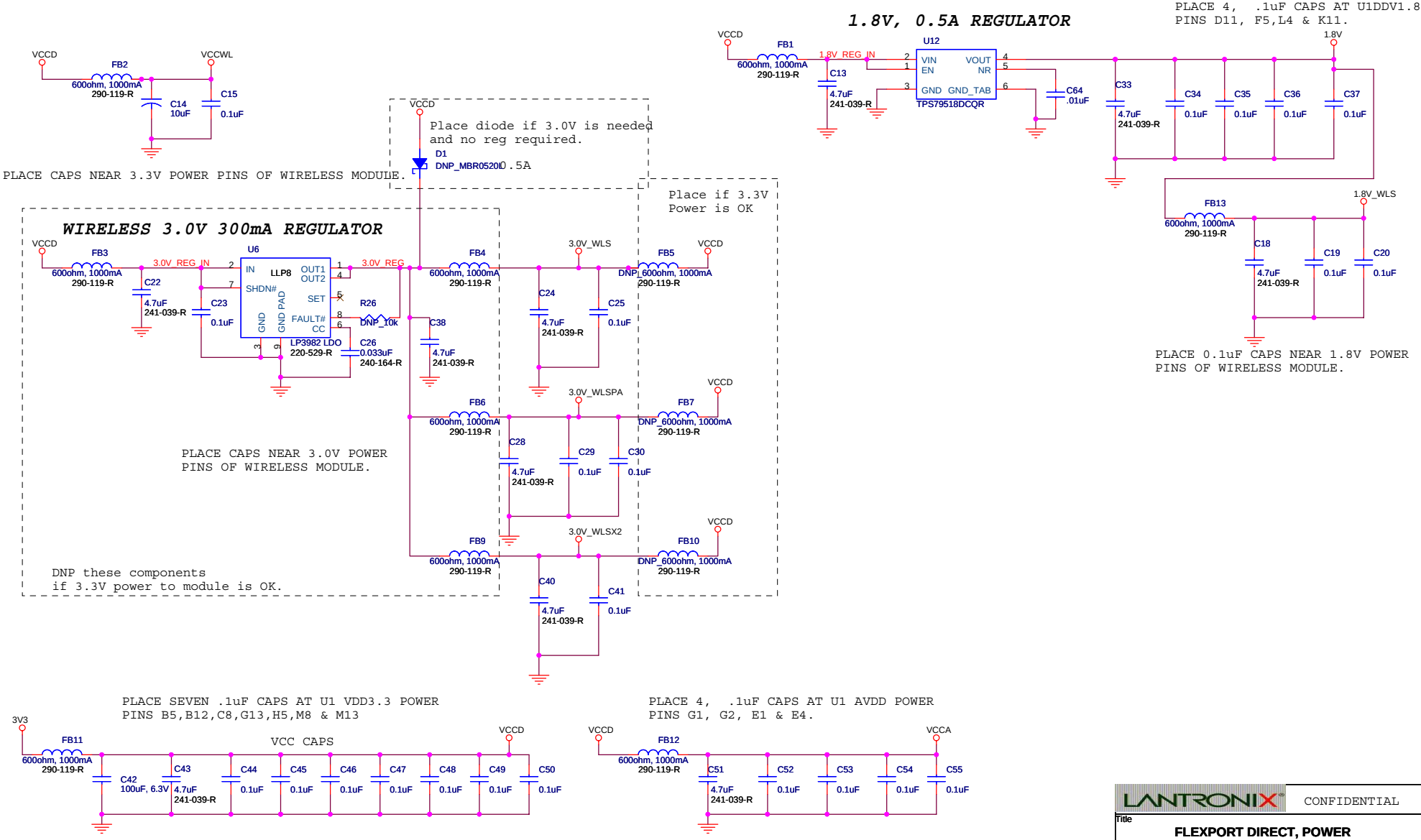



LANTRONIX CONFIDENTIAL MS

Title: FLEXPORT DIRECT, FLASH

| Size | Document Number | Rev |
|---|---|---|
| B | 330-191-SCH-R | B |

Date: Wednesday, January 31, 2007 Sheet 3 of 6

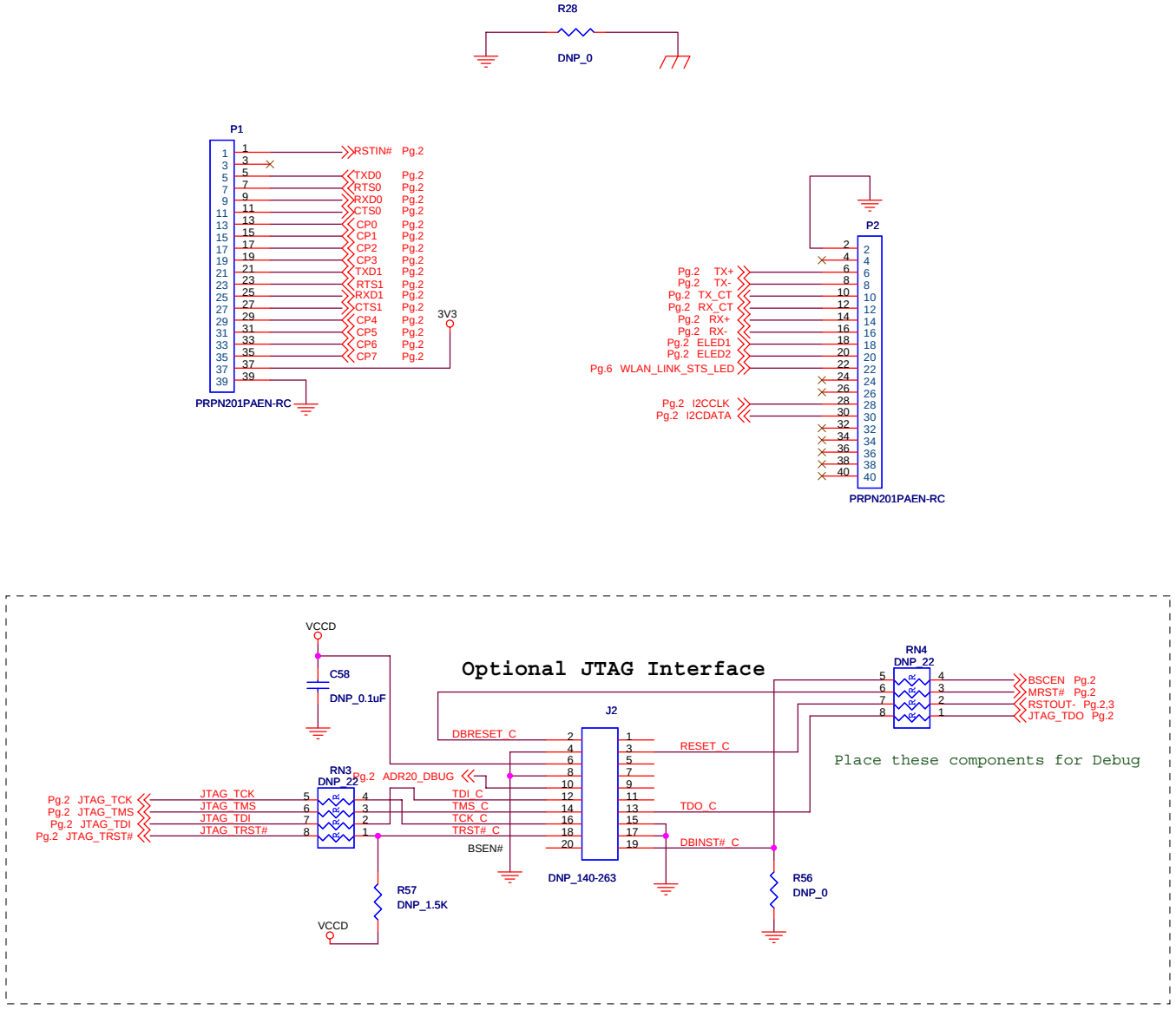



LANTRONIX CONFIDENTIAL MS

Title: FLEXPORT DIRECT, POWER

Size B | Document Number: 330-191-SCH-R | Rev B

Date: Wednesday, January 31, 2007 | Sheet 4 of 6

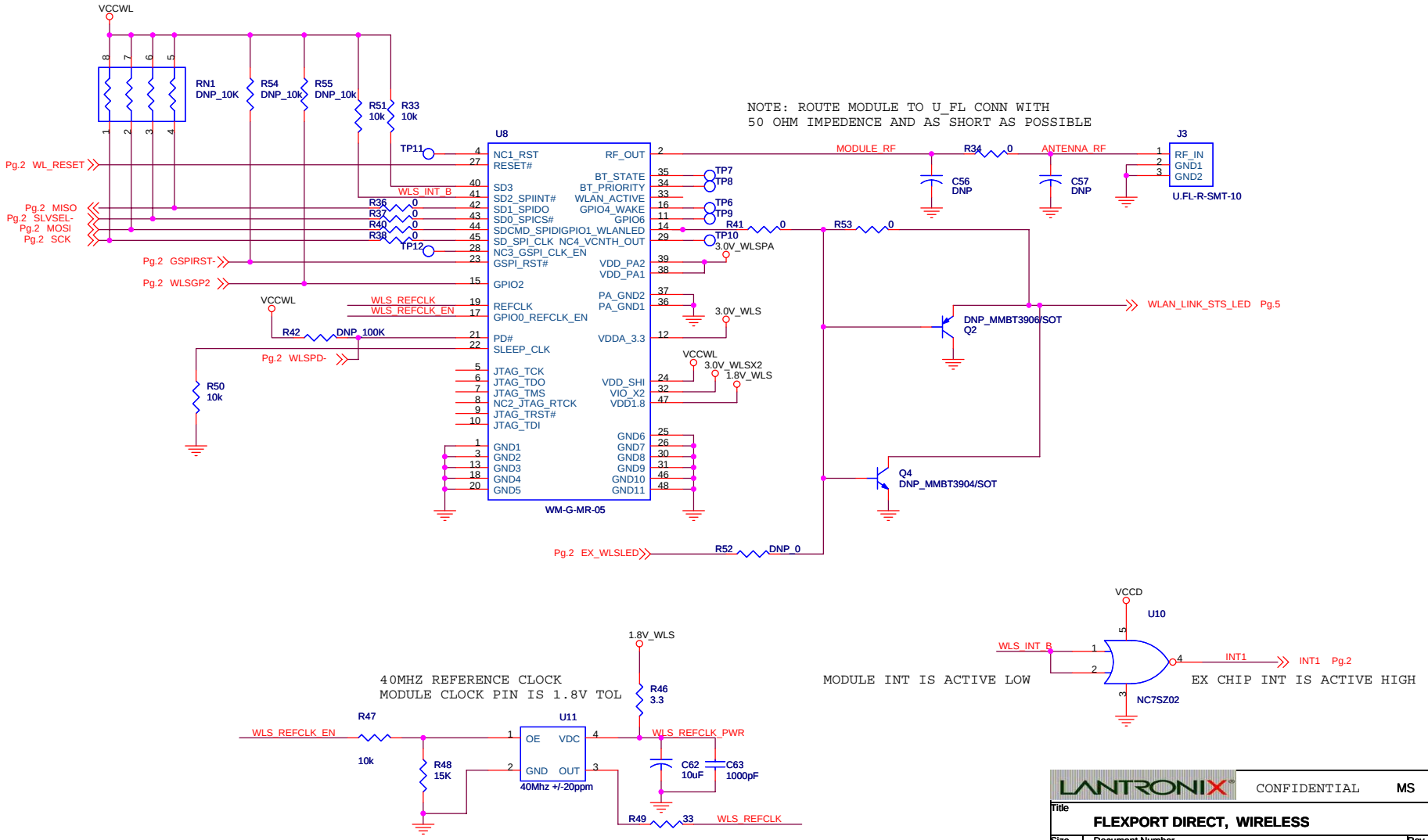



LANTRONIX CONFIDENTIAL MS

Title: FLEXPORT DIRECT, INTERFACE-HEADER/JTAG

| Size | Document Number | Rev |
|---|---|---|
| B | 330-191-SCH-R | B |

Date: Wednesday, January 31, 2007 Sheet 5 of 6




LANTRONIX

CONFIDENTIAL MS

Title

**FLEXPORT DIRECT, WIRELESS**

| Size | Document Number | Rev |
|---|---|---|
| B | 330-191-SCH-R | B |

Date: Wednesday, January 31, 2007 Sheet 6 of 6

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# *Exhibit X*

# *User's Guide*

LANTRONIX®


MatchPort™

# MatchPort™ b/g User Guide

Part Number 900-484
Revision A March 2007

## Copyright and Trademark



MatchPort, with its patent-pending technology, is a trademark of Lantronix.

Ethernet is a trademark of XEROX Corporation. UNIX is a registered trademark of The Open Group. Windows 95, Windows 98, Windows 2000, Windows NT, and Windows XP are trademarks of Microsoft Corp. Netscape is a trademark of Netscape Communications Corporation.

## Contacts

**Lantronix Corporate Headquarters**
15353 Barranca Parkway
Irvine, CA 92618, USA
Phone: 949-453-3990
Fax: 949-453-3995

**Technical Support**
Online: www.lantronix.com/support

**Sales Offices**
For a current list of our domestic and international sales offices, go to the Lantronix web site at http://www.lantronix.com/about/contact/

## Disclaimer

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device is intended only for OEM Integrators. The OEM integrator should be aware of the following important issues.

### *Labeling of the End Product*

The label of the end product integrating this module must clearly indicate that the end product contains an FCC approved RF module. The format of such statement could be "Contains Transmitter with FCC ID: R68MTCHDRCT" or something similar.

### *RSS-GEN Sections 7.1.4 and 7.1.5 Statement for Devices with Detachable Antennas*

This device has been designed to operate with the antennas listed in the Certificate, and having a maximum gain of 5 dBi. Antennas not included in this list or having a gain greater than 5 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

### *Integration Note*

a) This module is authorized under limited module approval specified to mobile host equipment. So, the antenna must be installed such that 20cm is maintained between the antenna and users.

b) The transmitter module may not be co-located with any other transmitter or antenna.

As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emission, PC peripheral requirements, etc.)

***Note:*** *In the event that these conditions cannot be met (for example certain laptop configurations, general purpose PCMCIA or similar cards, or co-*

*location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product (including the transmitter) and obtaining a separate FCC authorization.*

***Note:*** *Changes or modifications to this device not explicitly approved by Lantronix will void the user's authority to operate this device*.

# Contents

# 1: Using This Guide

## Purpose and Audience

This guide provides the information needed to configure, use and update the MatchPort b/g™ and is intended for software developers and system integrators who are embedding the unit in their designs.

## Chapter Summary

The remaining chapters in this guide include:

| | |
|---|---|
| **Introduction** | Describes the main features of the MatchPort and the protocols it supports. |
| **Using DeviceInstaller** | Provides information for viewing the MatchPort's configuration using DeviceInstaller. |
| **Configuration Using Web-Manager** | Details configuration using the Web-Manager to set parameters such as port and server properties. |
| **Configuration via Serial Mode or Telnet Port** | Provides instructions for accessing Setup Mode (command line interface) using a Telnet connection through the network or a terminal or terminal emulation program through the serial port. Details the parameters that you must configure. |
| **Configurable Pins** | Provides instructions for configuring the five General Purpose I/O pins. |
| **Monitor Mode** | Provides instructions for accessing and using the command line interface for monitoring the network and diagnosing problems. |
| **Updating Firmware** | Provides instructions for obtaining the latest firmware and updating the MatchPort. |
| **Troubleshooting** | Describes common problems and error messages and provides information about the diagnostic LEDs. Also provides Lantronix Technical Support contact information. |

## Additional Documentation

The following guides are available on the product CD and the Lantronix web site www.lantronix.com:

| | |
|---|---|
| **MatchPort b/g Demonstration Kit Quick Start Guide** | Briefly explains the basics of getting the MatchPort up and running. |
| **MatchPort b/g Integration Guide** | Provides information about the MatchPort hardware and integrating the MatchPort into another product. |

# 2: Introduction

MatchPort b/g is a wireless embedded device server that provides a network-enabling solution based on the IEEE 802.11b/g wireless standard. MatchPort allows Original Equipment Manufacturers (OEMs) to add wireless connectivity to their products by incorporating it onto a circuit board.

The MatchPort functions independently of a PC, providing a fully integrated solution that combines a processor, memory, 802.11b/g transceiver, and 230K (maximum) baud rate serial port into a single compact module. It includes an operating system, an embedded web server, and a full TCP/IP protocol stack. In addition, the MatchPort sends email alerts and supports numerous other network communication protocols, including ARP, UDP, TCP, ICMP, Telnet, AutoIP, DHCP, HTTP, SNMP, and SMTP.

Wired Equivalent Privacy (WEP), Wireless Protected Access (WPA ), and 802.11i/WPA2-Personal are available to guarantee the security of the wireless communication. WEP uses an RC4 encryption algorithm with a configured 64-bit or 104-bit key to scramble the data. WPA uses TKIP, which expands upon WEP by changing the key automatically every session, detecting intrusion and using improved authentication.

For OEMs who wish to customize the user interface by employing common and familiar tools, the MatchPort serves applets to a web browser, resulting in interactive web pages. This customization of HTML web pages and configuration screens tailors the MatchPort to fit unique requirements.

Two models of the MatchPort b/g are available: one with AES encryption and one without.

***Note:*** *The MatchPort b/g is based on a standard release of Lantronix's CoBos operating system. Some CoBos products support both wired and wireless interfaces. The MatchPort b/g currently supports only wireless.* ***Please ignore references and settings that deal with a wired Ethernet interface.***

## Capabilities

The MatchPort b/g device server has the following capabilities:

- Communication between TCP and UDP to serial
- Wireless interface (802.11b/g) with WEP, WPA, or 802.11i/WPA2-Personal protection
- Ethernet interface
- Email notification of configurable alarms and events
- Upgradeable firmware
- SNMP monitoring

- Connection to devices through a TCP or UDP data channel to computers or to another device server
- Web server allowing presentation of custom content and easy configuration through the browser
- Contains five programmable I/O pins used to monitor or control attached devices.

## Applications

The MatchPort device server connects serial devices such as those listed below to wireless and Ethernet networks using the IP protocol family.

- Remote sensing
- CNC controllers
- Data collection devices
- Telecommunications equipment
- Data display devices
- Security alarms and access control devices
- Time clocks and terminals

## Protocol Support

The MatchPort device server uses the TCP/IP protocol stack for network communications. Other supported protocols include:

- ARP, UDP, TCP, ICMP, Telnet, TFTP, AutoIP, DHCP, HTTP, and SNMP for network communications and management.
- TCP, UDP, and Telnet for connections to the serial port.
- TFTP for firmware and web page updates.
- IP for addressing, routing, and data block handling over the network.
- User Datagram Protocol (UDP) for typical datagram applications in which devices interact with other devices without maintaining a point-to-point connection.
- SMTP for email transmission.

## Configuration Methods

For the unit to operate correctly on a network, it must have a unique IP address on the network. There are three basic methods for logging into the device server:

**DeviceInstaller**: View the current MatchPort configuration using a Graphical User Interface (GUI) on a PC attached to a network. (See *3: Using DeviceInstaller*.)

**Web-Manager**: Through a web interface, configure the MatchPort and its settings. (See *4: Configuration Using Web-Manager*.)

**Serial & Telnet Ports**: There are two approaches to accessing Serial Mode. Make a Telnet connection to the network port (9999) or connect a terminal (or a PC running a terminal emulation program) to the unit's serial port. (See *5: Configuration via Serial Mode or Telnet Port*.)

# Addresses and Port Numbers

## Hardware Address

The hardware address is also referred to as the Ethernet address or the MAC address. The first three bytes of the Ethernet address are fixed and read 00-20-4A, identifying the unit as a Lantronix product. The fourth, fifth, and sixth bytes are unique numbers assigned to each unit.

**Example:** 00-20-4A-14-01-18

***Note:*** *Make note of the MAC address. It is needed to locate the MatchPort using DeviceInstaller.*

## IP Address

Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit. The MatchPort is automatically assigned an IP address on DHCP-enabled networks, as it is DHCP-enabled by default.

## Port Numbers

Every TCP connection and every UDP datagram is defined by a destination IP address and a port number. For example, a Telnet application commonly uses port number 23. A port number is similar to an extension on a phone system.

The unit's serial channel (port) can be associated with a specific TCP/UDP port number. Port number 9999 is reserved for access to the unit's Setup (configuration) Mode window. Ports 0-1024 are reserved as well. For more information on reserved port numbers, refer to *Table 5-6. Reserved Port Numbers*.

# 3: Using DeviceInstaller

This chapter covers the steps for viewing the MatchPort device server's properties and device details.

The MatchPort's default configuration is as follows:

- Network name: LTRX_IBSS
- Ad hoc mode
- No security
- BOOTP, DHCP, and AutoIP enabled.

The computer on which DeviceInstaller will be installed needs to have access to a wireless card with the same settings. Set the IP address to 0.0.0.0.

***Note:*** *AutoIP generates a random IP address in the range 169.254.0.1 to 169.254.255.254 if no BOOTP or DHCP server is found.*

## Accessing MatchPort b/g using DeviceInstaller

***Note:*** *Make note of the MAC address. You will need it to locate the MatchPort using DeviceInstaller. For more information on the hardware address, see* *Hardware Address on page 12**.*

Follow the instructions on the product CD to install and run DeviceInstaller.

1. Click **Start→Programs→Lantronix→DeviceInstaller→DeviceInstaller**.
2. Click the **MatchPort** folder. The list of Lantronix MatchPort devices available displays.
3. Expand the list of MatchPort b/g units by clicking the + symbol next to the MatchPort b/g icon. Select the MatchPort b/g unit by clicking its IP address to view its configuration.

## Viewing the MatchPort b/g's Current Configuration

***Note:*** *The MatchPort b/g is based on a standard release of Lantronix's CoBos operating system. Some CoBos products support both wired and wireless interfaces. The MatchPort b/g currently supports only wireless.* ***Please ignore references and settings that deal with a wired Ethernet interface****.*

In the right window, click the **Device Details** tab. The current MatchPort configuration displays:

| | |
|---|---|
| **Name** | Configurable field. Enter a name to identify the MatchPort. Double-click the field, type the value, and press **Enter** to complete. This name is not visible on other PCs or laptops using DeviceInstaller. |

| | |
|---|---|
| **Group** | Configurable field. Enter a group to categorize the MatchPort. Double-click the field, type in the value, and press **Enter** to complete. This group name is not visible on other PCs or laptops using DeviceInstaller. |
| **Comments** | Configurable field. Enter comments for the MatchPort. Double-click the field, type the comment, and press **Enter** to complete. This description or comment is not visible on other PCs or laptops using DeviceInstaller. |
| **Device Family** | Non-configurable field. Displays the MatchPort b/g's device family type as **MatchPort**. |
| **Type** | Non-configurable field. Displays the device type as **MatchPort b/g**. |
| **ID** | Non-configurable field. Displays the MatchPort's ID embedded within the box. |
| **Hardware Address** | Non-configurable field. Displays the MatchPort's hardware (MAC) address. |
| **Firmware Version** | Non-configurable field. Displays the firmware currently installed on the MatchPort. |
| **Extended Firmware Version** | Non-configurable field. Displays the full version nomenclature of the firmware. |
| **Online Status** | Non-configurable field. Displays the MatchPort's status as online, offline, unreachable (the MatchPort is on a different subnet), or busy (the MatchPort is currently performing a task). |
| **Telnet Enabled** | Non-configurable field. Displays **True**, indicating that the user can access the MatchPort by means of a Telnet session. |
| **Telnet Port** | Non-configurable field. Displays the MatchPort's port for Telnet sessions. |
| **Web Enabled** | Non-configurable field. Displays **True**, indicating that the user can access the MatchPort by means of a web browser. |
| **Web Port** | Non-configurable field. Displays the MatchPort's port for Web-Manager configuration. |
| **Maximum Baud Rate Supported** | Non-configurable field. Displays the MatchPort's maximum baud rate. ***Note:*** *The MatchPort may not currently be running at this rate.* |
| **Firmware Upgradeable** | Non-configurable field. Displays **True**, indicating the MatchPort's firmware is upgradeable as newer versions become available. |
| **IP Address** | Non-configurable field. Displays the MatchPort's current IP address. To change the IP address, see *4: Configuration Using Web-Manager* or *5: Configuration via Serial Mode or Telnet Port*. |
| **Number of COB partitions supported** | Non-configurable field. Displays the number of COB partitions supported (19). |

| | |
|---|---|
| **Supports DynamicIP** | Non-configurable field. Indicates whether the current IP address on the MatchPort was set using DHCP or other automatic method. |
| **Subnet Mask** | Non-configurable field. Displays the MatchPort's current subnet mask. To change the subnet mask, see *4: Configuration Using Web-Manager* or *5: Configuration via Serial Mode or Telnet Port*. |
| **Gateway** | Non-configurable field. Displays the MatchPort's current gateway. To change the gateway, see *4: Configuration Using Web-Manager* or *5: Configuration via Serial Mode or Telnet Port*. |
| **Number of Ports** | Non-configurable field. Displays the number of ports on the MatchPort. |
| **TCP Keepalive** | Non-configurable field. Displays **1-65s**, the MatchPort's TCP keepalive range. The default setting is **45**. |
| **Supports Configurable Pins** | Non-configurable field. Displays **True**, indicating configurable pins are available on the MatchPort. |
| **Supports Email Triggers** | Non-configurable field. Displays **True**, indicating email triggers are available on the MatchPort. |
| **Supports AES Data Stream** | Non-configurable field. Displays **True** if the MatchPort unit supports AES encryption. |
| **Supports 485** | Non-configurable field. Displays **True,** indicating the MatchPort supports the RS-485 protocol. |
| **Supports 920K Baud Rate** | Non-configurable field. Displays **False**. MatchPort does not support baud rates up to 920 Kbps. |
| **Supports Wired Ethernet** | Non-configurable field. Displays **True**. |
| **Supports HTTP Server** | Non-configurable field. Displays **True.** |
| **Supports HTTP Setup** | Non-configurable field. Displays **True.** |
| **Supports 230K Baud Rate** | Non-configurable field. Displays **True**. |
| **Supports GPIO Communication** | Non-configurable field. Displays **True**, indicating MatchPort supports communication via General Purpose Input Output (GPIO). |

# 4: Configuration Using Web-Manager

This chapter describes how to configure the MatchPort using Web-Manager, Lantronix's browser-based configuration tool. The unit's configuration is stored in nonvolatile memory and is retained without power. The unit performs a reset after the configuration is changed and stored.

***Note:*** *The MatchPort b/g is based on a standard release of Lantronix's CoBos operating system. Some CoBos products support both wired and wireless interfaces. The MatchPort b/g currently supports only wireless.* ***Please ignore references and settings that deal with a wired Ethernet interface.***

## Accessing Web-Manager using DeviceInstaller

Follow the instructions on the product CD to install and run DeviceInstaller.

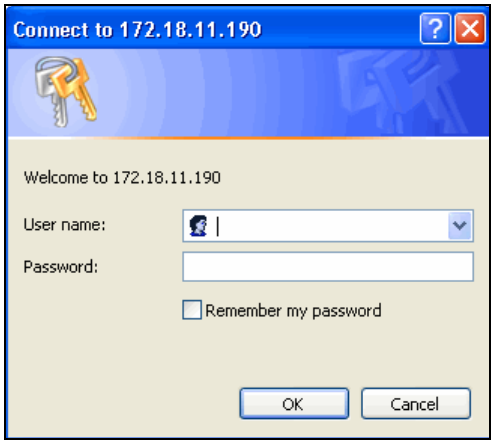
***Note:*** *For more information on DeviceInstaller, see 3: Using DeviceInstaller.*

1. Run DeviceInstaller and search for the list of available Lantronix device servers.
2. Select the MatchPort unit by clicking its IP address.
3. In the right window, click the **Web Configuration** tab.
4. To view the MatchPort's Web-Manager in the current DeviceInstaller window, click **Go**. To open the Web-Manager in a web browser, click **Use External Browser**. The Web-Manager opens.

   ***Note:*** *Alternatively, if the MatchPort is connected to the network, access Web-Manager by entering its IP address in a web browser.*

   A user and password dialog box displays. By default, no username and password are configured.

**Figure 4-1. Web-Manager Login Window**

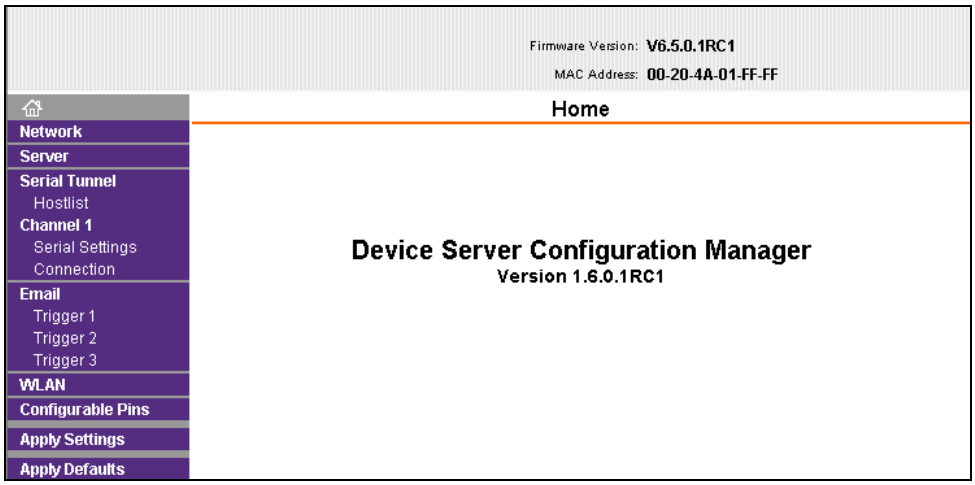



5. Do one of the following:

- If no Telnet password has been defined (default), leave both fields blank and click **OK**.
- If a Telnet password has been defined, leave the username blank, type in the password, and then click **OK**.

  The Web-Manager displays. The main menu is in the left pane of the Web-Manager page.

**Figure 4-2. Web-Manager**

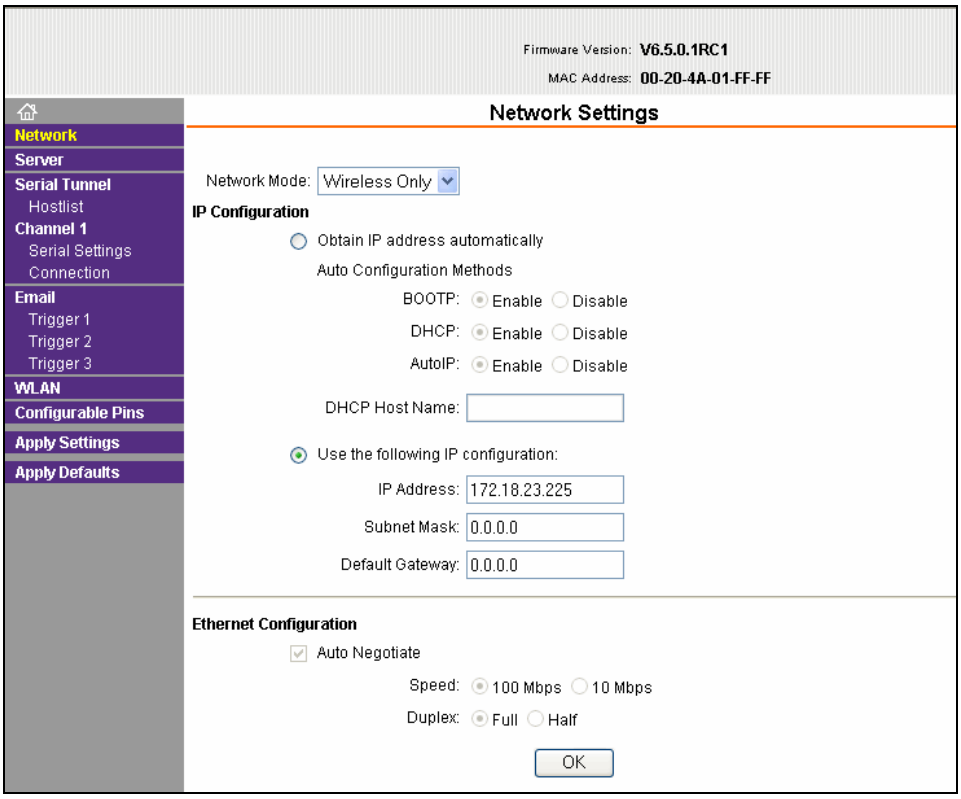



## Network Configuration

The unit's network values display when you select **Network** from the main menu. The following sections describe the configurable parameters within the Network configuration menu.

***Note:*** *The IP address is assigned via DHCP (on DHCP-enabled networks). Assign a static IP address if preferred.*

**Figure 4-3. Network Settings (Wireless Only)**




## Network Mode Configuration

To determine the MatchPort's network mode:

1. Click **Network** from the main menu.
2. Modify the following:

| | |
|---|---|
| **Network Mode** | Select **Wireless Only** to enable only the wireless network connectivity for the MatchPort. Select **Wired Only** to enable only the Ethernet network connectivity. |

## Automatic IP Address Configuration

To assign an IP address and its network configuration automatically:

1. Click **Network** from the main menu.
2. Select **Obtain IP address automatically**.
3. Enter the following (as necessary):

| | |
|---|---|
| **BOOTP** | Select **Enable** to permit the Bootstrap Protocol (BOOTP). The BOOTP server automatically assigns the IP address from a pool of addresses. |
| **DHCP** | Select **Enable** to permit Dynamic Host Configuration Protocol (DHCP). DHCP automatically assigns a leased IP address to the MatchPort unit. |
| **AutoIP** | The MatchPort generates an IP in the 169.254.x.x address range with a Class B subnet. Select the **Enable** checkbox to |

| | |
|---|---|
| | enable this feature. |
| **DHCP Host Name** | Enter the name of the host on the network providing the IP address. |

***Note:*** *Disabling BOOTP, DHCP, and Auto-IP (all three checkboxes) is not advised as the only available IP assignment method will then be ARP or serial port.*

4. Click the **OK** button when finished.

## Static IP Address Configuration

To assign an IP address and its network configuration manually:

1. Click **Network** from the main menu.
2. Select **Use the following IP configuration**.
3. Enter the following (as necessary):

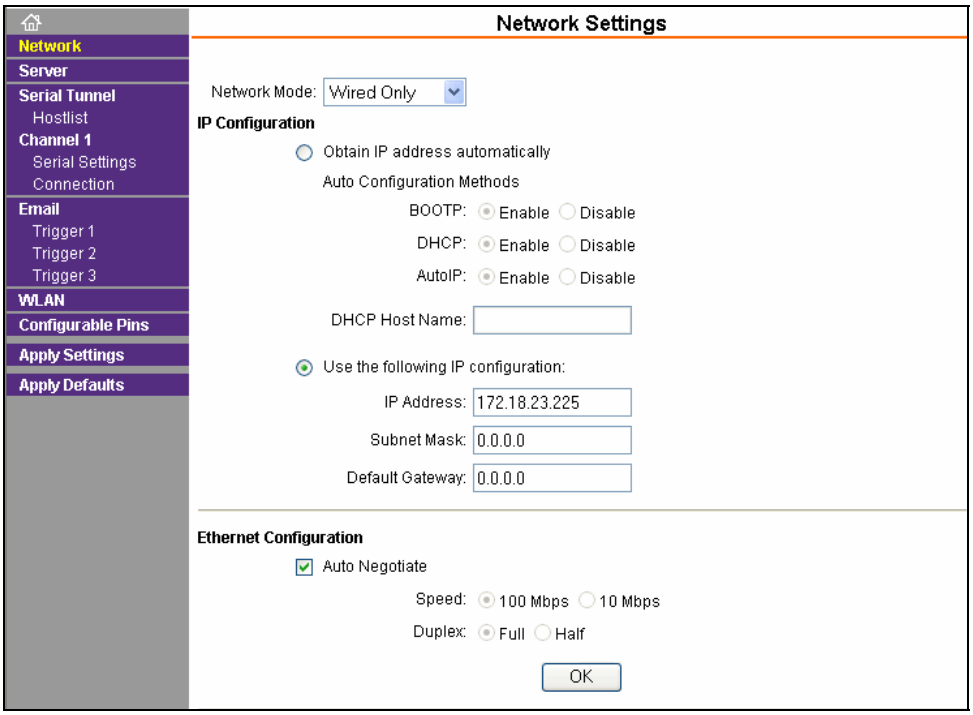
| | |
|---|---|
| **IP Address** | If DHCP is not used to assign IP addresses, enter it manually in standard decimal-dot notation. The IP address must be set to a unique value in the network. |
| **Subnet Mask** | A subnet mask defines the number of bits taken from the IP address that are assigned for the host part. |
| **Default Gateway** | The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network. |

4. Click the **OK** button when finished.

## Ethernet Configuration

If the **Network Mode** is **Wired Only**, in addition to the IP configuration, you must specify the speed and direction of data transmission.

**Figure 4-4. Ethernet Settings (Wired Only)**




**To specify how data will be transmitted:**

1. Enter the following (as necessary):

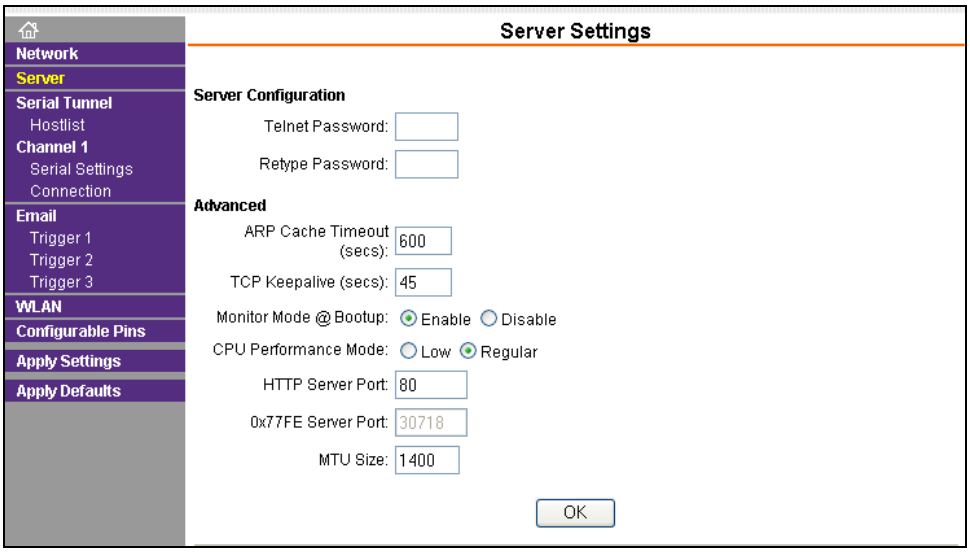
| | |
|---|---|
| **Auto Negotiate** | With this option, the Ethernet port auto-negotiates the speed and duplex with the hardware endpoint to which it is connected. This is the default setting.<br><br>If this option is not selected, complete the fields that become available:<br>**Speed:** The speed of data transmission. The default setting is **100 Mbps**.<br>**Duplex:** The direction of data transmission. The default setting is **Full**. |

2. When you are finished, click the **OK** button.
3. On the main menu, click **Apply Settings**.

# Server Configuration

The unit's server values display when you select **Server** from the main menu. The following sections describe the configurable parameters within the Server configuration menu.

**Figure 4-5. Server Settings**




To configure the MatchPort's device server settings:

1. On the main menu, click **Server** to open the Server Settings page.
2. Configure or modify the following fields:

### *Server Configuration*

| | |
|---|---|
| **Telnet Password** | Enter the password required for Telnet access. |
| **Retype Password** | Re-enter the password required for Telnet access. |

### *Advanced*

| | |
|---|---|
| **ARP Cache Timeout** | When the unit communicates with another device on the network, it adds an entry into its ARP table. ARP Cache timeout defines the number of seconds (1-600) before it refreshes this table. |
| **TCP Keepalive** | TCP keepalive time defines how many seconds the unit waits during an inactive connection before checking the connection status. If the unit does not receive a response, it drops that connection. Enter a value between **0** and **65** seconds. **0** disables keepalive. |
| **Monitor Mode @ Bootup** | Select **Disable** to disable the entry into the monitor mode via the **yyy** or **xx1** key sequence at startup. This command prevents the unit from entering monitor mode by interpreting the stream of characters that are received during the device server's initialization at startup. |
| **CPU Performance Mode** | Select the MatchPort's performance mode. Higher performance settings require more energy. **Low** is 26 Mhz, |

| | |
|---|---|
| | and **Regular** is 48 Mhz. The default is **Regular**. |
| **HTTP Server Port** | This option allows the configuration of the web server port number. The valid range is **1-65535**. The default HTTP server port number is **80**. |
| **0x77FE Server Port** | Not applicable for this product. |
| **MTU Size** | The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between **512** and **1400** bytes. The default is **1400** bytes. |

## Host List Configuration

The MatchPort scrolls through the host list until it connects to a device listed in the host list table. After a successful connection, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until the next successful connection.

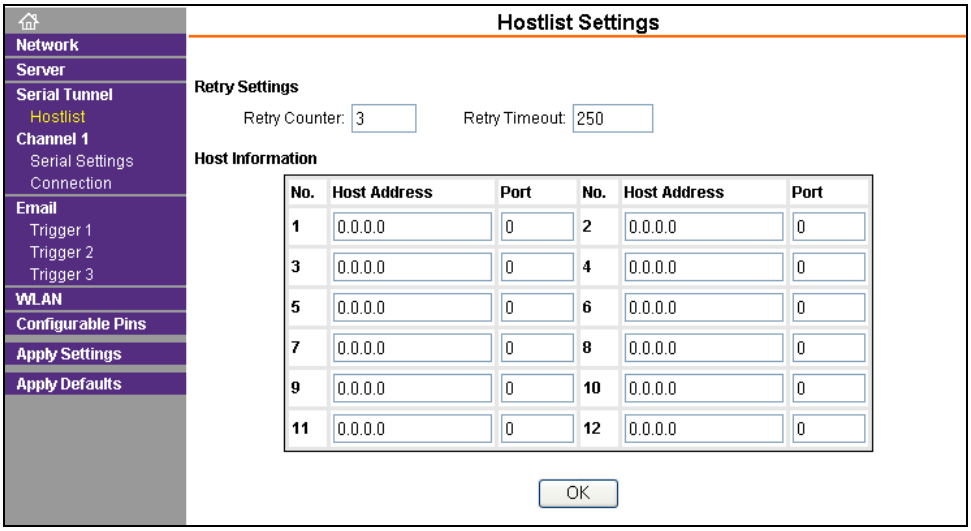
The host list supports a minimum of 1 and a maximum of 12 entries. Each entry contains an IP address and a port number.

***Note:*** *The host list is disabled for Manual and Modem Mode. The unit does not accept a data connection from a remote device when the hostlist option is enabled.*

To configure the MatchPort's host list:

1. On the main menu, click the **Hostlist** tab to open the Hostlist Settings page.

**Figure 4-6. Hostlist Settings**




2. Enter or modify the following fields from the Hostlist Settings page:

### *Retry Settings*

| | |
|---|---|
| **Retry Counter** | Enter the value for the number of times the MatchPort should attempt to retry connecting to the host list. |
| **Retry Timeout** | Enter the duration (in seconds) the MatchPort should abandon attempting a connection to the host list. |

### Host Information

| | |
|---|---|
| **Host Address** | Enter or modify the host's IP address. |
| **Port** | Enter the target port number. |

# Channel 1 Configuration

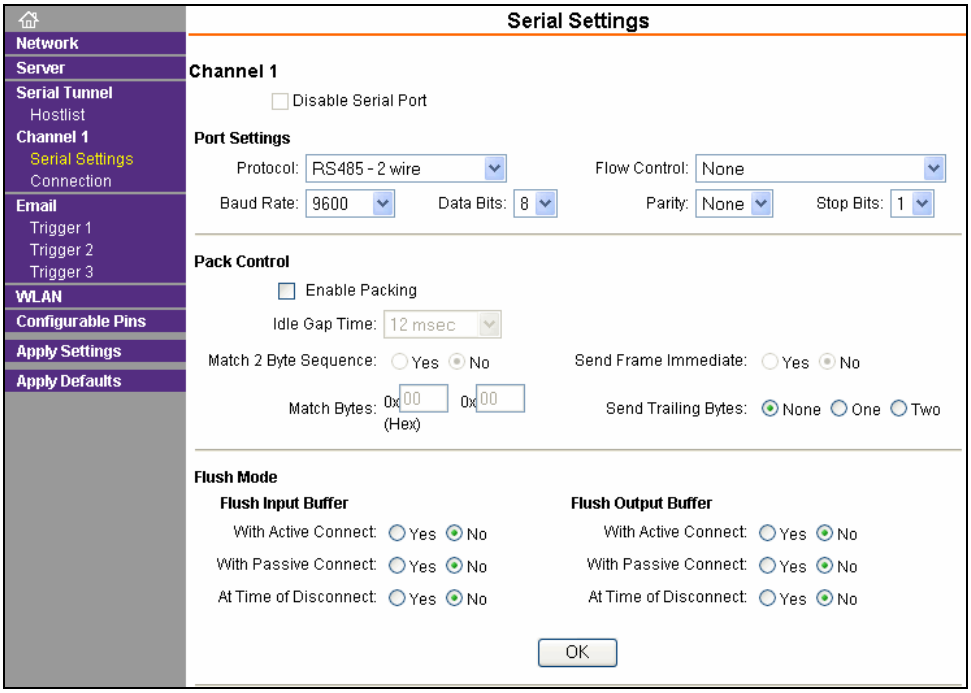
Channel 1 configuration defines how the serial port responds to network and serial communication.

## Serial Settings

To configure the channel's serial settings:

1. On the main menu, click **Serial Settings** for Channel 1 to open the Serial Settings page.

**Figure 4-7. Channel Serial Settings**




2. In the available fields, enter the following information:

### Channel 1

| | |
|---|---|
| **Disable Serial Port** | When selected, disables communication through the serial port. |

### Port Settings

| | |
|---|---|
| **Protocol** | Select the protocol type from the drop-down list for the selected channel. **RS-422/485 4-wire** and **RS-485 2-wire** options are available on the MatchPort-485 only. |
| **Flow Control** | Flow control manages data flow between devices in a network to ensure it is processed efficiently. Too much data arriving before a device is prepared to manage it causes lost or |

| | |
|---|---|
| | retransmitted data. |
| **Baud Rate** | The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, and 230400. |
| **Data Bits** | Indicates the number of bits in a transmitted data package. |
| **Parity** | Checks for the parity bit. The default is **None**. |
| **Stop Bits** | The stop bit follows the data and parity bits in serial communication. It indicates the end of transmission. |

### *Pack Control*

| | |
|---|---|
| **Enable Packing** | Select the checkbox to enable packing on the MatchPort.<br>Two firmware-selectable packing algorithms define how and when packets are sent to the network. The standard algorithm is optimized for applications in which the unit is used in a local environment, allowing for very small delays for single characters, while keeping the packet count low. The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream. |
| **Idle Gap Time** | Select the maximum time for inactivity. The default time is 12 milliseconds. |
| **Match 2 Byte Sequence** | Use to indicate the end of a series of data to be sent as one group. Two bytes must occur sequentially to indicate to the MatchPort the end of the data collection. |
| **Send Frame Immediately** | After the detection of the byte sequence, indicates whether to send the data frame or the entire buffer. Select **True** to send only the data frame. |
| **Match Bytes** | Use to indicate the end of a series of data to be sent as one group. Set this value to **00** if specific functions are not needed. |
| **Send Trailing Bytes** | Select the number of bytes to send after the end-of-sequence characters. |

### *Flush Input Buffer (Serial to Network)*

| | |
|---|---|
| **With Active Connect** | Select **Yes** to clear the input buffer with a connection that is initiated from the device to the network. |
| **With Passive Connect** | Select **Yes** to clear the input buffer a connection initiated from the network to the device. |
| **At Time of Disconnect** | Select **Yes** to clear the input buffer when the network connection to or from the device is disconnected. |

### *Flush Output Buffer (Network to Serial)*

| | |
|---|---|
| **With Active Connect** | Select **Yes** to clear the output buffer with a connection that is initiated from the device to the network. |

| | |
|---|---|
| **With Passive Connect** | Select **Yes** to clear the output buffer with a connection initiated from the network to the device. |
| **At Time of Disconnect** | Select **Yes** to clear the output buffer when the network connection to or from the device is disconnected. |

## Connection Settings - TCP

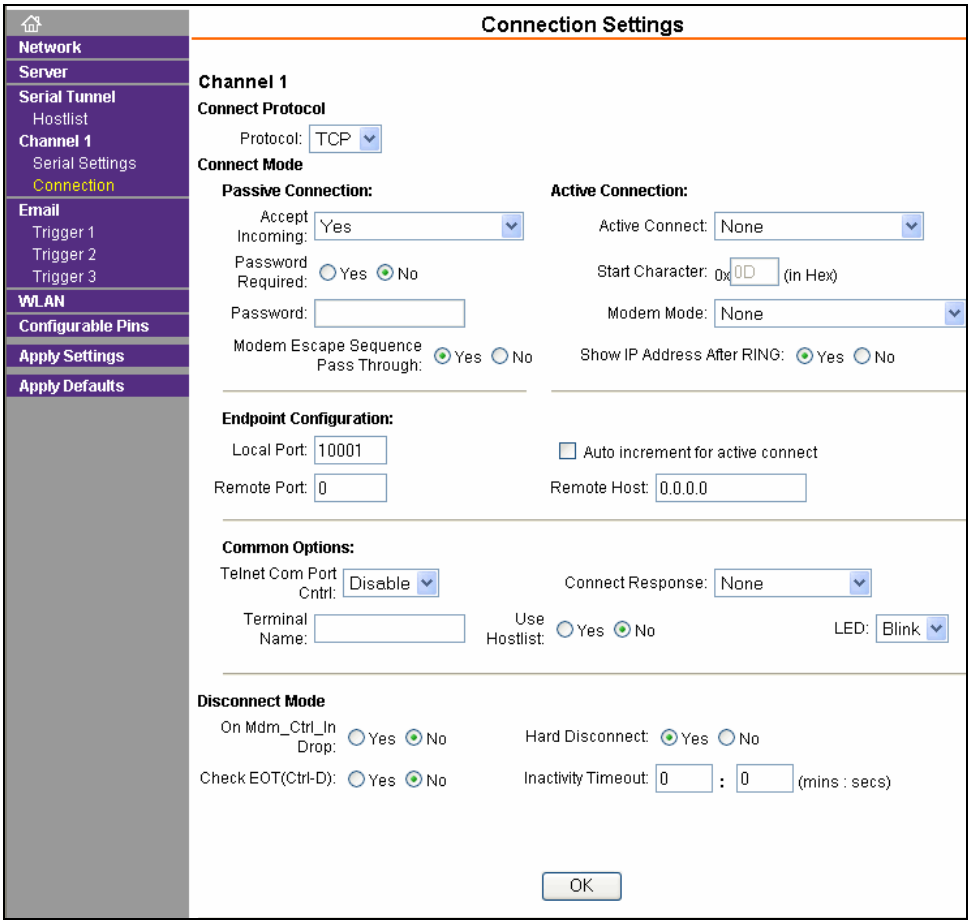
To configure a channel's TCP settings:

1. On the main menu, click **Connection** to open the Connection Settings page for the channel.
2. In the available fields, enter the following information:

### *Connect Protocol*

| | |
|---|---|
| **Protocol** | Select **TCP** from the drop-down list. |

**Figure 4-8. TCP Connection Settings**




### *Connect Mode: Passive Connection*

| | |
|---|---|
| **Accept Incoming** | Select **Yes** to accept incoming connections. |
| **Password Required** | Determines whether a password is required for an incoming passive connection. Not available when a password is set for |

| | |
|---|---|
| | Telnet mode. |
| **Password** | If **Password Required** was set to **Yes**, enter the password for passive connections. |

### Connect Mode: Active Connection

| | |
|---|---|
| **Active Connect** | Select **None** to disable **Active Connect**. Otherwise, indicate the connection type from the drop-down list:<br>**With Any Character:** Attempts to connect when any character is received from the serial port.<br>**With Active Mdm Ctrl In:** Accepts external connection requests only when the **Modem Control In** input is asserted.<br>**With Start Character:** Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return.<br>**Manual Connection:** Attempts to connect when directed by a command string received from the serial port.<br>**Auto Start:** Automatically connects to the remote IP address and port after booting up. |
| **Start Character** | If **Active Connect** is set to **With Start Character**, enter the start character in this field. |
| **Modem Mode** | Indicates the on-screen response type when in Modem Mode (if **Modem Mode** is enabled). |
| **Modem Escape Sequence Pass Through** | Disable or enable the MatchPort's ability to send the escape sequence. The default is **Y** (Yes) (send the escape sequence). |
| **Show IP Address After Ring** | Indicates whether to display the remote IP address upon connection. The default setting is **Yes**. |

### Endpoint Configuration

| | |
|---|---|
| **Local Port** | Enter the local port number. |
| **Auto increment for active connect** | Select to auto-increment the local port number for new outgoing connections. The range of auto-incremented port numbers is 50,000 to 59,999 and loops back to the beginning when it reaches the maximum range. |
| **Remote Port** | Enter the remote port number. |
| **Remote Host** | Enter the IP address of the remote device. |

### Common Options

| | |
|---|---|
| **Telnet Com Port Cntrl** | Available for configuration only when **Active Connect** is set to **None**. Select **Enable** to permit Telnet communication to the MatchPort unit. The **Telnet Com Port Cntrl** feature is used in conjunction with the Com Port Redirector (CPR) utility. (See the CPR online Help for details.) |
| **Connect Response** | A single character is transmitted to the serial port when there is a change in connection state. Default setting is **None**. |
| **Terminal Name** | Available for configuration only when **Telnet Com Port Cntrl** is set to **Enable**. |

| | |
|---|---|
| | Use the terminal name for the Telnet terminal type. Enter only one name. When this option is enabled, the unit also reacts to the end of record (EOR) and binary options, which can be used for applications such as terminal emulation to IBM hosts. |
| **Use Hostlist** | If this option is set to **True**, the device server scrolls through the host list until it connects to a device listed in the host list table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it is able to connect to another IP in the host list.<br>The host list is disabled for Manual and Modem Modes. The unit will not accept a data connection from a remote device when the host list option is enabled.<br>For information on configuring the host list, see *Host List Configuration* on page 22. |
| **LED** | Select **Blink** for the status LEDs to blink upon connection, or select **None** for no LED output. |

### *Disconnect Mode*

| | |
|---|---|
| **On Mdm_Ctrl_In Drop** | Set to **Yes** for the network connection to or from the serial port to disconnect (drop) when **Modem Control In** transitions from an asserted state to not asserted state. The default setting is **No**. |
| **Hard Disconnect** | When set to **Yes**, the TCP connection closes even if the remote site does not acknowledge the disconnect request. |
| **Check EOT (Ctrl+D)** | Choose **Yes** to drop the connection when **Ctrl+D** or **Hex 04** is detected. Both Telnet mode and **Disconnect with EOT** must be enabled for **Disconnect with EOT** to function properly. **Ctrl+D** is only detected going from the serial port to the network. |
| **Inactivity Timeout** | Use this parameter to set an inactivity timeout. The unit drops the connection if there is no activity on the serial line before the set time expires. Enter time in the format mm:ss, where m is the number of minutes, and s is the number of seconds. To disable the inactivity timeout, enter **00:00**. |

## Connection Settings - UDP

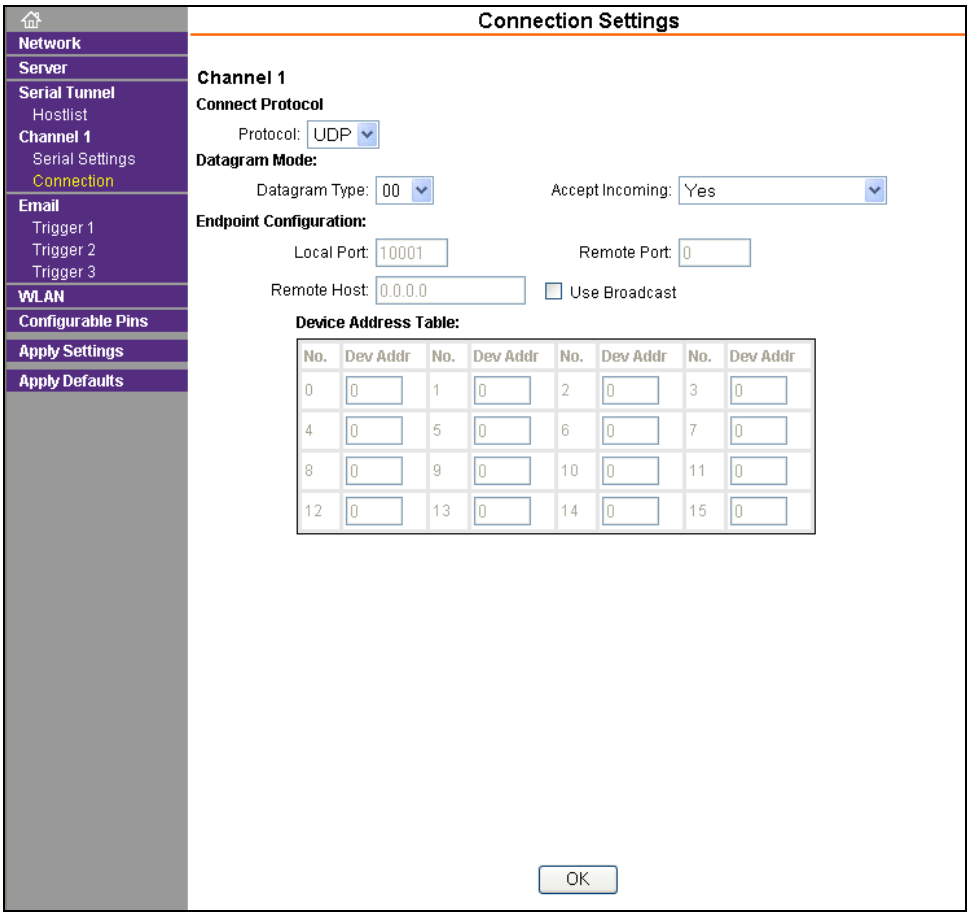
To configure a channel's UDP settings:

1. On the main menu, click **Connection** for either Channel 1 or Channel 2 to open the Connection Settings page for the selected channel.
2. In the available fields, enter the following information:

### *Connect Protocol*

| | |
|---|---|
| **Protocol** | Select **UDP** from the drop-down list. |

**Figure 4-9. UDP Connection Settings**




## Datagram Mode

| | |
|---|---|
| **Datagram Type** | Configures the remote IP or network broadcast address and the remote port. Enter **01** for directed or broadcast UDP. |
| **Accept Incoming** | Select **Yes** to accept incoming UDP datagrams. Other options are **No** and **With Active Mdm Ctrl In**. |

## Endpoint Configuration

| | |
|---|---|
| **Local Port** | Enter the local port number. |
| **Remote Port** | Enter the port number of the remote device. |
| **Remote Host** | Enter the IP address of the remote device. |
| **Use Broadcast** | Select to broadcast the UDP datagram. The default is not to broadcast.<br>***Note:*** *Diagrams are sent as subnet-directed broadcasts.* |

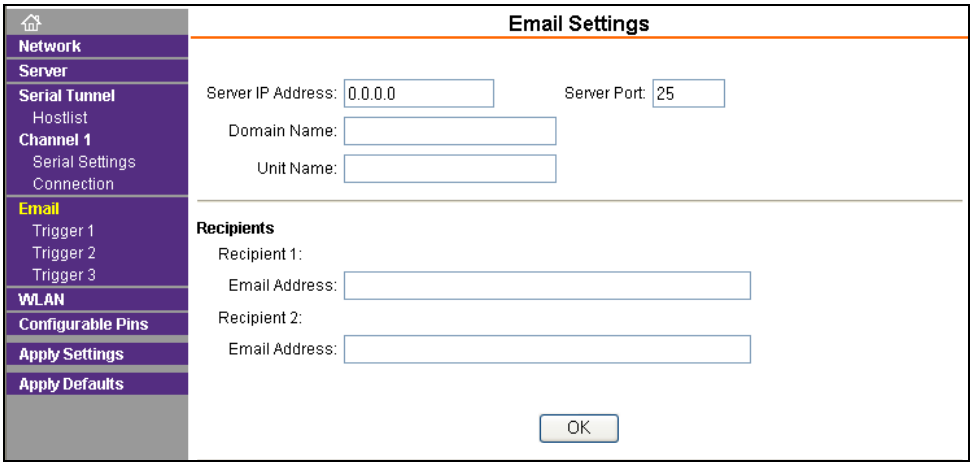
# Email Configuration

The unit sends an email to multiple recipients when a specific trigger event occurs. There are three separate triggers, based on any combination of the configurable pins when selected as user I/O functions. Optionally, use a two-byte serial string to initiate a trigger. Each trigger is independent of the others. Each condition within an individual trigger must be met before the unit will send the email.

To configure the MatchPort's email settings:

1. On the main menu, click **Email** to open the Email Settings page.

**Figure 4-10. Email Settings**




2. Configure the following fields:

| | |
|---|---|
| **Server IP Address** | Enter the IP address of the mail server. |
| **Server Port** | Enter the port number on the email server. |
| **Domain Name** | Enter the email server's domain name. |
| **Unit Name** | Enter the username used by the MatchPort to send email messages. Spaces are not permitted. |

### *Recipients*

| | |
|---|---|
| **Recipient 1: Email Address** | Enter the email address designated to receive email notifications. |
| **Recipient 2: Email Address** | Enter an additional email address designated to receive email notifications. |

## Trigger Configuration

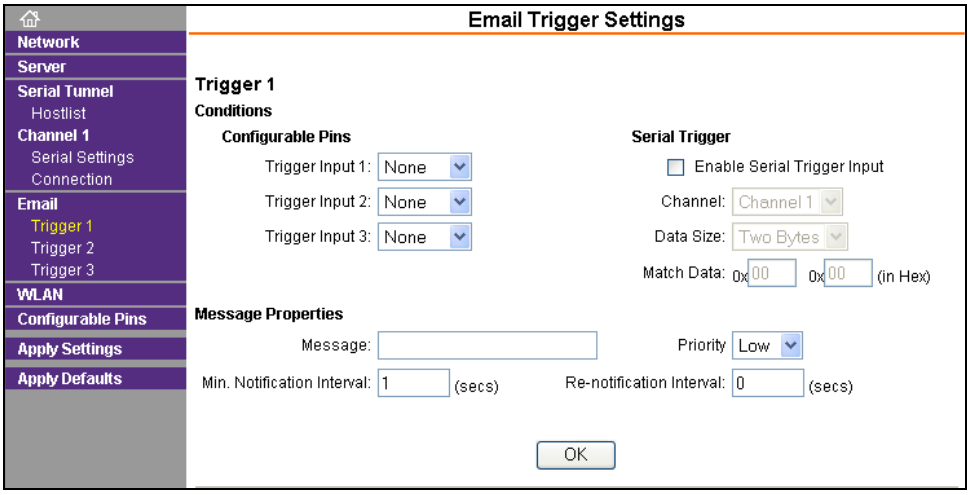
A trigger event occurs when the unit receives either one or two bytes of a specified sequence on the serial port, or because of a specified combination of conditions on the configurable pins.

Set the configurable pins to **Active**, **Inactive**, or **None**. The configurable pins are disabled if they are all set to None. If both the serial sequence and the configurable pins are disabled, the trigger is disabled.

To configure the MatchPort's email trigger settings:

1. On the main menu, click **Trigger 1**, **Trigger 2**, or **Trigger 3** to configure the desired Trigger settings. The Email Trigger Settings page opens.

**Figure 4-11. Email Trigger Settings**




2. Configure the following fields:

### Conditions

| | |
|---|---|
| **Configurable Pins** | Select the condition from the drop-down list for the configurable pins. Repeat for each **Trigger Input** field. |

### Serial Trigger

| | |
|---|---|
| **Enable Serial Trigger Input** | When selected, specified serial communications count as a trigger input. |
| **Channel** | Select the channel prompting the trigger. |
| **Data Size** | Select the data size prompting the trigger. |
| **Match Data** | Enter the data that, when it appears in the communication stream, prompts a trigger. |

***Note:*** *All of the conditions must match to send an email notification.*

### Message Properties

| | |
|---|---|
| **Message** | The subject line of the trigger event email to the specified recipient(s). |
| **Priority** | The priority level for the email. |
| **Min. Notification Interval** | The notification interval is the minimum time allowed between individual triggers. If a trigger event occurs within the minimum interval since the last trigger, it is ignored. |
| **Re-notification Interval** | Indicates the time interval in which a new email message is sent to the recipient(s) when a single trigger event remains active. |

# WLAN Configuration

Without adequate protection, a wireless LAN is susceptible to access by unauthorized users.

***Note:*** *Due to regulations, the country-specific setting has been removed from the setup menu and Web-Manager. However, we provide a separate utility for changing the* ***Country/Zone*** *setting. The utility is called SetZone and is included in the MatchPort package. It is also available for download from the Lantronix web site.*

*The syntax is* ***`SetZone <IP address> [<zone abbreviation>]`***

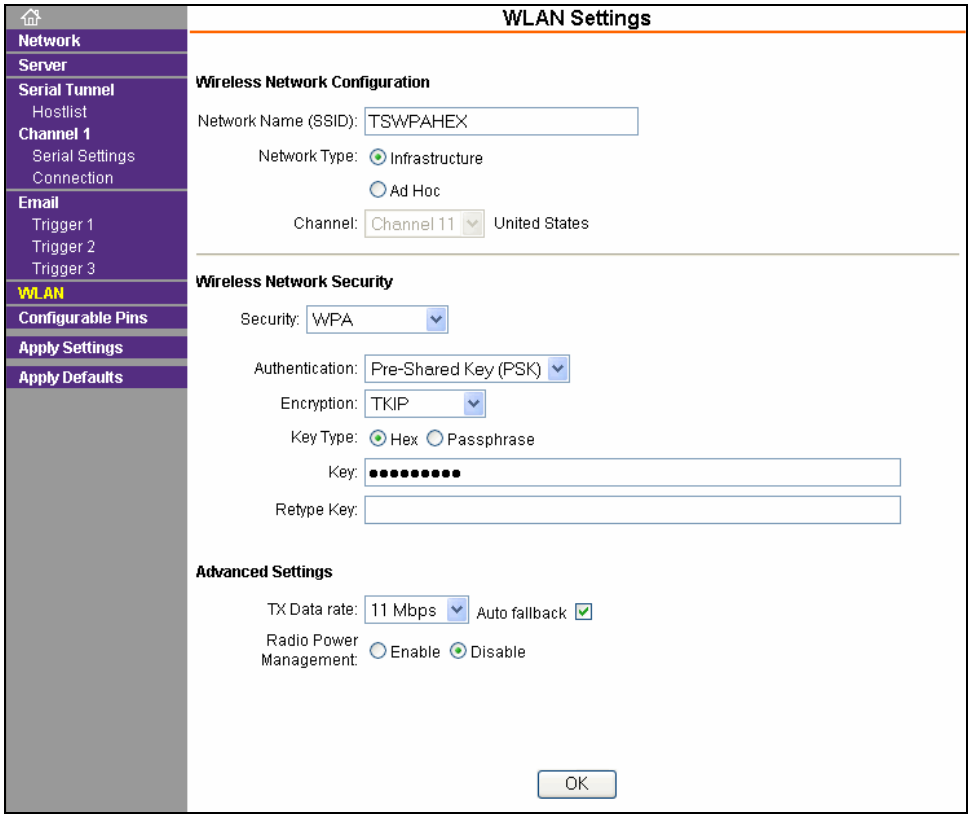
*Leaving the zone blank causes the utility to report the current setting only. Following are valid zone abbreviations. These settings are consistent with IEEE802.11b/g zones:*

| | |
|---|---|
| **US=United States CA=Canada** | **JP=Japan** |
| **FR=France** | **OT=Others, such as Europe (excluding France), Asia, Africa, and Australia** |
| **SP=Spain** | |

To configure the MatchPort's WLAN settings:

1. On the main menu, click **WLAN** to open the WLAN Settings page.

**Figure 4-12. WLAN Settings**



2. Enter or modify the following fields:

### Wireless Network Configuration

| | |
|---|---|
| **Network Name** | Enter the name of the wireless network (SSID). The MatchPort connects to this wireless network. |
| **Network Type** | Select **Infrastructure** or **Ad-Hoc**. Infrastructure mode communicates with Access Points. Adhoc mode communicates only with other clients. |
| **Channel** | Configurable only when **Network Type** is set to **Ad-Hoc**. Select from the drop-down list the radio channel for the Ad Hoc network. The default value is **11**. |

### Wireless Network Security

| | |
|---|---|
| **Security** | As a security measure, enable **WEP**, **WPA**, or **802.11i/WPA2-Personal** on the MatchPort. By default, wireless security is disabled on MatchPort. |

### WEP Options

| | |
|---|---|
| **Authentication** | Select an authentication scheme (**Open/None** or **Shared**) from the drop-down list. |
| **Encryption** | Select the encryption type (**64 bits** or **128 bits** for WEP) from the drop-down list. **64 bits** is the default encryption for WEP. |
| **Key Type** | Select the key type (**Hex** or **Passphrase**). |
| **Key and Retype Key** | Enter the **Encryption Key** in hexadecimal value if **Hex** is selected as the key type. Enter key as a string if **Passphrase** is selected as the key type. Passphrase input is not the same as ASCII input. A passphrase of more than 20 characters is recommended for adequate security. Spaces and punctuation are permitted. |
| **TX Key** | Select the key to use for transmission. |

### WPA Options

| | |
|---|---|
| **Authentication** | Select **Pre-Shared Keys** from the drop-down list. |
| **Encryption** | Select the encryption type from the drop-down list. **TKIP** is the default encryption for WPA. |
| **Key Type** | Select the key type (**Hex** or **Passphrase**). |
| **Key and Retype Key** | Enter the **Encryption Key** in hexadecimal value if the key type is **Hex**. Enter key as a string if the key type is **Passphrase**. Passphrase input is not the same as ASCII input. A passphrase of more than 20 characters is recommended. Spaces and punctuation characters are permitted. |

### 802.11i/WPA2-Personal Options

| | |
|---|---|
| **Authentication** | Select **Pre-Shared Keys** from the drop-down list. |
| **Encryption** | Select the encryption type from the drop-down list. **CCMP** is |

| | |
|---|---|
| | the default encryption for WPA. |
| **Key Type** | Select the key type (**Hex** or **Passphrase**). |
| **Key and Retype Key** | Enter the **Encryption Key** in hexadecimal value if the key type is **Hex**. Enter the key as a string if the key type is **Passphrase**. Passphrase input is not the same as ASCII input. A passphrase of more than 20 characters is recommended. Spaces and punctuation characters are permitted. |

### *Advanced Settings*

| | |
|---|---|
| **TX Data Rate** | MatchPort permits the control of the transmission data rate. Click the **Auto fallback** check box to allow the MatchPort to set the data rate automatically (or leave unchecked to set the transmission rate manually). The default rate is **11 Mbps**.<br>If the **Auto fallback** check box is selected, choose the maximum data rate from the drop-down list.<br>If the **Auto fallback** check box was not selected, select the fixed data rate (in Mbps) from the drop-down list. |
| **Radio Power Management** | Power management reduces the overall power consumption of the MatchPort unit. Selecting **Enable** increases the response time. Power management is not permitted in Ad-Hoc mode. |

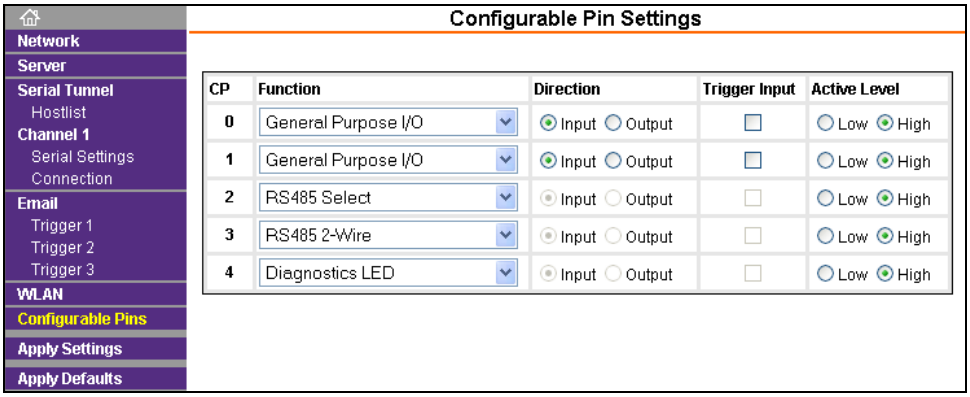
## Configurable Pin Settings

There are 11 configurable hardware pins on the MatchPort unit. For each pin, configure the pin function, communication direction, and its activity level. For more information, see *Configurable Pins* on page 63.

To configure the MatchPort's OEM Configurable Pins:

1. On the main menu, click **Configurable Pins** to open the Configurable Pins page.

**Figure 4-13. Configurable Pins Settings**




2. Configure or modify the following fields for each pin:

| | |
|---|---|
| **Function** | From the drop-down list, select the purpose of the specified pin. See *Configurable Pin Functions* for a description of each available function. |

| | |
|---|---|
| **Direction** | Select whether the pin inputs or outputs. |
| **Trigger Input** | Select whether the GPIO input signal is to be used as a trigger condition for email. |
| **Active Level** | Select the signal active level (**Low** or **High**). |

### *Configurable Pin Functions*

| | |
|---|---|
| **General Purpose I/O** | Monitors input or controls output by means of the 77F0 port. |
| **Modem Ctrl Channel 1 In** | Allows for control of the connection (and disconnection) of channel 1. |
| **Modem Ctrl Channel 1 Out** | Indicates a connection is established on channel 1. |
| **Serial Channel 1 Status LED** | Indicates channel 1 status and extended diagnostics when the Diagnostics LED is lit. |
| **Reset to Defaults (Wireless)** | Asserting during bootup for at least 7 seconds resets the configuration back to factory defaults. Used when network access is impossible because of improper configuration. |
| **RS-485 Select out** | Selects between RS-232 and RS-485 line drivers. |
| **RS-485 2 Wire out** | Selects 2-wire line drivers. Usable as a half/full duplex selector. |
| **RS-422/485 4 Wire out** | Selects 4-wire line drivers |
| **Reset to Defaults (Ethernet)** | Asserting during bootup for at least 7 seconds resets the configuration back to factory default. Used when network access is impossible because of improper configuration. |

## Updating Settings

Click the **Apply Settings** button from the main menu to save and apply the configuration changes.

## Applying Defaults

Click the **Apply Defaults** button from the main menu to apply the factory settings to the MatchPort. For a list of the default settings, see *Default Settings* on page 61.

# 5: Configuration via Serial Mode or Telnet Port

As an alternative to Web-Manager, you can configure the MatchPort unit using a terminal program to access the serial port locally. Using this terminal program to respond to prompts is referred to as being in *Setup Mode.* Another way to access Setup Mode is over the network through a Telnet connection.

The unit's configuration is stored in nonvolatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after the configuration has been changed and stored.

***Note:*** *The menus in this section show a typical device. Not all devices display information in the same manner.*

***Note:*** *The MatchPort b/g is based on a standard release of Lantronix's CoBos operating system. Some CoBos products support both wired and wireless interfaces. The MatchPort b/g currently supports only wireless.* ***Please ignore references and settings that deal with a wired Ethernet interface.***

## Accessing Setup Mode

### Telnet Access

To configure the unit over the network, establish a Telnet connection to port 9999:

***Note:*** *Alternatively, use DeviceInstaller to access Telnet. Select the device from the main page list, and click the* ***Telnet Configuration*** *tab in the right page. If using* ***Telnet*** *from the DeviceInstaller toolbar, skip steps 1 through 3.*

1. From the Windows **Start** menu, click **Run**.
2. From the Run dialogue box**,** type the following command (where x.x.x.x is the IP address and 9999 is the unit's fixed network configuration port number):

   Windows: `telnet x.x.x.x 9999`
   UNIX: `telnet x.x.x.x:9999`

3. Click **OK**. The following information displays:

**Figure 5-1. MAC Address**

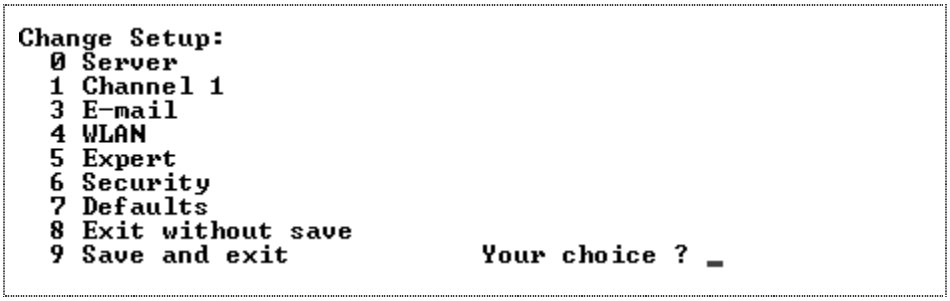
```
MAC address 00204A01FFFF
Software version V6.5.0.1RC1 (070131)
AES library version 1.8.2.1
```

4. To enter the Setup Mode, press **Enter** within 5 seconds.

   ***Note:*** *The connection fails if you do not press* ***Enter*** *within 5 seconds.*

   The configuration settings display, followed by the setup menu options:

**Figure 5-2. Change Setup Menu Options**




5. To select a menu option, enter the number of the option in the **Your choice ?** field and press **Enter**.

   View the current configuration by pressing **Enter** from the Change Setup menu.

   To enter a value for a parameter, type the value and press **Enter**. To confirm a current value, press **Enter** (without entering parameters).

6. When finished, save the new configurations (**9 Save and exit**). The unit reboots.

## Serial Port Access

To configure the unit through a serial connection:

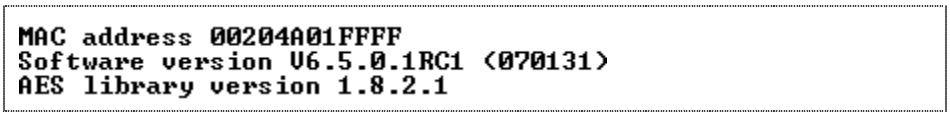
1. Connect a console terminal or PC running a terminal emulation program to your unit's serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.

2. Reset the MatchPort unit by cycling the unit's power (turning the power off and back on). Immediately upon resetting the device, enter three lowercase **x** characters (**xxx**).

   ***Note:*** *The easiest way to enter Setup Mode is to hold down the **x** key at the terminal (or emulation) while resetting the unit. You must do this within three seconds of resetting the MatchPort.*

   Upon connection, the following information displays:

**Figure 5-3. MAC Address**

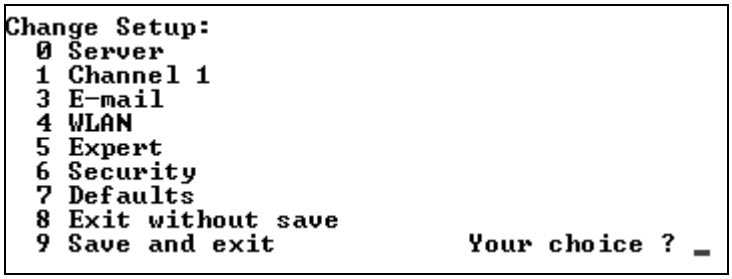



3. To enter the Setup Mode, press **Enter** within 5 seconds.

   ***Note:*** *The connection fails if you do not press **Enter** within 5 seconds.*

   The configuration settings display, followed by the setup menu options:

**Figure 5-4. Change Setup Menu Options**




4. Select an option on the menu by entering the number of the option in the **Your choice ?** field and pressing **Enter**.

   View the current configuration by pressing **Enter** from the Change Setup menu.

   To enter a value for a parameter, type the value and press **Enter**. To confirm a current value, press **Enter** (without entering parameters).

5. When finished, save the new configurations (**9 Save and exit**). The unit reboots.

## Server Configuration

The unit's basic server (network) values display when you select **Server** (option **0** from the Change Setup menu). The following sections describe the configurable parameters within the Server configuration menu.

### Network Mode

Select the network mode for the MatchPort. Options available are **Wired Only** and **Wireless Only**.

```
Network mode: 0=Wired Only, 1=Wireless Only (1) ?
```

### Set the IP Address

If DHCP is not used to assign IP addresses, enter it manually. The IP address must be set to a unique value in the network. Enter each octet and press **Enter** between sections. The current value displays in parentheses.

```
IP Address : ( 0) ( 0) ( 0) ( 0) _
```

### Set the Gateway IP Address

The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network.

The default is **N** (No), indicating the gateway address has not been set. To set the gateway address, type **Y**. At the prompt, enter the gateway address.

```
Set Gateway IP Address (N) ?
Netmask: Number of Bits for Host Part (0=default) (0)
```

## Set the Netmask

A netmask defines the number of bits taken from the IP address that are assigned for the host part.

```
Netmask: Number of Bits for Host Part (0=default) (0) _
```

The unit prompts for the number of host bits to be entered, then calculates the netmask, which displays in standard decimal-dot notation when the saved parameters display (for example, 255.255.255.0).

**Table 5-1. Standard IP Network Netmasks Representing Host Bits**

| Network Class | Host Bits | Netmask |
|---|---|---|
| A | 24 | 255.0.0.0 |
| B | 16 | 255.255.0.0 |
| C | 8 | 255.255.255.0 |

## Change Telnet Configuration Password

Setting the Telnet configuration password prevents unauthorized access to the setup menu through a Telnet connection to port 9999 or by web pages. The password must have 4 characters.

```
Change telnet config password (N) ? _
```

An enhanced password setting (for Telnet access only) of 16 characters is available under option **6 Security** from the Change Setup menu.

***Note:*** *A password is not required to access the Setup Mode window through a serial connection.*

## DHCP Name

If a DHCP server has automatically assigned the IP address and network settings, discover the unit by using the DeviceInstaller network search feature.

There are three methods for assigning DHCP names to the unit.

- **Default DHCP Name**: If the DHCP name is not changed and the IP is 0.0.0.0, then the DHCP name defaults to CXXXXXX (XXXXXX is the last 6 digits of the MAC address shown on the label on the bottom/side of the unit). For example, if the MAC address is 00-20-4A-12-34-56, then the default DHCP name is C123456.
- **Custom DHCP Name**: Create your own DHCP name. If using an IP address of 0.0.0.0, the last option in Server configuration is **Change DHCP device name**. This option allows you to change the DHCP name to an alphanumeric name (LTX in the example).

  ```
  Change DHCP device name (not set) ? (N) Y
  Enter new DHCP device name : LTX
  ```

- **Numeric DHCP Name:** You can change the DHCP name by specifying the last octet of the IP address. When you use this method, the DHCP name is LTXYY where YY is what you chose for the last octet of the IP address. If the IP address you specify is 0.0.0.12, the DHCP name is LTX12. This method only works with 2-digit numbers (0-99).

The third octet of the IP address sets the BootP/DHCP/AutoIP options. To disable an option, set the appropriate bit:

**Table 5-2. BootP/DHCP/AutoIP Options**

| Options | Bit |
|---|---|
| AutoIP | 0 |
| DHCP | 1 |
| BootP | 2 |

For example, if the third octet is 0.0.5.0, the AutoIP and BootP options are disabled; only DHCP is enabled. (The value 5 results from adding the binary equivalents of 0 and 2.) This is the most common setting when using DHCP.

## Channel 1 Configuration

Select option **1 Channel 1** or **2 Channel 2** from the Change Setup menu to define how the serial port responds to network and serial communications. The following sections describe the configurable parameters within the Channel configuration menu.

**Figure 5-5. Serial and Telnet Port Parameters**

```
Baudrate (9600) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (10001) ?
ConnectMode (C0) ?
Send '+++' in Modem Mode  (Y) ?
Show IP addr after 'RING'  (Y) ?
Auto increment source port  (N) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port  (0) ?
DisConnMode (00) ?
FlushMode   (00) ?
DisConnTime (00:00) ?:
SendChar 1  (00) ?
SendChar 2  (00) ?
```

### Baudrate

The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, or 230400. The current value displays in parentheses.

```
Baudrate (9600) ? _
```

### I/F (Interface) Mode

The Interface (I/F) Mode is a bit-coded byte entered in hexadecimal notation. The current value displays in parentheses.

```
I/F Mode (4C) ? _
```

The following table displays available I/F Mode options:

***Note:*** *All bit positions in the table that are blank represent "don't care" bits for that particular option, which can be set to either a 0 or 1 value.*

**Table 5-3. Interface Mode Options**

| I/F Mode Option | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| RS-232 (1) | | | | | | | 0 | 0 |
| RS-422/485 4-wire | | | | | | | 0 | 1 |
| RS-485 2-wire | | | | | | | 1 | 1 |
| 7 Bit | | | | | 1 | 0 | | |
| 8 Bit | | | | | 1 | 1 | | |
| No Parity | | | 0 | 0 | | | | |
| Even Parity | | | 1 | 1 | | | | |
| Odd Parity | | | 0 | 1 | | | | |
| 1 stop bit | 0 | 1 | | | | | | |
| 2 stop bits(1) | 1 | 1 | | | | | | |

(1) 2 stop bits are implemented by the software. This might influence performance.

The following table demonstrates some common I/F Mode settings:

**Table 5-4. Common Interface Mode Settings**

| Common I/F Mode Setting | Binary | Hex |
|---|---|---|
| RS-232C, 8-bit, No Parity, 1 stop bit | 0100 1100 | 4C |
| RS-232C, 7-bit, Even Parity, 1 stop bit | 0111 1000 | 78 |
| RS-485 2-wire, 8-bit, No Parity, 1 stop bit | 0100 1111 | 4F |
| RS-422, 8-bit, Odd Parity, 1 stop bit | 0101 1101 | 5D |

## Flow

Flow control sets the local handshaking method for stopping serial input/output. The current value displays in parentheses.

```
Flow (00) ? _
```

Use the following table to select flow control options:

**Table 5-5. Flow Control Options**

| Flow Control Option | Hex |
|---|---|
| No flow control | 00 |
| XON/XOFF flow control | 01 |
| Hardware handshake with RTS/CTS lines | 02 |
| XON/XOFF pass characters to host | 05 |

## Port Number

The **Port No** setting represents the source port number in TCP connections. It is the number that identifies the channel for remote initiating connections. The port number functions as the TCP/UDP source port number for outgoing packets. Packets sent to the unit with this port number are received to this channel. The port number selected is the Incoming TCP/UDP port and Outgoing TCP/UDP source port.

```
Port No (10001) ? _
```

The current value displays in parentheses. The default setting for Port 1 is 10001. The range is 1-65535, except for the following reserved port numbers:

**Table 5-6. Reserved Port Numbers**

| Port Numbers | Reserved for |
|---|---|
| 1 – 1024 | Reserved |
| 9999 | Telnet setup |
| 14000-14009 | Reserved for Redirector |
| 30704 | Reserved (77F0h) |
| 30718 | Reserved (77FEh) |

***Note:*** *We recommend that you not use the reserved port numbers for this setting as incorrect operation may result.*

Use Port 0 for the outgoing local port to change with each connection. The port range is 50,000 to 59,999. Each subsequent connection increments the number by 1 (it wraps back around to 50,000).

Only use this automatic port increment feature to initiate a connection using TCP. Set the port to a non-zero value when the unit is in a passive mode or when using UDP instead of TCP.

## Connect Mode

Connect Mode defines the unit's connection method and its reaction to incoming connections over the network. The current value displays in parentheses.

```
ConnectMode (C0) ? _
```

Enter Connect Mode options in hexadecimal notation:

***Note:*** *All bit positions in the table that are blank represent "don't care" bits for that particular option, which can be set to either a 0 or 1 value.*

**Table 5-7. Connect Mode Options**

| Connect Mode Option | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **a) Incoming Connection** | | | | | | | | |
| Never accept incoming | 0 | 0 | 0 | | | | | |
| Accept with Modem Control In Active | 0 | 1 | 0 | | | | | |
| Always Accept | 1 | 1 | 0 | | | | | |
| **b) Response** | | | | | | | | |
| Nothing (quiet) | | | | 0 | | | | |
| Character response (C=connect, D=disconnect, N=unreachable) | | | | 1 | | | | |
| **c) Active Startup** | | | | | | | | |
| No active startup | | | | | 0 | 0 | 0 | 0 |
| With any character | | | | | 0 | 0 | 0 | 1 |
| With Modem Control In Active | | | | | 0 | 0 | 1 | 0 |
| With a specific start character | | | | | 0 | 0 | 1 | 1 |
| Manual connection | | | | | 0 | 1 | 0 | 0 |
| Autostart | | | | | 0 | 1 | 0 | 1 |
| Hostlist | 0 | 0 | 1 | 0 | | | | |
| **d) Datagram Type** | | | | | | | | |
| Directed UDP | | | | | 1 | 1 | 0 | 0 |
| **e) Modem Mode** | | | | | | | | |
| No Echo | | | 0 | 0 | | 1 | 1 | |
| Echo & Modem Response (Numeric) | | | 0 | 1 | | 1 | 1 | 1 |
| Echo & Modem Response (Verbose) | | | 0 | 1 | | 1 | 1 | 0 |
| Modem Response Only (Numeric) | | | 0 | 0 | 1 | 1 | 1 | 1 |
| Modem Response Only (Verbose) | | | 0 | 0 | 1 | 1 | 1 | 0 |

### a) Incoming Connection

| | |
|---|---|
| **Never Accept Incoming** | Rejects all external connection attempts. |
| **Accept with Modem Control In Active** | Accepts external connection requests only when the **Modem Control In** input is asserted. Cannot be used with Modem Mode. |
| **Always Accept** | Accepts any incoming connection when a connection is not already established. Default setting. |

### b) Response

| | |
|---|---|
| **Character Response** | A single character is transmitted to the serial port when there is a change in connection state:<br>C = connected, D = disconnected, N = host unreachable.<br>This option is overridden when the **Active Start Modem Mode** or **Active Start Host List** is in effect. Default setting is **Nothing** (quiet). |

### c) Active Startup

| | |
|---|---|
| **No Active Startup** | Does *not* attempt to initiate a connection. Default setting. |
| **With Any Character** | Attempts to connect when any character is received from the serial port. |
| **Accept with Modem Control In Active** | Attempts to connect when the **Modem Control In** input changes from not asserted to asserted. |
| **With a Specific Start Character** | Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return. |
| **Manual Connection** | Attempts to connect when directed by a command string received from the serial port. The first character of the command string must be a **C** (ASCII 0x43), and the last character must be either a carriage return (ASCII 0x0D) or a line feed (0x0A). No blanks or space characters may be in the command string. Between the first and last command string characters must be a full or partial destination IP address and can include a destination port number.<br><br>The IP address must be in standard dot-decimal notation and may be a partial address, representing the least significant 1, 2, or 3 bytes of the remote IP address. The period is required between each pair of IP address numbers.<br><br>If present, the port number must follow the IP address, must be presented as a decimal number in the range 1-65535, and must be preceded by a forward slash (ASCII 0x2F). The slash separates the IP address and the port number. If you omit the port number from a command string, the internally stored remote port number starts a connection.<br><br>If a partial IP address is presented in a command string, it is interpreted to be the least significant bytes of the IP address and uses the internally stored remote IP address to provide the most significant bytes of the IP address. If the IP address entered is 0.0.0.0/0, the device server enters Monitor Mode. |

| | |
|---|---|
| | For example, if the remote IP address already configured in the unit is 129.1.2.3, then an example command string would be C3/7. (This would connect to 129.1.2.3 and port 7.) You may also use a different ending for the connection string. For example, C50.1/23 would connect you to 129.1.50.1 and port 23. |

**Table 5-8. Manual Connection Address Example**

| Command String | Result if remote IP is 129.1.2.3 and remote port is 1234 |
|---|---|
| C121.2.4.5/1 | Complete override; connection is started with host 121.2.4.5, port 1 |
| C5 | Connects to 129.1.2.5, port 1234 |
| C28.10/12 | Connects to 129.1.28.10, port 12 |
| C0.0.0.0/0 | Enters Monitor Mode |

| | |
|---|---|
| **Autostart (Automatic Connection)** | The unit automatically attempts a connection to the remote IP address and port after booting up. |
| **Hostlist** | If this option is set to True, the device server scrolls through the host list until it connects to the first available device listed in the host list table. Once it connects, the unit stops further attempts. If this connection fails, the unit continues to scroll through the table until it is able to connect to the next available IP address in the host list.<br>The host list supports a minimum of 1 and a maximum of 12 entries. Each entry contains the IP address and the port number.<br>The hostlist is disabled for Manual and Modem Modes. The unit will not accept a data connection from a remote device when the hostlist option is enabled. |

**Figure 5-6. Hostlist Example**

```
Baudrate (9600) ?
I/F Mode (4C) ?
Flow (00) ?
Port No (10001) ?
ConnectMode (C0) ?25
Hostlist :
No Entry !
Change Hostlist ? (N) Y
01. IP address : (000) 172.(000) 19.(000) 0.(000) 1     Port :
(0) ?23
02. IP address : (000) 172.(000) 19.(000) 0.(000) 2     Port :
(0) ?3001
03. IP address : (000) 172.(000) 19.(000) 0.(000) 3     Port :
(0) ?10001
04. IP address : (000) .(000) .(000) .(000)

Hostlist :
01. IP : 172.019.000.001  Port : 00023
02. IP : 172.019.000.002  Port : 03001
03. IP : 172.019.000.003  Port : 10001

Change Hostlist ? (N) N

Hostlist Retrycounter  (3) ?
```

```
Hostlist Retrytimeout  (250) ?
DisConnMode (00) ?
FlushMode   (00) ?
DisConnTime (00:00) ?:
SendChar 1  (00) ?
SendChar 2  (00) ?
```

**To enable the hostlist:**

1. Enter a **Connect Mode** of **0x20**. The menu shows a list of current entries already defined in the product.
2. To delete, modify, or add an entry, select **Yes**. If you enter an IP address of **0.0.0.0**, that entry and all others after it are deleted.
3. After completing the hostlist, repeat the previous step if necessary to edit the hostlist again.
4. For **Retrycounter**, enter the number of times the Lantronix unit should try to make a good network connection to a hostlist entry that it has successfully ARPed. The range is 1-15, with the default set to **3**.
5. For **Retrytimeout**, enter the number of seconds the unit should wait before failing an attempted connection. The time is stored as units of milliseconds in the range of 10-65535. The default is **250**.

### *d) Datagram Type*

| | |
|---|---|
| **Directed UDP** | When selecting this option, the prompt requests the Datagram type. Enter **01** for directed or broadcast UDP.<br><br>When the UDP option is in effect, the unit uses UDP datagrams to send and receive data. |

### *e) Modem Mode*

In Modem (Emulation) Mode, the unit presents a modem interface to the attached serial device. It accepts AT-style modem commands and handles the modem signals correctly.

Normally, there is a modem connected to a local PC and a modem connected to a remote machine. A user must dial from the local PC to the remote machine, accumulating phone charges for each connection. Modem Mode allows you to replace modems with MatchPorts, and to use an Ethernet connection instead of a phone call. By not having to change communications applications, you avoid potentially expensive phone calls.

To select Modem Mode, set the Connect Mode to **C6** (no echo), **D6** (echo with full verbose), or **D7** (echo with numeric response).

***Note:*** *If the unit is in Modem Mode, and the serial port is idle, the unit can still accept network TCP connections to the serial port if Connect Mode is set to **C6** (no echo), **D6** (echo with full verbose), or **D7** (echo with numeric response).*

| | |
|---|---|
| **Without Echo** | In Modem Mode, echo refers to the echo of all of the characters entered in command mode; it does not mean to echo data that is transferred. Quiet Mode (without echo) refers to the modem not sending an answer to the commands received (or displaying what was typed). |

| | |
|---|---|
| **Echo & Modem Response** | **Full Verbose:** The unit echoes modem commands and responds to a command with a message string shown in the table below.<br><br>**Numeric Response:** The unit echoes modem commands and responds to a command with a numeric response. |
| **Modem Responses Only** | **Full Verbose:** The unit responds to a command with a message string shown in the table below.<br><br>**Numeric Response:** The unit responds to a command with a numeric response. |

**Table 5-9. Modem Mode Messages**

| Message | Meaning |
|---|---|
| **Full Verbose** | |
| OK | Command was executed without error. |
| CONNECT | A network connection has been established. |
| NO CARRIER | A network connection has been closed. |
| RING n.n.n.n. | A remote device, having IP address n.n.n.n, is connecting to this device. |
| **Numeric Response** | |
| 0 | OK |
| 1 | Connected |
| 2 | Ring |
| 3 | No Carrier |
| 4 | Error |

Received commands must begin with the two-character sequence **AT** and be terminated with a carriage return character.

The unit ignores any character sequence received *not* starting with **AT**, and only recognizes and processes single **AT**-style commands. The unit treats compound **AT** commands as unrecognized commands.

If the **Full Verbose** option is in effect, the unit responds to an unrecognized command string that is otherwise formatted correctly (begins with **AT** and ends with carriage return) with the "OK" message and takes no further action.

If the **Numeric Response** option is in effect, the unit responds to an unrecognized command string that is otherwise formatted correctly with the "OK" message and takes no further action.

When an active connection is in effect, the unit transfers data and does not process commands received from the serial interface.

When a connection is terminated or lost, the unit reverts to command mode.

When an active connection is in effect, the unit terminates the connection if it receives the following sequence from the attached serial device:

- No serial data is received for one second.
- The character sequence +++ is received, with no more than one second between each two characters.
- No serial data is received for one second after the last + character. At this time, the unit responds affirmatively according to the selected echo/response mode.
- The character string **ATH** is received, terminated with a carriage return. The unit responds affirmatively according to the selected echo/response mode and drops the network connection. The serial interface reverts to accepting command strings.

If this sequence is not followed, the unit remains in data transfer mode.

**Table 5-10. Modem Mode Commands**

| Modem Mode Command | Function |
|---|---|
| ATDTx.x.x.x,pppp or ATDTx.x.x.x/pppp | Makes a connection to an IP address (x.x.x.x) and a remote port number (pppp). |
| ATDTx.x.x.x | Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit. |
| ATD0.0.0.0 | Forces the unit into Monitor Mode. Uses remote IP address and port settings to initiate a connection. |
| ATD or ATDT | Forces the unit into Monitor Mode. Uses remote IP address and port settings to initiate a connection. |
| ATDx.x.x.x | Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit. |
| ATH | Hangs up the connection (Entered as +++ ATH). |
| ATS0=n | Enables or disables connections from the network going to the serial port.<br>n=0 disables the ability to make a connection from the network to the serial port.<br>n=1-9 enables the ability to make a connection from the network to the serial port.<br>n>9 is invalid. |
| ATEn | Enables or disables character echo and responses.<br>n=0 disables character echo and responses.<br>n=1 enables character echo and responses. |
| ATVn | Enables numeric response or full verbose.<br>n=0 enables numeric response.<br>n=1 enables full verbose. |

***Note:*** *The unit recognizes these AT commands as single commands such as ATE0 or ATV1; it does not recognize compound commands such as ATE0V.*

### Send the Escape Sequence (+++) in Modem Mode

```
Send '+++' in Modem Mode (Y) ? _
```

Disable or enable the MatchPort's ability to send the escape sequence. The default is **Y** (Yes) (send the escape sequence).

### Show IP addr after 'RiNG'

```
Show IP addr after 'RING'  (Y) ?
```

Disable or enable the MatchPort's ability to show the IP address after RING in Modem Mode. The default is **Y** (Yes), to show the IP address.

### Auto Increment Source Port

```
Auto increment source port (N) ? _
```

**Y** (Yes) auto increment the source port. The MatchPort increments the port number used with each new connection.

### Remote IP Address

This is the destination IP address used with an outgoing connection.

```
Remote IP Address : ( 0) ( 0) ( 0) ( 0)_
```

***Note:*** *This option is not displayed when Hostlist is enabled from the* ***ConnectMode*** *prompt (see page 42 for more information).*

### Remote Port

Set the remote TCP port number for the unit to make outgoing connections. This parameter defines the port number on the target host to which a connection is attempted.

```
Remote Port ( 0) ? _
```

To connect an ASCII terminal to a host using the unit for login purposes, use the remote port number 23 (Internet standard port number for Telnet services).

***Note:*** *This option does not display when* ***Hostlist*** *is enabled from the* ***ConnectMode*** *prompt (see page 42 for more information).*

### DisConnMode

Disconnect Mode (DisConnMode) determines the conditions under which the unit will cause a network connection to terminate. The current value displays in parentheses.

```
DisConnMode ( 0) ? _
```

***Note:*** *All bit positions in the table that are blank represent "don't care" bits for that particular option, which can be set to either a 0 or a 1 value.*

The following table displays the available input options:

**Table 5-11. Disconnect Mode Options**

| Disconnect Mode Option | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| Disconnect when Modem Control In not asserted (6) | 1 | | | | | | | |
| Ignore Modem Control In | 0 | | | | | | | |
| Telnet Com Port Cntrl and terminal type setup (1) | | 1 | | | | | | |
| Channel (port) password (2) | | | | 1 | | | | |
| Hard disconnect (3) | | | | | 0 | | | |
| Disable hard disconnect | | | | | 1 | | | |
| State LED off with connection (4) | | | | | | | | 1 |
| Disconnect with EOT (^D) (5) | | | 1 | | | | | |

(1) The MatchPort sends the "Terminal Type" upon an outgoing connection.
(2) A password is required for a connection to the serial port from the network.
(3) The TCP connection closes even if the remote site does not acknowledge the disconnection.
(4) When there is a network connection to or from the serial port, the state LED turns off instead of blinking.
(5) When **Ctrl+D** or **Hex 04** is detected, the connection is dropped. Both **Telnet Com Port Cntrl** and **Disconnect with EOT** must be enabled for **Disconnect with EOT** to function properly. **Ctrl+D** is only detected going from the serial port to the network.
(6) When **Modem Control In** transitions from a high state to a low state, the network connection to or from the serial port drops.

## Flush Mode

The FlushMode (buffer flushing) parameter controls line handling and network buffers with connection startup and disconnect.

```
FlushMode ( 0) ? _
```

Select between two different packing algorithms (the current configuration displays within the parentheses).

***Note:*** *All bit positions in the table that are blank represent "don't care" bits for that particular option, which can be set to either a 0 or 1 value.*

Available Flush Mode options are:

**Table 5-12. Flush Mode Options**

| Function | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **Input Buffer (Serial to Network)** | | | | | | | | |
| Clear with a connection that is initiated from the device to the network | | | | 1 | | | | |
| Clear with a connection initiated from the network to the device | | | 1 | | | | | |
| Clear when the network connection to or from the device is disconnected | | 1 | | | | | | |

| Function | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **Output Buffer (Network to Serial)** | | | | | | | | |
| Clear with a connection that is initiated from the device to the network | | | | | | | | 1 |
| Clear with a connection initiated from the network to the device | | | | | | | 1 | |
| Clear when the network connection to or from the device is disconnected | | | | | | 1 | | |
| **Alternate Packing Algorithm (Pack Control)** | | | | | | | | |
| Enable | 1 | | | | | | | |

### *Pack Control*

The packing algorithm defines how and when packets are sent to the network. The standard algorithm is optimized for applications in which the unit is used in a local environment. The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream.

Pack control settings are enabled in Flush Mode. Set this value to **00** if specific functions are not needed.

***Note:*** *All bit positions in the table that are blank represent "don't care" bits for that particular option, which can be set to either a 0 or 1 value.*

**Table 5-13. Pack Control Options**

| Option | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| **Packing Interval** | | | | | | | | |
| Interval: 12ms | | | | | | | 0 | 0 |
| Interval: 52ms | | | | | | | 0 | 1 |
| Interval: 250ms | | | | | | | 1 | 0 |
| Interval: 5sec | | | | | | | 1 | 1 |
| **Trailing Characters** | | | | | | | | |
| None | | | | | 0 | 0 | | |
| One | | | | | 0 | 1 | | |
| Two | | | | | 1 | 0 | | |
| **Send Characters** | | | | | | | | |
| 2-Byte Send Character Sequence | | | | 1 | | | | |
| Send Immediately After Send chars | | | 1 | | | | | |

***Packing Interval:*** Packing Interval defines how long the unit should wait before sending accumulated characters. This wait period is between successive network segments containing data. For alternate packing, the default interval is 12 ms.

***Trailing Characters:*** In some applications, CRC, Checksum, or other trailing characters follow the end-of-sequence character; this option helps to adapt frame transmission to the frame boundary.

***Send Characters:***

- If **2-Byte Send Character Sequence** is enabled, the unit interprets the sendchars as a 2-byte sequence; if this option is not enabled, the unit interprets them independently.
- If **Send Immediately After Characters** is not set, any characters already in the serial buffer are included in the transmission after a "transmit" condition is found. If this option is set, the unit sends immediately after recognizing the transmit condition (sendchar or timeout).

***Note:*** *A transmission might occur if status information needs to be exchanged or an acknowledgment needs to be sent.*

## DisConnTime (Inactivity Timeout)

Use this parameter to set an inactivity timeout. The unit drops the connection if there is no activity on the serial line before the set time expires. Enter time in the format **mm:ss**, where **m** is the number of minutes and **s** is the number of seconds.

```
DisConnTime (0: 0) ?:
```

To disable the inactivity timeout, enter **00:00**. Range is 0 (disabled) to 5999 seconds (99 minutes, 59 seconds). The default is **0**.

## SendChar 1 and SendChar2

Enter up to two characters in hexadecimal representation.

```
SendChar 1 ( 0) ? _
SendChar 2 ( 0) ? _
```

If the unit receives a character on the serial line that matches one of these characters, it sends the character immediately, along with any awaiting characters, to the TCP connection. This action minimizes the response time for specific protocol characters on the serial line (for example, ETX, EOT). Setting the first SendChar to **00** disables the recognition of the characters. Alternatively, the unit can interpret two characters as a sequence (see *Pack Control* on page 50).

## Telnet Terminal Type

This parameter displays only if the terminal type option is enabled in Disconnect Mode. If this option is enabled, use the terminal name for the Telnet terminal type. Enter only one name.

If the terminal type option is enabled, the unit also reacts to the EOR (end of record) and binary options, which can be used for applications such as terminal emulation to UNIX hosts.

## Channel (Port) Password

This parameter appears only if the channel (port) password option is enabled in Disconnect Mode. If the option is enabled, set a password on the serial port.

# Email Configuration

The unit sends an email to multiple recipients when a specific trigger event occurs. There are three separate triggers, based on any combination of the configurable pins (PIO) when selected as user I/O functions. Optionally, use a two-byte serial string to initiate a trigger. To configure email configuration settings, select option **3 Email** from the Change Setup menu.

**Figure 5-7. Email Settings**

```
Mail server (0.0.0.0) ? (000) .(000) .(000) .(000)
Unit name () ?
Domain name () ?
Recipient 1 () ?
Recipient 2 () ?

- Trigger 1
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message () ?
Priority (L) ?
Min. notification interval (1 s) ?
Re-notification interval (0 s) ?

- Trigger 2
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message () ?
Priority (L) ?
Min. notification interval (1 s) ?
Re-notification interval (0 s) ?

- Trigger 3
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input2 [A/I/X] (X) ?
Trigger input3 [A/I/X] (X) ?
Message () ?
Priority (L) ?
Min. notification interval (1 s) ?
Re-notification interval (0 s) ?
```

## Mail Server

Enter the IP address of the mail server. Enter each 3-digit section and press **Enter** between sections. The current value displays in parentheses.

```
Mail Server (0.0.0.0) ? ( 0) _
```

## Unit Name

Enter the username used by the MatchPort to send email messages. The current value displays in parentheses. Spaces are not permitted.

```
Unit name () ? _
```

## Domain Name

Enter the email server's domain name. The current value displays in parentheses.

```
Domain name () ? _
```

## Recipients

Enter the full email address of up to two trigger email recipients. The current value displays in parentheses.

```
Recipient 1 () ? _
Recipient 2 () ? _
```

## Triggers

A trigger event occurs when the unit receives the specified trigger input because of a specified combination of conditions on the configurable pins.

```
Enable serial trigger input (N) ?
Trigger input1 [A/I/X] (X) ?
Trigger input1 [A/I/X] (X) ?
Trigger input1 [A/I/X] (X) ?
Message () ?
Priority (L) ?
Minimum notification interval (1 s) ?
Re-notification interval (0 s) ?
```

To change the configurable pins' settings, send setup records to Port 77FE.

| | |
|---|---|
| **Enable serial trigger input** | Select (**Y**) Yes to enable serial trigger inputs. |
| **Trigger inputs 1-3** | Set the configurable pins to **A** = Active, **I** = Inactive, or **X** = Don't Care. Active can mean Active Low or Active High. If the configurable pins are all set to **X** (Don't Care), then they are disabled. If both the serial sequence and the configurable pins are disabled, the trigger is disabled.<br>***Note:*** *Each trigger is independent of the others. Each condition within an individual trigger must be met before the unit will send the email.* |
| **Message** | Subject line of the trigger event email to the specified recipient(s). |
| **Priority** | Priority level for the trigger event email. Enter **L** for normal priority or **H** for high priority. |
| **Minimum notification interval** | Minimum time allowed between individual triggers. If a trigger event occurs within the minimum interval since the last trigger, it is ignored. |
| **Re-notification interval** | Time interval in which a new email message is sent to the recipient(s) when a single trigger event remains active. |

# WLAN Settings

Without adequate protection, a wireless LAN is susceptible to access by unauthorized users. As such, MatchPort features the WPA security standard, based on IEEE802.11i and IEEE802.1X. WEP provides for backwards compatibility and interaction with older devices.

When in WPA and WPA2-PERSONAL modes, the encryption setting denotes the lowest acceptable encryption method. CCMP is higher than TKIP and TKIP is higher than WEP. For example, if the MatchPort is configured for WEP and the access point supports TKIP, the negotiation results the use of TKIP. If the MatchPort is configured for TKIP and the access point supports only WEP, the association will fail since the access point does not meet the MatchPort's requirements.

Unicast communication occurs between the access point and a single wireless device. It uses the pairwise encryption method. Multicast communication occurs between the access point and multiple wireless devices. It uses the group encryption method. The group encryption for all wireless devices communicating with the same access point must be equal to receive broadcast and multicast messages. If any device is WEP-only (no support for WPA), set the encryption to **TKIP+WEP**. To use higher security with the MatchPort than other devices connecting to the same access point, use a group encryption lower than the pairwise encryption.

***Note:*** *Due to regulations, the country-specific setting has been removed from the setup menu and Web-Manager. However, we provide a separate utility for changing the* ***Country/Zone*** *setting. The utility is called SetZone and is included in the MatchPort package. It is also available for download from the Lantronix web site.*

*The syntax is* ***`SetZone <IP address> [<zone abbreviation>]`***

*Leaving the zone blank causes the utility to report the current setting only. Following are valid zone abbreviations. These settings are consistent with IEEE802.11b/g zones:*

**US=United States**
**CA=Canada**
**FR=France**
**SP=Spain**
**JP=Japan**
**OT=Others, such as Europe (excluding France), Asia, Africa, and Australia**

To modify WLAN settings, select **4 WLAN** from the Change Setup menu.

## Topology

Select **Infrastructure** (ESS) mode or **Adhoc** (IBSS) mode. Infrastructure mode communicates with Access Points. Adhoc mode communicates only with other clients.

```
Topology 0=Infrastructure, 1=Adhoc (0) ?  _
```

## Network Name (SSID)

Enter the name of the network to which the MatchPort will connect.

```
Network name (LTRX_IBSS) ? _
```

## Adhoc Network Channel

When **Adhoc** is selected in the **Topology** parameter, and the MatchPort cannot find the specified network, it creates one with that name by transmitting a beacon on the selected channel.

```
Channel (11) ? _
```

You can only select channels allowed in the country for which the MatchPort is designated. The country displays in the settings overview.

## Security Suite

The MatchPort features WEP, WPA, and 802.11i/WPA2-Personal to secure all wireless communication. WPA and 802.11i/WPA2-Personal are not available when **Adhoc** is selected as the topology.

The 802.11i/WPA2-Personal mode is compliant with the Robust Secure Network that is specified in the IEEE standard 802.11i. It enables the AES-based strong CCMP encryption.

```
Security suite  0=none, 1=WEP, 2=WPA, 3=WPA2/802.11i
(0) ? _
```

## WEP

```
Authentication 0=open/none, 1=shared (0) ? _
Encryption 0=WEP64, 1=WPE128 (1) ?
Display current key (N) ?
Change key (N) ? Y
Key type 0=hex, 1=passphrase (0) ?
Enter key: **-**-**-**-**
TX Key index (1) ?
```

| | |
|---|---|
| **Authentication** | Select whether the encryption keys are matched (1 = shared) with those of the communication partner before passing through messages or not (2 = open/none). |
| **Encryption** | Length of the encryption key and the security strength. WEP64 uses a 40 bits/5 bytes key (option 1). WEP128 uses a 104 bits/13 bytes key (option 2). |
| **Display Current Key** | Select (**Y**) Yes to show the currently configured key/passphrase |
| **Change key** | Select (**Y**) Yes to modify the currently configured key. |
| **Key type** | Indicate whether the new key is in hexadecimal or passphrase format. |
| **Enter key** | Enter the new encryption key. The passphrase input is not the same as ASCII input (as used on some products). ASCII is translated directly into hexadecimal bytes according to the ASCII table. The MatchPort passphrase is hashed using the Neesus Datacom algorithm (for WEP64) or MD5 (for WEP128).<br>The passphrase input is safer because it is up to 63 chars long. ASCII input is a maximum of 5 (WEP64) or 13 (WEP128) characters long and limits the number of key combinations.<br><br>Please refer to the other equipment's manual to determine |

| | |
|---|---|
| | the passphrase input style recommended.<br>***Note:*** *Lantronix recommends using a passphrase of 20 characters or more for maximum security.* |
| **TX Key index** | Select the WEP key used for transmissions. Enter a value from 1 to 4. |

## WPA

This firmware version allows only Pre-Shared Keys (PSK) for authentication.

```
Display current key (N) ?
Change key (N) ?
Key type 0=hex, 1=passphrase (1) ?
Enter key: () ?
It is strongly recommended to use a passphrase of 20
chars or more!
Encryption: 0=TKIP, 1=TKIP+WEP (1)
```

| | |
|---|---|
| **Display current key** | Select (**Y**) Yes at the prompt to show the currently configured key/passphrase |
| **Change key** | Select (**Y** (Yes) to modify the currently configured key. |
| **Key type** | Indicate whether the new key is in hexadecimal or passphrase format. |
| **Enter key** | Enter the passphrase. The maximum length is 63 characters.<br>*Note: Lantronix recommends using a passphrase of 20 characters or more for maximum security.* |
| **Encryption** | Set the type to the minimum required security level. The "+" sign indicates that the group (broadcast) encryption method is different from the pairwise (unicast) encryption (WEP and TKIP). |

## 802.11i/WPA2-Personal

```
Display current key (N) ?
Change key (N) ? Y
Key type 0=hex, 1=passphrase (1) ?
Enter key: () ?
It is strongly recommended to use a passphrase of 20
chars or more!
Encryption: 0=CCMP, 1=CCMP+TKIP, 2=CCMP+WEP, 3=TKIP,
4=TKIP+WEP (4) ?
```

| | |
|---|---|
| **Display current key** | Select (**Y**) Yes to show the currently configured key/passphrase. |
| **Change key** | Select (**Y)** Yes to modify the currently configured key. |
| **Key type** | Indicate whether the new key is in hexadecimal or passphrase format. |
| **Enter key** | Enter the passphrase. The maximum length is 63 characters. Lantronix recommends using a passphrase of 20 characters or more for maximum security. |
| **Encryption** | Set the type to the minimum required security level. The "+" sign indicates that the group (broadcast) encryption method is different from the pairwise (unicast) encryption. For example, for CCMP+TKIP, CCMP is the pairwise encryption and TKIP is the group encryption. |

### Fixed or Automatic Data Rate

MatchPort permits the control of the transmission rate. Select **0** to set a fixed data rate or select **1** to set an automatic data rate. The default is **1** (auto fallback).

```
TX Data rate: 0=fixed. 1=auto fallback (1) ?
```

### Transmission Data Rate

If the above **TX Data rate** is set to **fixed**, the selected data rate is the MatchPort's fixed transmission rate. If the above **TX Data rate** is set to **auto fallback**, the selected data rate is the MatchPort's maximum data rate. Lower data rates allow for larger distances. It may also be required when communicating with older devices. The default is **11** Mbps.

```
TX Data rate 0=1, 1=2, 2=5.5, 3=11
             4=18, 5=24, 6=36, 7=54 Mbps (0) ? _
```

### Enable Power Management

This allows the software to turn off the radio when expecting not to receive or transmit soon. This feature reduces the power consumption by up to 140 mA. Enabling power management increases the response time, because the radio needs to start up again. The radio is enabled to synchronize and check for incoming messages (every 100 ms).

***Note:*** *This option is not available when the* ***Topology*** *is set to* ***Adhoc.***

```
Enable power management (N) ? _
```

## Expert Settings

***Note:*** *Change these settings using Telnet or a serial connection only.*

***Caution:*** ***Only an expert should change these parameters. These changes hold serious consequences.***

### TCP Keepalive Time

Defines how many seconds the unit waits during a silent connection before checking whether the currently connected network device is still on the network. If the unit does not receive a response, it drops that connection.

```
TCP Keepalive time in s (1s - 65s; 0s=disable): (45)? _
```

### ARP Cache Timeout

When the unit communicates with another device on the network, it adds an entry into its ARP table. ARP Cache timeout defines the number of seconds (1-600) the unit waits before timing out this table.

```
ARP Cache timeout in s (1s – 65s; 0s=disable): (600)? _
```

### CPU Performance

Select the MatchPort's performance mode. Higher performance settings require more energy. **Low** is 26 Mhz, and **Regular** is 48 Mhz. The default is **Regular**.

```
CPU performance (0=Regular, 1=Low): (0) ? _
```

### Disable Monitor Mode

Disables entry into Monitor Mode via the **yyy** or **xx1** key sequence at startup. This command prevents the unit from entering Monitor Mode by interpreting the stream of characters that are received during the device server's initialization at startup. The default is **N** (No).

```
Disable Monitor Mode @ bootup (N) ? _
```

### HTTP Port Number

This option allows the configuration of the web server port number. The valid range is 1-65535. The default HTTP server port number is **80**.

```
HTTP Port Number : (80) ? _
```

### SMTP Port Number

This option allows the configuration of the SMTP port number. The valid range is 1-65535. The default HTTP server port number is **25**.

```
SMTP Port Number : (25) ? _
```

### MTU Size

The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between 512 and 1400 bytes. The default is **1400** bytes.

```
MTU Size: (1400) ? _
```

### Alternate MAC Address

If necessary, enable the alternate MAC address (if specified in the OEM setup record).

```
Enable alternate MAC (N) ? _
```

### Ethernet Connection Type

The MatchPort allows you to configure the Ethernet speed manually. Enter **0** for automatic negotiation (default). To select the speed and duplex, enter one of the following: **2** (10Mbit/half duplex), **3** (10Mbit/full duplex), **4** (100Mbit/half duplex), or **5** (100Mbit/full duplex).

***Note:*** *Manually configured speed/duplex settings only work correctly if the peer or switch also uses a static setting. If the peer is set for auto negotiation, it will not necessarily result in the correct mode. This is a common Ethernet problem and is not MatchPort-specific.*

```
Ethernet connection type: (0) ? _
```

## Security Settings

Security settings can only be changed using the setup menu (Telnet or serial).

***Caution:*** *We recommend setting security over a dedicated network or over the serial setup, to prevent eavesdropping.*

***Note:*** *To prevent unauthorized access from the network, disable the Telnet setup, port 77FE, and the web setup features.*

### Disable SNMP

For security purposes, disable SNMP (if required) on the MatchPort unit. The current setting displays in parentheses.

```
Disable SNMP (N) ? _
```

### SNMP Community Name

The SNMP Community Name is a required field for NMS to read or write to a device. Enter a string of 1 to 13 characters.

```
SNMP Community Name (public): _
```

The default entry is **public**. The current value displays in parentheses.

### Disable Telnet Setup

*This setting defaults to the **N** (No) option. The **Y** (Yes) option disables access to the setup menu via Telnet to port 9999.*

```
Disable Telnet Setup (N) ? _
```

### Disable TFTP Firmware Upgrade

This setting defaults to the **N** (No) option. The **Y** (Yes) option disables TFTP for network firmware upgrades.

```
Disable TFTP Firmware Update (N) : _
```

### Disable Port 77FE (Hex)

Custom programs use Port 77FE to configure the unit remotely. If required, disable this capability for security purposes.

```
Disable Port 77FEh (N) ? _
```

The default setting is the **N** (No) option, which enables remote configuration.

### Disable Web Server

The **Y** (Yes) option disables the web server. This setting defaults to the N (option).

```
Disable Web Server (N) ? _
```

### Disable Web Setup

The **Y** (Yes) option disables configuration using the Web-Manager. This setting defaults to the **N** (No) option.

```
Disable Web Setup (N) ? _
```

### Disable ECHO Ports

This setting controls whether port 7 echoes characters it receives.

```
Disable ECHO ports (Y) ? _
```

### AES Encryption

```
Enable Encryption (Y) ? _
Key length in bits (256): _
Change Key (N) ? _
Enter Key: _
```

| | |
|---|---|
| Enable Encryption | This option displays only if the MatchPort model features AES encryption. It enables AES encryption for tunneling only. |
| Key length in bits | Valid options are 128, 192 and 256 bits. |
| Change Key | Select to modify the current AES encryption key. The default is (**N**) No. |
| Enter Key | If you selected **Change Key**, enter the key (at the **Enter Key** prompt) in hexadecimal numbers. Enter 32 characters for 128 bits key length, 48 characters for 192 bits key length, or 64 characters for 256 bits key length. |

### Enable Enhanced Password

Setting enhanced password allows an extended security password of 16-characters for protecting Telnet access. **N** (No) is the default, which permits a 4-character password protecting Setup Mode by means of Telnet and web pages.

```
Enable Enhanced Password (Y) ? _
```

### Disable Port 77F0 (Hex)

Port 77F0 allows a custom application to query or set the five MatchPort configurable pins when they are functioning as general purpose I/O (GPIO). Disable this capability, if desired, for security purposes.

```
Disable Port 77F0h ? _
```

The default setting, the **N** (No) option, enables GPIO control. The **Y** (Yes) option disables the GPIO control interface.

## Default Settings

Select **7 Default Settings** from the Change Setup menu to reset the unit's Channel 1 configuration, Channel 2 configuration, Email settings, and Expert settings to the factory default settings. The server configuration settings for IP address, gateway IP address, netmask, wireless enable, infrastructure or ad hoc setting, and wireless security settings remain unchanged. The configurable pins' settings also remain unchanged. The specific settings this option changes are listed below.

***Note:*** *To reset to factory defaults, use the "Reset to Defaults" Configurable Pin. For more information on Configurable Pins, see* *Configurable Pins page 63.*

### Channel 1 Configuration

| | |
|---|---|
| **Baudrate** | 9600 |
| **I/F Mode** | 4C (1 stop bit, no parity, 8 bit, RS-232C, no flow control) |
| **Port No** | 10001 |
| **Connect Mode** | C0 (always accept incoming connection; no active connection startup) |
| **Hostlist Retry Counter** | 3 |
| **Hostlist Retry Timeout** | 250 (msec) |
| **Send Character** | 0x0D (CR) |
| **All other parameters** | 0 |

### WLAN Settings

| | |
|---|---|
| **Topology** | 1 (AdHoc) |
| **Network Name** | LTRX_IBSS |
| **Channel** | 11 |
| **Security** | 0 (none) |
| **TX Data Rate** | 0 (fixed) |
| **TX Data Rate** | 11 Mbps |
| **Enable Power Management** | N (No) |

### Expert Settings

| | |
|---|---|
| **TCP Keepalive** | 45 (seconds) |
| **ARP Cache Timeout** | 600 (seconds) |
| **CPU Performance** | Regular |
| **Disable Monitor Mode** | (N) No |

| | |
|---|---|
| **HTTP Port Number** | 80 |
| **SMTP Port Number** | 25 |
| **MTU Size** | 1400 |
| **Enable Alternate MAC** | N (No) ( for OEM use only) |
| **Ethernet Connection Type** | 0 (auto negotiate) |

### Security Settings

| | |
|---|---|
| **Disable SNMP** | (N) No |
| **SNMP Community Name** | public |
| **Disable Telnet Setup** | (N) No |
| **Disable TFTP Firmware Update** | (N) No |
| **Disable Port 77FEh** | (N) No |
| **Disable Web Server** | (N) No |
| **Disable Web Setup** | (N) No |
| **Disable ECHO ports** | (Y) Yes |
| **Enable Encryption** | (N) No |
| **Enable Enhanced password** | (N) No |
| **Disable Port 77F0h** | (N) No |

### Email Settings

| | |
|---|---|
| **Trigger Priority** | L |
| **Min. notification interval** | 1 second |
| **All other parameters** | 0 (e.g. email notification and triggers are disabled) |

## Exit Configuration Mode

To exit setup mode:

- Select option **9 Save and exit** from the Change Setup menu to save all changes and reboot the device. All values are stored in nonvolatile memory.

  or

- Select option **8 Exit without save** from the Change Setup menu to exit the configuration mode without saving any changes or rebooting.

# 6: Configurable Pins

The MatchPort has five pins configurable for General Purpose I/O (GPIO).

Use these GPIO pins to control devices such as relays, servers, lights, monitor switches, sensors, and even processes such as data transfer.

### Defaults Settings

- Function: general purpose input/output
- Direction: input
- Active Level: low

Set the functions for the five pins independently and in any combination. The initial directions (input/output) and active levels (low or high active) at boot up can also be configured through 77FE.

This chapter describes how the directions, active levels, and states can be dynamically controlled and probed through special port 77F0.

### Features

- TCP and UDP can be used.
- The protocol supports up to 32 GPIO for future products.
- Function configuration can be retrieved.
- Input or output selection can be retrieved and controlled.
- Active low or high selection can be retrieved and controlled.
- Active or inactive selection can be retrieved and controlled.
- 77F0 can be disabled.

Every change of state (active/inactive) requires a command over TCP or UDP, and thus is not very fast. If you use this port for data transfer, the throughput is low, usually up to 1 Kbps.

## Control Protocol

The GPIO control protocol, a simple, proprietary protocol, is described below.

### Guidelines

The GPIO control protocol is described from the PC side. *Send* means from PC to MatchPort. *Response* comes from MatchPort to PC.

The protocol allows for control of up to five GPIOs.

The parameters are four bytes long and represent GPIOs 0-31, with GPIO0 in bit 0 of the first byte (Little Endian). Parameter bits for configurable pins not configured as GPIOs are undefined for **Get** commands and ignored on **Set** commands.

Every command consists of nine bytes: one command type of one byte and two parameters of four bytes each.

| | Command | Parameter 1 | | | | | | | | Parameter 2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Byte | 0 | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
| Pin Number | | 0 | 7 | 8 | 15 | 16 | 23 | 24 | 31 | 0 | 7 | 8 | 15 | 16 | 23 | 24 | 31 |

On some commands, one or all parameters are ignored.

For UDP, command type and parameters need to be in the same datagram.

Responses to valid commands are always five bytes long, consisting of the returned command byte and as parameters in the current or updated values. In case of an invalid command, only one byte with value 0FFh is returned.

| | Command | Parameter 1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Byte | 0 | 1 | | 2 | | 3 | | 4 | |
| Pin Number | | 0 | 7 | 8 | 15 | 16 | 23 | 24 | 31 |

When sending a command (TCP and UDP), wait for the response before sending the next command.

## Commands

### *Byte 0 Command Types*

| | |
|---|---|
| **10h** | **Get functions** |
| **11h** | **Get directions** (input or output) |
| **12h** | **Get active levels** (high active or low active) |
| **13h** | **Get current states** (active or not active) |
| **19h** | **Set directions** |
| **1Ah** | **Set active levels** |
| **1Bh** | **Set current states** |

There is no **Set functions** command. Since the pin's function depends on the hardware in which the MatchPort is embedded, that configuration is only allowed via 77FE. Settings changed by any of the **Set** commands are not stored and are lost when the unit is powered down or rebooted.

### *Command 10h, Get Functions*

| | | |
|---|---|---|
| **Send:** | | |
| | No parameters | |
| **Response:** | | |
| | 1 parameter | |
| | Bytes 1-4: Functions | |
| | Bit X | 1 means general purpose IO available to the user. |
| | | 0 means dedicated function (e.g., serial flow control, diagnostics) for configurable pin X. |

### Command 11h, Get Directions

| | | |
|---|---|---|
| **Send:** | | |
| | No parameters | |
| **Response:** | | |
| | 1 parameter | |
| | Bytes 1-4: Directions | |
| | Bit X | 1 means GPIO X is an output. |
| | | 0 means it is an input. |

### Command 12h, Get Active Levels

| | | |
|---|---|---|
| **Send:** | | |
| | No parameters | |
| **Response:** | | |
| | 1 parameter | |
| | Bytes 1-4: Active levels | |
| | Bit X | 1 means GPIO X is active low (0V when active, 3.3V when inactive). |
| | | 0 means it is active high (3.3V when active, 0V when inactive). |

### Command 13h, Get Current States

| | | |
|---|---|---|
| **Send:** | | |
| | No parameters | |
| **Response:** | | |
| | 1 parameter | |
| | Bytes 1-4: States | |
| | Bit X | 1 means GPIO X is active |
| | | 0 means it is inactive. |

### Command 19h, Set Directions

| | | |
|---|---|---|
| **Send:** | | |
| | 2 parameters | |
| | Bytes 1-4: Mask | |
| | Bit X | 1 means the direction for GPIO X will be updated with the value in the second parameter. |
| | | 0 means the direction for that GPIO will not change. |
| | Bytes 5-8: New Directions | |
| | Bit X | 1 means GPIO X will become an output. |
| | | 0 means it will become an input. |
| **Response:** | | |
| | 1 parameter | |
| | Bytes 1-4: The updated directions | |

### Command 1Ah, Set Active Levels

| | | |
|---|---|---|
| **Send:** | | |
| | 2 parameters | |
| | Bytes 1-4: Mask | |
| | Bit X | 1 means the direction for GPIO X will be updated with the value in the second parameter. |
| | | 0 means the active type for that GPIO will not change. |
| | Bytes 5-8: New Active Levels | |
| | Bit X | 1 means GPIO X will become active low. |
| | | 0 means it will become active high. |
| **Response:** | | |
| | 1 parameter | |
| | Bytes 1-4: Updated active levels | |

### Command 1Bh, Set States

| | | |
|---|---|---|
| **Send:** | | |
| | 2 parameters | |
| | Bytes 1-4: Mask | |
| | Bit X | 1 means the state for GPIO X will be updated with the value in the second parameter. |
| | | 0 means the state for that GPIO will not change. |
| | Bytes 5-8: New States | |
| | Bit X | 1 means GPIO X will become active. |
| | | 0 means it will become inactive. |
| **Response:** | | |
| | 1 parameter | |
| | Bytes 1-4: Updated states | |

## Examples

**Example 1: PC sends command 10h to find out which configurable pins are available as GPIO.**

PC -> MatchPort b/g: 10h, 00h, 00h, 00h, 00h, 00h, 00h, 00h, 00h
MatchPort b/g -> PC: 10h, 03h, 02h, 00h, 00h

**Command details:**

10h = command 10h
00h, 00h, 00h, 00h = ignored
00h, 00h, 00h, 00h = ignored

**Response details:**

10h = response to command 10h
03h, 02h, 00h, 00h =

bits 0, 1, and 9 are 0 →CP0, CP1, and CP9 are configured as GPIOs (GPIO0, GPIO1, GPIO9).
bits 2 to 8 and 10 are 0 → configured for a special function and are unavailable for control or monitoring by the user.

**Example 2: PC sends command 1Bh to change the current states of GPIO 0 and 1 (assuming they are configured as outputs).**

PC -> MatchPort b/g: 1Bh, 01h, 02h, 00h, 00h, 01h, 00h, 00h, 00h
MatchPort b/g -> PC: 1Bh, 03h, 00h, 00h, 00h

**Command details:**

1Bh = command 1Bh
01h, 00h, 00h, 00h = the mask that determines which GPIOs will be changed.

Bit 0 and 9 are 1 → GPIO0 and GPIO9 will be changed.
bit 1 is 0 → GPIO1 will remain the same.

01h, 00h, 00h, 00h = the new states

bit 0 is 1 → GPIO0 will become 1.
bit 1 is ignored since it is masked out.
bit 0 is 0 → GPIO9 will become 0.

**Response details:**

1Bh = response to command 1Bh
03h, 00h, 00h, 00h =

bit 0 is 1 → GPIO0 = 1
bit 1 is 1 → GPIO1 = 1
bit 9 is 0 → GPIO9 = 0

# 7: Monitor Mode

Monitor Mode is a command-line interface used for diagnostic purposes.

There are two ways to enter Monitor Mode: locally using the serial port or remotely via the network.

***Note:*** *The MatchPort b/g is based on a standard release of Lantronix's CoBos operating system. Some CoBos products support both wired and wireless interfaces. The MatchPort b/g currently supports only wireless.* ***Please ignore references and settings that deal with a wired Ethernet interface.***

## Entering Monitor Mode via the Serial Port

**To enter Monitor Mode locally:**

1. Follow the same steps used for setting the serial configuration parameters (see *Serial Port Access* on page 36).
2. Instead of typing three **x** keys, however:
   a) Type **zzz** to enter Monitor Mode with network connections.
   b) Type **yyy** to enter Monitor Mode without network connections.

A **0>** prompt indicates that you have successfully entered Monitor Mode.

## Entering Monitor Mode via the Network Port

To enter Monitor Mode using a Telnet connection:

1. Establish a Telnet session to the configuration port (9999).
2. When the ***Press Enter to go into Setup Mode*** prompt displays, type **M** (upper case).

   A **0>** prompt indicates that you have successfully entered Monitor Mode.

## Monitor Mode Commands

The following commands are available in Monitor Mode.

***Note:*** *All commands must be in capital letters.*

**Table 7-1. Monitor Mode Commands**

| Command | Command Name | Function |
|---|---|---|
| **VS** | Version | Queries software header record (16 bytes) of unit. |
| **GC** | Get Configuration | Gets configuration of unit as hex records (120 bytes). |
| **SC** | Send Configuration | Sets configuration of unit from hex records. |

| Command | Command Name | Function |
|---|---|---|
| **PI x.x.x.x** | Ping | Pings unit with IP address x.x.x.x to check device status. |
| **AT** | ARP Table | Shows the unit's ARP table entries. |
| **TT** | TCP Connection Table | Shows all incoming and outgoing TCP connections. |
| **NC** | Network Connection | Shows the unit's current IP address. |
| **RS** | Reset | Resets the unit. |
| **QU** | Quit | Exits diagnostics mode. |
| **G0, G1, ....,Ge, Gf** | Get configuration from memory page | Gets a memory page of configuration information from the device. |
| **S0, S1,...,Se, Sf** | Set configuration to memory page | Sets a memory page of configuration information on the device. |
| **GM** | Get MAC address | Shows the unit's 6-byte MAC. |
| **SS** | Set Security record | Sets the Security record without the encryption key and length parameters. The entire record must still be written, but the encryption-specific bytes do not need to be provided (they can be null since they are not overwritten). |
| **SA** | Scan | Initiates a wireless scan if the wireless interface is enabled. Reports any stations found, including BSSID, SSID, and RSSI. If SA is followed by a string, the string is used to filter SSIDs before reporting. If the BSS does not broadcast its SSID, only the BSSID and RSSI are returned. |
| **NS** | Network Status | Reports the network interfaces' statuses. Includes potentially negotiated parameters like speed/duplex for Ethernet or BSSID, encryption, authentication for wireless interfaces. |

Responses to some of the commands are given in Intel Hex format.

***Note:*** *Entering any of the commands listed above generates one of the following command response codes:*

**Table 7-2. Command Response Codes**

| Response | Meaning |
|---|---|
| 0> | OK; no error |
| 1> | No answer from remote device |
| 2> | Cannot reach remote device or no answer |
| 8> | Wrong parameter(s) |
| 9> | Invalid command |

# 8: Updating Firmware

This chapter explains how to obtain and update the unit's firmware.

## Obtaining Firmware

Obtain the most up-to-date firmware and release notes for the unit from the Lantronix web site (www.lantronix.com) or by using anonymous FTP (ftp.lantronix.com/pub).

## Reloading Firmware

There are several ways to update the unit's internal operational code (*.ROM): via DeviceInstaller (the preferred way), via TFTP, or via the serial port. You can also update the unit's internal web interface (*.cob) via TFTP or DeviceInstaller.

Here are typical names for those files. Check the Lantronix web site for the latest versions and release notes.

**Table 8-1. Firmware Files**

| ROM File | COB (Web-Manager) |
|---|---|
| mpt_6502.rom | gen_mpt_webm_1602.cob |

Please refer to the DeviceInstaller online Help for information about reloading firmware using DeviceInstaller. The other methods are discussed below.

### Using TFTP: Graphical User Interface

To download new firmware from a computer:

1. Use a TFTP client to put a binary file to the unit (*.ROM to upgrade the unit's internal operational code and *.COB to upgrade its internal web interface).

   ***Note:*** *TFTP requires the* ***.rom*** *(binary) version of the unit's internal operational code.*

2. In the **TFTP server** field, enter the IP address of the unit being upgraded.
3. Select **Upload** operation and **Binary** format.
4. Enter the full path of the firmware file in the **Local file name** field.
5. In the **Remote file name** field, enter the **current** internal operational code or **WEB1** to **WEB19** for the internal web interface.
6. Click the **Upload Now** button to transfer the file to the unit. The unit performs a power reset after the firmware has been loaded and stored.

## Using TFTP: Command Line Interface

To download new firmware from a computer, enter the following from a TFTP command line interface:

```
tftp –i <ip address> put <local filename> <destination
file name>
```

The following examples demonstrate the TFTP command sequence to download the .rom file, the .fwx file, and the .cob file:

```
tftp –i 192.168.1.111 put mpt_6502.rom W8

tftp –i 192.168.1.111 put gen_mpt_webm_1602.cob WEB1
```

## Recovering the Firmware Using the Serial Port

If for some reason the firmware is damaged, you can recover the firmware file by using the serial port to download the *.ROM file.

**Note:** See also Recovering Firmware in the DeviceInstaller User Guide.

1. Start DeviceInstaller.
2. From the **Tools** menu, select **Advanced/Recover Firmware**. The Recover Firmware window displays.
3. Enter the com port on your PC and the location of the firmware file. The Device Model should indicate MatchPort b/g.
4. Click **OK** to download the file.

# 9: Troubleshooting

This chapter discusses how you can diagnose and fix errors quickly without having to contact a dealer or Lantronix. The MatchPort's diagnostic LEDs indicate the unit's status. It helps to connect a terminal to the serial port while diagnosing an error to view summary messages that may display. When troubleshooting, always ensure that the physical connections (power cable, network cable, and serial cable) are secure.

**Note:** Some unexplained errors might be caused by duplicate IP addresses on the network. Make sure that your unit's IP address is unique.

When troubleshooting the following problems, make sure that the MatchPort is powered up. Confirm that you are using a good network connection.

## Diagnostic LED States

| Condition | Diagnostic LED | Channel 1 Status LED |
|---|---|---|
| No Errors | OFF | N/A |
| Firmware storage checksum error | ON | Blink 1x/4 seconds |
| RAM error | ON | Blink 2x/4 seconds |
| Network controller error | ON | Blink 3x/4 seconds |
| Serial number storage checksum error | ON | Blink 4x/4 seconds |
| Duplicate IP address present | ON | Blink 5x/4 seconds |
| Firmware and hardware mismatch | ON | Blink 6x/4 seconds |
| Radio command failure | ON | Blink 7x/4 seconds |
| Faulty network connection | Blink 2x/second | Blink 4x/4 seconds |
| No DHCP response | Blink 2x/second | Blink 5x/4 seconds |
| Setup menu active | Blink 2x/second | Follow Diagnostic LED for 2 seconds, off for 2 seconds |

## Problems and Error Messages

| Problem/Message | Reason | Solution |
|---|---|---|
| When you issue the **ARP –S** command in Windows, *The ARP entry addition failed: 5* message displays. | Your currently logged-in user does not have the right to use this command on this PC. | Have someone from your IT department log you in with sufficient rights. |
| When you attempt to assign an IP address to the unit by the ARP method and Telnet to the device server through port 1, the connection fails. | When you Telnet to port 1 on the device server, you are only assigning a temporary IP address. When you Telnet into port 9999 and do not press **Enter** quickly, the device server reboots, causing it to lose the IP address. | Telnet back to Port 1. Wait for it to fail, then Telnet to port 9999 again. Make sure you press **Enter** within 5 seconds. |
| When you Telnet to port 9999, the *Press Enter to go into Setup Mode* message displays. However, nothing happens when you press **Enter**, or your connection is closed. | You did not press **Enter** quickly enough. You only have 5 seconds to press **Enter** before the connection is closed. | Telnet to port 9999 again, but press **Enter** as soon as you see the *Press Enter to go into Setup Mode* message. |
| When you Telnet to port 1 to assign an IP address to the device server, the Telnet window does not respond for a long time. | You may have entered the Ethernet address incorrectly with the ARP command. | Confirm that the Ethernet address that you entered with the ARP command is correct. The Ethernet address may only include numbers 0-9 and letters A-F. In Windows and usually in Unix, the segments of the Ethernet address are separated by dashes. In some forms of Unix, the Ethernet address is segmented with colons. |
| | The IP address you are trying to assign is not on your logical subnet. | Confirm that your PC has an IP address and that it is in the same logical subnet that you are trying to assign to the device server. |
| | The device server may not be plugged into the network properly. | Make sure that the Link LED is lit. If the Link LED is not lit, then the device server is not properly plugged into the network. |
| When you try to assign an IP with DeviceInstaller, you get the following message:<br><br>*No response from device! Verify the IP, Hardware Address and Network Class. Please try again*. | The cause is most likely one of the following:<br><br>The Hardware address you specified is incorrect.<br><br>The IP address you are trying to assign is not a valid IP for your | Double-check the parameters that you specified.<br>***Note:*** *You cannot assign an IP address to a device server through a router*. |

| Problem/Message | Reason | Solution |
|---|---|---|
| | logical subnet.<br><br>You did not choose the correct subnet mask. | |
| The device server is not communicating with the serial device to which it is attached. | The most likely reason is the wrong serial settings were chosen. | The serial settings for the serial device and the device server must match. The default serial settings for the device server are RS-232, 9600 baud, 8 character bits, no parity, 1 stop bit, no flow control. |
| When you try to enter the setup mode on the device server through the serial port, you get no response. | The issue is most likely something covered in the previous problem, or possibly, you have **Caps Lock** on. | Double-check everything in the problem above. Confirm that **Caps Lock** is not on. |
| You can ping the device server, but not Telnet to the device server on port 9999. | There may be an IP address conflict on your network<br><br>You are not Telneting to port 9999.<br><br>The Telnet configuration port (9999) is disabled within the device server security settings. | Turn the device server off and then issue the following commands at the DOS prompt of your computer:<br><br>ARP -D X.X.X.X (X.X.X.X is the IP of the device server).<br><br>PING X.X.X.X (X.X.X.X is the IP of the device server).<br>If you get a response, then there is a duplicate IP address on the network. If you do not get a response, use the serial port to verify that Telnet is not disabled. |
| The device server appears to be set up correctly, but you are not communicating with your device attached to the device server across the network. | If you are sure that the serial port setting is correct, then you may not be connecting to the correct socket of the device server.<br><br>Another possibility is that the device server is not set up correctly to make a good socket connection to the network. | You can check to see whether there is a socket connection to or from the device server by checking the state of CP1, if it has been configured for LED1 functionality.<br><br>If the state of CP1 is blinking consistently, or is completely off, then there is a good socket connection.<br><br>If the state of CP1 is low, use the Connect Mode option **C0** for making a connection to the device server from the network. Use Connect Mode option **C1** or **C5** for a connection to the network from the device server. See the full list of Connect Mode options in Connect Mode on page 42. |

| Problem/Message | Reason | Solution |
|---|---|---|
| When connecting to the Web-Manager within the device server, the *No Connection With The Device Server* message displays. | Your computer is not able to connect to port 30718 (77FEh) on the device server. | Make sure that port 30718 (77FEh) is not blocked with any router that you are using on the network. Also, make sure that port 77FEh is not disabled within the Security settings of the device server. |

## Technical Support

If you are experiencing an error that is not described in this chapter, or if you are unable to fix the error, contact Lantronix Tech Support as follows:

To check our online knowledge base or send a question to Technical Support, go to http://www.lantronix.com/support.

**Technical Support Europe, Middle East, and Africa**
Phone: +33 (0)1 39 30 41 72
Germany: +49 (0) 180 500 13 53
Email: eu_techsupp@lantronix.com or eu_support@lantronix.com

Firmware downloads, FAQs, and the most up-to-date documentation are available at www.lantronix.com/support.

When you report a problem, please provide the following information:

- Your name, and your company name, address, and phone number
- Lantronix model number
- Lantronix MAC number
- Software version (on the first screen shown when you Telnet to port 9999)
- Description of the problem
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem).