LANTRONIX®

MatchPort™

MatchPort b/g™ Integration Guide

Part Number 900-485
Revision A March 2007

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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 on the end product incorporating the MatchPort b/g module must clearly state that it contains an FCC-approved RF module. For example: “This product contains an RF transmitter ID# (put FCC or IC module grant number here).” The actual grant number is on the MatchPort b/g label.

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, unless system-level FCC approval is gained. 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

List of Figures

List of Tables

1: Introduction

About the Integration Guide

This guide provides the information needed to integrate the MatchPort b/g device server within another product. The intended audiences are the engineers responsible for integrating the MatchPort b/g into their product.

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 to get the MatchPort b/g up and running.
MatchPort b/g ™ User Guide	Provides information needed to configure, use, and update the MatchPort b/g firmware.

2: Description and Specifications

The MatchPort b/g wireless embedded device server is a complete network-enabling solution based on the IEEE 802.11b/g wireless standard, with 802.11i (PSK), WPA, and WEP capabilities. MatchPort b/g allows Original Equipment Manufacturers (OEMs) to add wireless connectivity to their products by incorporating it onto a circuit board with minimal engineering.

The MatchPort b/g functions independently of a PC, providing an integrated solution that combines a processor, memory, 802.11b/g transceiver and a high-speed serial port into a single compact module. It includes a wireless connection, an operating system, an embedded Web server, and a full TCP/IP protocol stack. In addition, the MatchPort b/g sends email alerts and supports numerous other network communication protocols, including ARP, UDP, TCP, ICMP, Telnet, AutoIP, DHCP, HTTP and SNMP.

MatchPort b/g Overview

The MatchPort b/g contains Lantronix's own DSTni controller with 256 Kbytes of internal zero wait state SRAM and 16 Kbytes of boot ROM.

The MatchPort b/g also contains the following:

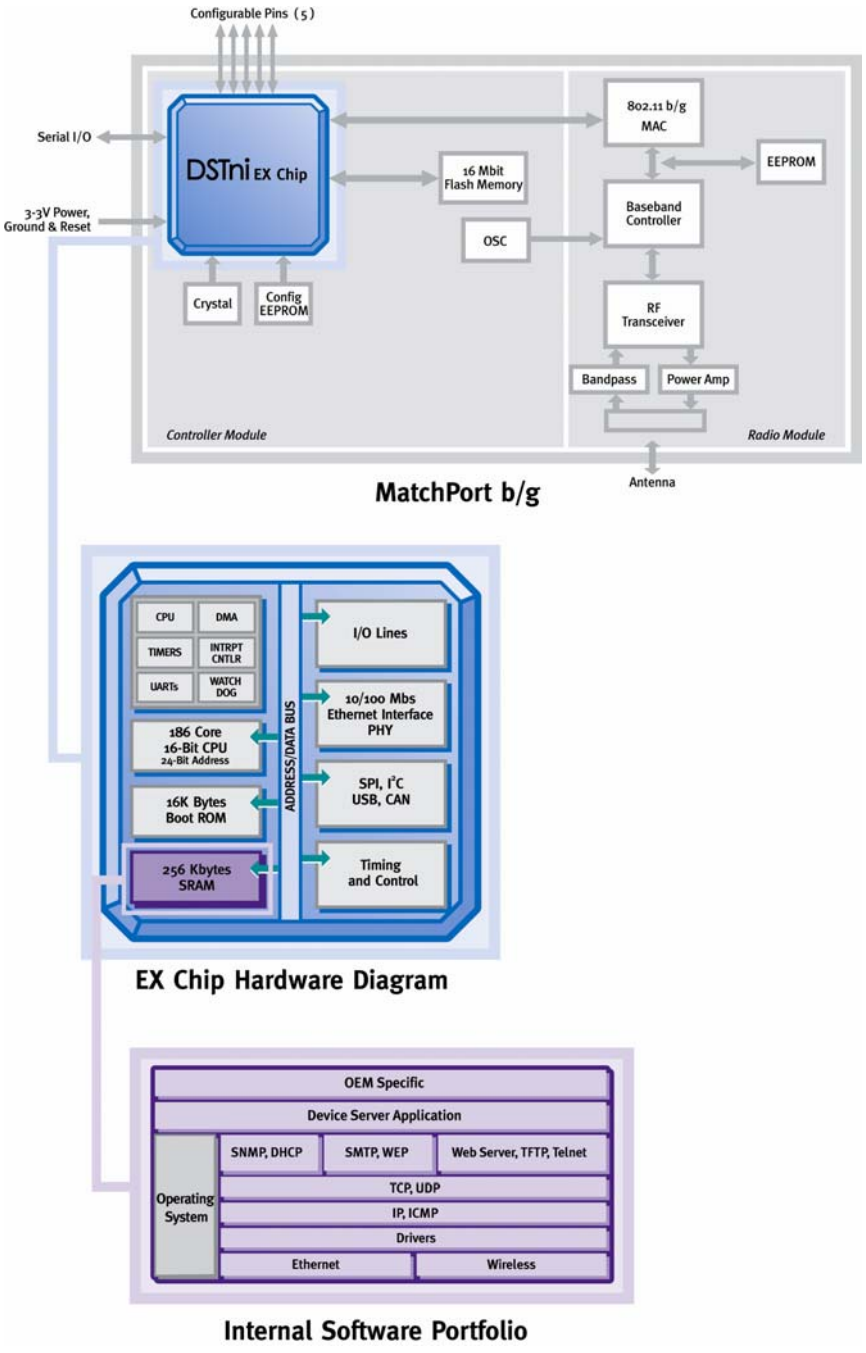
- One 3.3 volt, CMOS level, asynchronous serial interface (5 volt tolerant)
- Support for RS-232 and RS-485 up to 230400 Baud
- 16 Mbit flash memory
- 26 (low) or 48 (regular) MHz clock
- 802.11b/g interface
- 5 configurable pins

The MatchPort b/g requires +3.3-volt power and is designed to operate within a temperature range of -40ºC to +70ºC.

MatchPort b/g Block Diagram

The following drawing is a block diagram of the MatchPort b/g showing the relationships of the components.

Figure 2-1. MatchPort b/g Block Diagram



PCB Interface

Table 2-1. PCB Interface Signals

Pin #	Name	Function	Pin #	Name	Function
1	Reset IN#	Active low Reset. Min reset input 2 ms. Leave floating if unused.	2	GND	Signal Ground
3	NC	No Connect	4	NC	No Connect
5	TXD1	Transmit data output (logic level), port 0	6	RES	Reserved for future use.
7	RTS1	Request to Send output (logic level), port 0	8	RES	Reserved for future use.
9	RXD1	Receive data input (logic level), port 0	10	RES	Reserved for future use.
11	CTS1	Clear to Send input (logic level), port 0	12	RES	Reserved for future use.
13	CP1	Configurable pin	14	RES	Reserved for future use.
15	CP2	Configurable pin	16	RES	Reserved for future use.
17	CP3	Configurable pin	18	RES	Reserved for future use.
19	CP4	Configurable pin	20	RES	Reserved for future use.
21	RES	Reserved for future use.	22	WLAN LED	Wireless LAN status LED output (4mA) Active low
23	RES	Reserved for future use.	24	NC	No connect
25	RES	Reserved for future use.	26	NC	No connect
27	RES	Reserved for future use.	28	RES	Reserved for future use.
29	CP5	Configurable pin	30	RES	Reserved for future use.
31	RES	Reserved for future use.	32	NC	No connect
33	RES	Reserved for future use.	34	NC	No connect
35	RES	Reserved for future use.	36	NC	No connect
37	3.3V	3.3V power input	38	NC	No connect
39	GND	Signal Ground	40	NC	No connect

Note: *For all the configurable pins, see the MatchPort b/g User Guide for selectable functions.*

Mating Connector

MatchPort can be soldered directly to the PCB using the footprint shown in Figure 2-10. If a socket is required, two 2 mm 20-pin sockets spaced 1.42" apart can be used (e.g., Samtec P/N SMM-120-02-S-S-TR).

An antenna connection is made via the U.FL style connector on the MatchPort. Lantronix offers two cable options, reverse-SMA to U.FL (P/N 500-180-R) or U.FL to U.FL (P/N 500-181-R).

Figure 2-2. Reverse-SMA to U.FL (P/N 500-180-R)

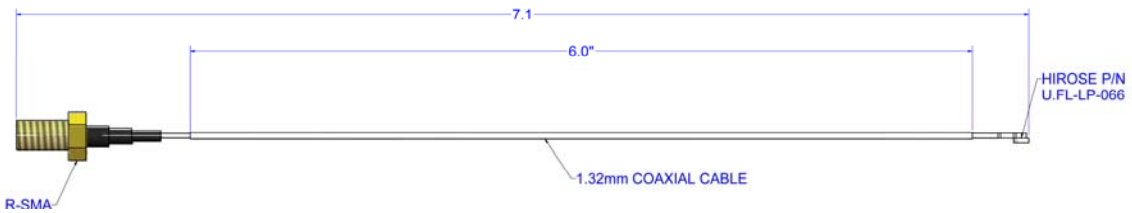
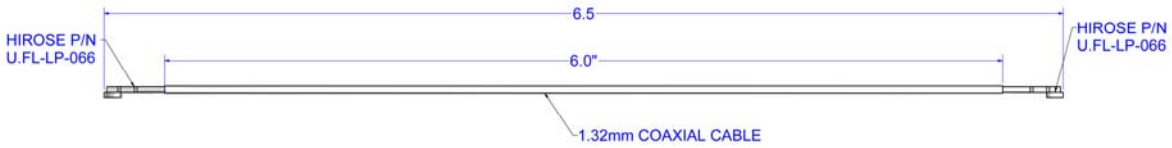


Figure 2-3. U.FL to U.FL Cable (P/N 500-181-R)



Note: *The antenna cable is included in the MatchPort b/g sample. For production, it can be purchased from Lantronix or a cable supplier.*

Serial Input/Output

The unit has one serial port compatible with RS232 serial standards at data rates up to 230 Kbps. The serial I/O signals are 3.3V CMOS logic level and pins are 5V tolerant. Serial signals connect to the OEM CPU/UART. For evaluation and prototype work, it is convenient to have an external RS-232 interface that can connect to the serial port on a PC. The MatchPort Demo Board has an RS-232/422/485 transceiver to implement this external interface.

If desired, use the CPs to create a DTE or DCE-style interface using any 3 available CPs. To create these interfaces, connect the signals according to Table 2-2 and Table 2-4.

Note: *CPx, and CPy are any of the available CPs.*

Table 2-2. RS232 Connections

MatchPort b/g		DCE Connector			DTE Connector		
Signal (Logic)	**Description**	**DB9**	**DB25**	**Signal**	**DB9**	**DB25**	**Signal**
RXD1	Data In	2	3	RXD1	3	2	TXD1
TXD1	Data Out	3	2	TXD1	2	3	RXD1
RTS1	H/W Flow Control Output	7	4	RTS1	8	5	CTS1
CTS1	H/W Flow Control Input	8	5	CTS1	7	4	RTS1
CPx	Modem Control Input	1	8	DCD	4	20	DTR
CPy	Modem Control Output	4	20	DTR	1	8	DCD

Table 2-4. JP6 RS422/485 Connections

MatchPort b/g Signal (logic)	Description	RS485 Signal	JP6 Pin	DB25 4 Wire	DB25 2 Wire	DB9 4 wire	DB9 2 wire
TXD1	Data Out	TX+485	4	14	14	7	7
TXD1	Data Out	TX-485	3	15	15	3	3
RXD1	Data In	RX+485	2	21	14	2	7
RXD1	Data In	RX-485	1	22	15	8	3
RTS1	TX Enable						
CP3	RS485 Select						
CP4	RS485 2-wire						

Sample Layouts for RS-485 Connectivity

Figure 2-4. Combined RS-232/422 Transceiver

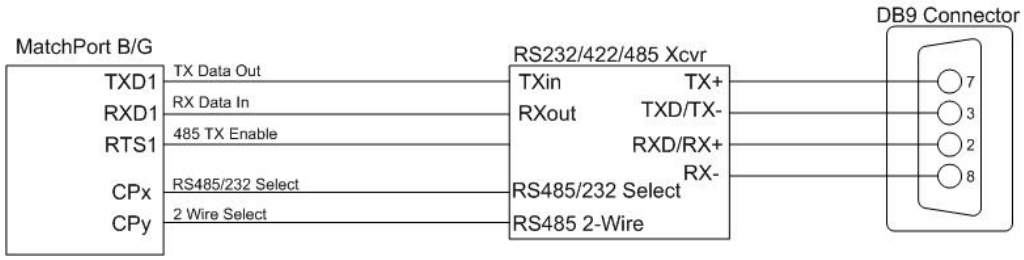


Figure 2-5. Separate RS-232/422 Transceivers

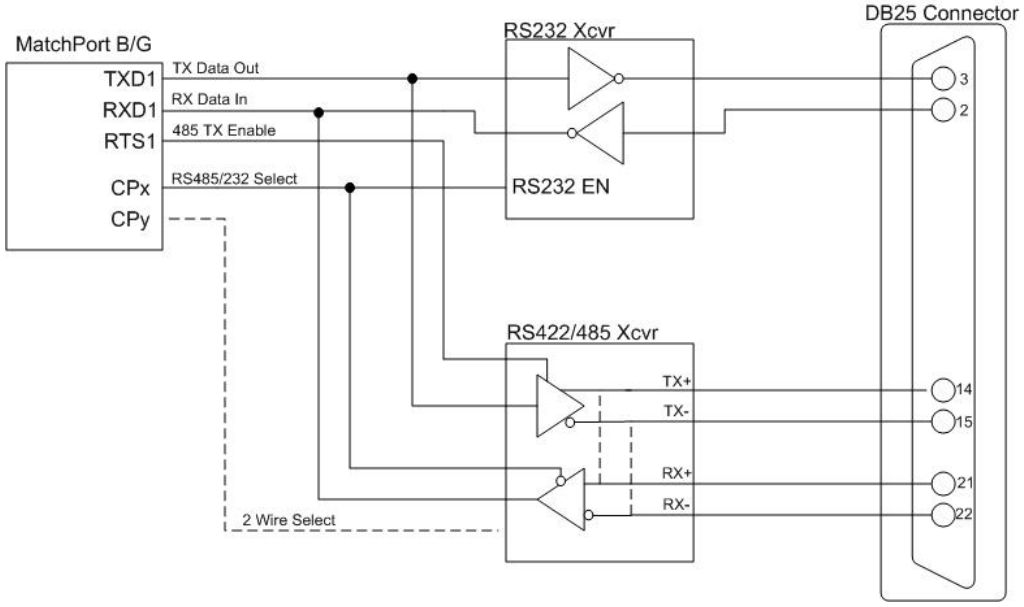
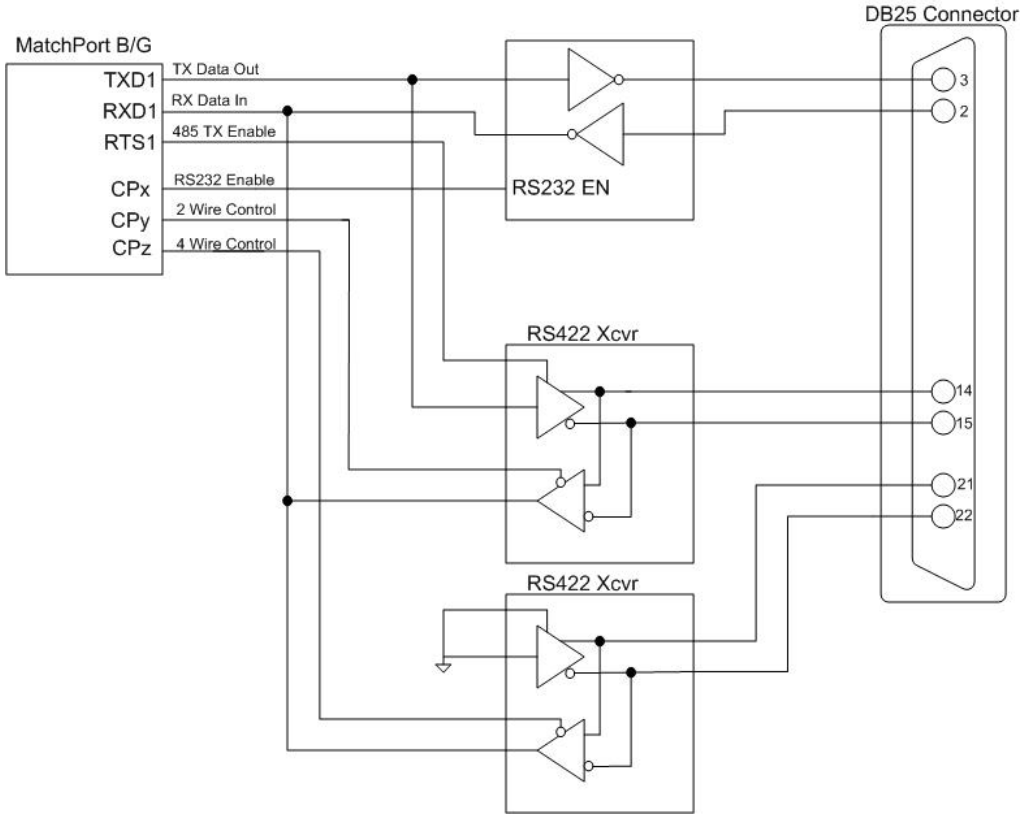


Figure 2-6. Separate RS-422 Transceivers for 2-Wire and 4-Wire Setups



WLAN Input/Output

The following table displays the WLAN LED functions.

Table 2-3. WLAN Signals

Pin Number	Pin Function
22	WLAN LED

MatchPort b/g

Output WLAN LED can be used to drive an external LED to monitor the activity of the radio. The output is active when the receiver and or transmitter are on. The output is active low and can drive an LED with 10mA. The LED shall be connected between the output and 3.3V with a series resistor of 220 ohm.

Note: *If you have questions or concerns, please contact Lantronix Technical Support at (800) 422-7055 (US only) or (949) 453-7198.*

If power management is disabled, and when the unit is associated with a network, the receiver will always be on and thus any LED output, that indicates the receiver or transmitter being on will be active continuously.

Power, Ground, and Reset

Table 2-4. Power, Ground, and Reset Pins

Power	Ground	Reset
Pin 37	Pin 2	Pin 1
	Pin 39	

Driving the Reset In line low resets the MatchPort b/g. Minimum reset pulse width is 2 ms at IIL = -500uA

Absolute Maximum Ratings

Table 2-5. Absolute Maximum Ratings

Parameter	Min	Max	Units
Supply Voltage	3.0	3.6	V
Input Voltage	-0.5	6	V
Output Voltage	-0.5	6	V
Operating Temperature	-40	70	ºC
Storage Temperature	-40	85	ºC

Recommended Operating Conditions

The following table illustrates the optimal and recommended operating conditions for the MatchPort b/g device.

Table 2-6. Operating Conditions, Serial Ports, & Configurable Pins

Parameter	Min	Typical	Max	Units
Supply Voltage	3.135	3.3	3.45	V
Voltage Ripple			2	%
VIL Input Low Voltage*	-0.3		0.8	V
VIH Input High Voltage*	2		5.5	V
II Input Leakage Current*		+/- 10 nA	+/- 1 µA	
VOL Output Low Voltage @ IOL max*			0.4	V
VOH Output High Voltage @ IOH max*	2.4			V
TXD1, RTS1 IOL Low Level Output Current @ VOL 0.4V	2.2	3.5	4.3	mA
CP1-CP5 Low Level Output Current @VOL 0.4V	4.4	7.1	8.5	mA
TXD1, RTS1 IOH High Level Output Current @ VOH 2.4V	-3.2	-6.4	-10.0	mA
CP1-CP5 IOH High Level Output Current @ VOH 2.4V	-6.4	-12.8	-20.0	mA

* For UART and CP pins

Wireless Specifications

Refer to the following table for the MatchPort b/g's wireless specifications:

Table 2-7. Wireless Specifications

Category		IEEE 802.11b/g
Frequency Range		2.400 – 2.484 GHz
Output Power		14 +2.0/- 1.5 dBm 1, 2, 5.5, 11 Mbps 12 +/- 1.5 dBm 6, 9, > 12 Mbps
Antenna Connector		1
Data Rates		1,2,5.5,11,6,9,12,18,24,36,48,54 Mbps
Radio	Number of Selectable Subchannels	US 1-11 CA 1-11 JP 1-14 FR 10-13 SP 10-11 OT 1-13 (OT=Others)
	Modulation	DSSS,DBPSK,DQPSK,CCK, OFDM, 16QAM, 64QAM
	Antenna Connector	1
Security		WEP 64/128,WPA, WPA2/802.11i
Maximum Receive Level		-10 dBm (with PER < 8%)
Receiver Sensitivity		-69 dBm for 54 Mbps -88 dBm for 11 Mbps -85 dBm for 6 Mbps -91 dBm for 1.0 Mbps
WLAN LED Current		Max: 10 mA

Technical Specifications

Table 2-8. Technical Specifications

Category	MatchPort b/g
CPU, Memory	Lantronix DSTni-EX 186 CPU, 256 KB zero wait state SRAM 2048 KB Flash,16 KB Boot ROM
Firmware	Upgradeable via TFTP and serial port
Reset Circuit	Reset In is low active. Minimum reset pulse width is 2 ms at IIL = -500 µA
Serial Interface	CMOS (Asynchronous) 3.3V - level signals Speed software selectable (300 bps to 230400 bps)
Serial Line Formats	7 or 8 data bits, 1-2 Stop bits, Parity: odd, even, none
Modem Control	DTR, DCD
Flow Control	XON/XOFF (software), CTS/RTS (hardware), none
Network Interface	802.11b/g
Protocols Supported	ARP, UDP, TCP, Telnet, ICMP, SNMP, DHCP, BOOTP, Auto IP, HTTP, SMTP, TFTP
Management	Internal web server, SNMP (read only) Serial login, Telnet login, DeviceInstaller software
Internal Web Server	Serves web pages WEB storage capacity: 1.2 MB
Distance	Up to 328 feet Indoors
Average Power Consumption (at 3.3V)	**Wireless Mode Associated** 850 mW (Reg performance. Data transfer at 230 Kbps.) 740 mW (Low performance. Data transfer at 230 Kbps.) 350 mW (Regular performance. No data transfer.) 250 mW (Low performance. No data transfer.)
Peak Supply Current (at 3.3V)	360 mA (Reg performance, 230 Kbps data transfer, Wireless mode)
Security	Password protection, locking features, 64/128 bit WEP, WPA, 802.11i (PSK)
Weight	14g
Cover Material	ABS
Temperature	Operating range: -40°C to +70°C Storage range: -40°C to +85°C (-40°F to 185°F)
Warranty	2-year limited warranty
Included Software	Windows™ 98/NT/2000/XP based Device Installer configuration software and Windows™ based Com Port Redirector, DeviceInstaller, and Web-Manager.

Dimensions

The MatchPort b/g dimensions are shown in the following diagrams:

Figure 2-7. Side Views

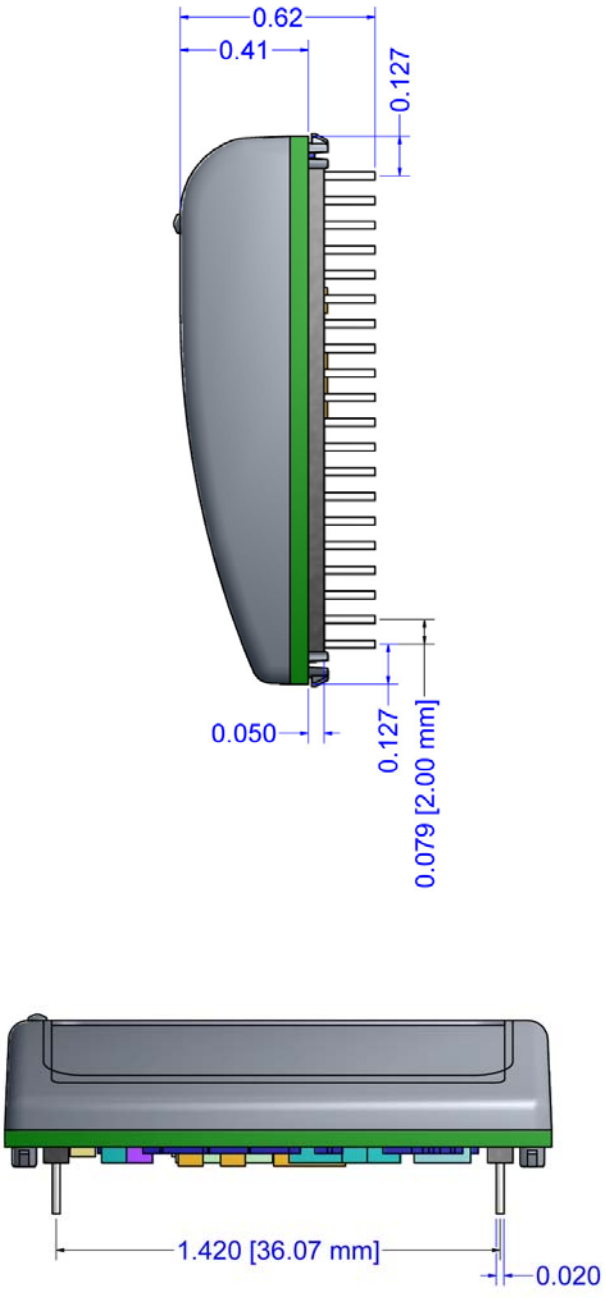


Figure 2-8. Top View

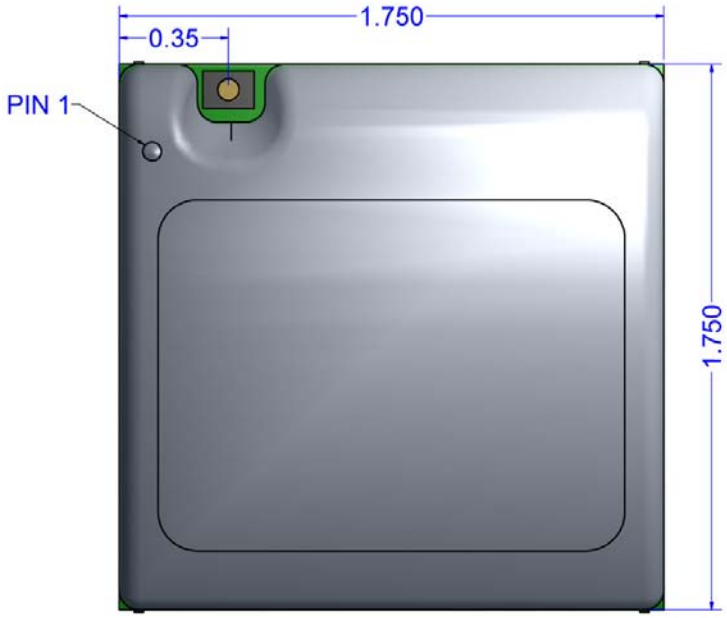


Figure 2-9. Bottom View

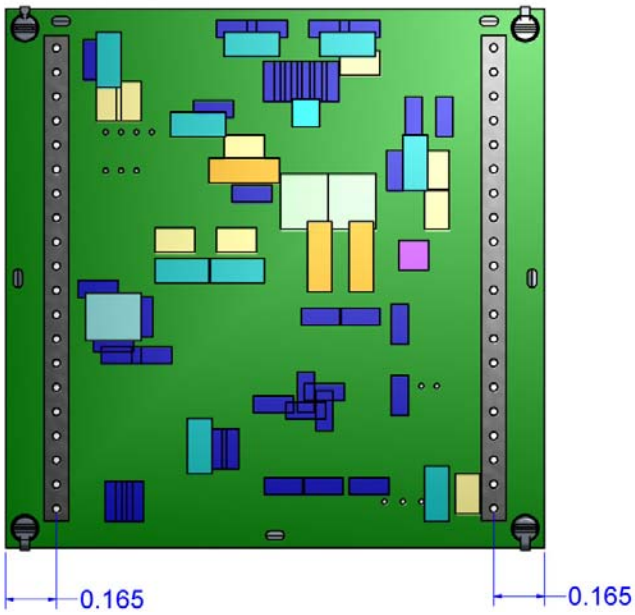
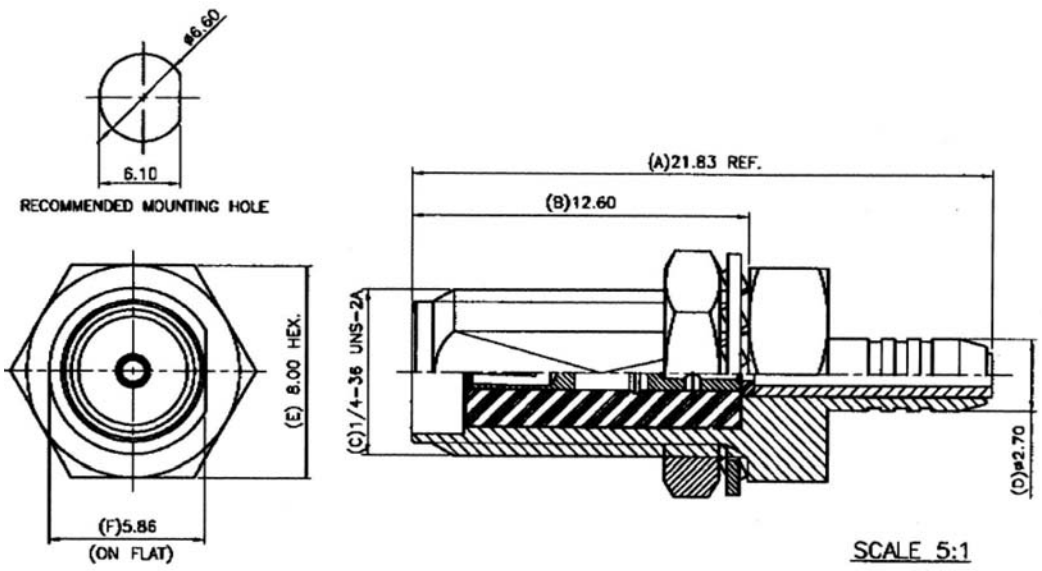


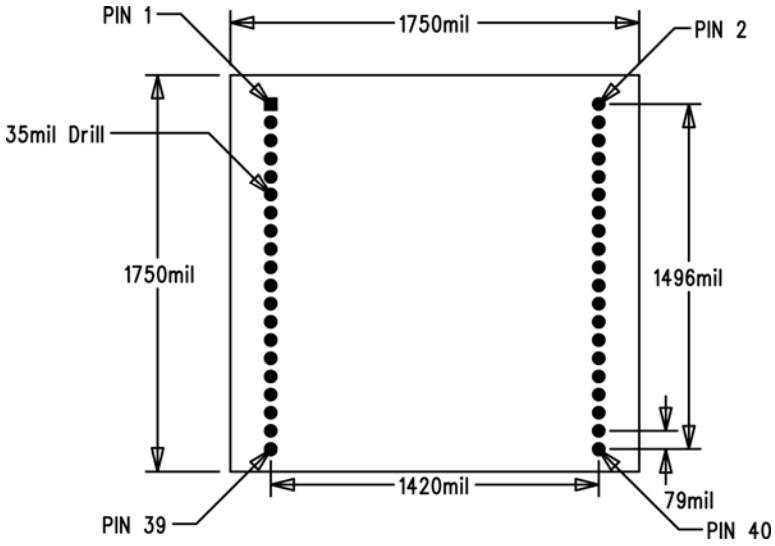
Figure 2-10. Wireless Connector Dimensions



Recommended PCB Layout

The hole pattern and mounting dimensions for the MatchPort b/g device server are shown in the following drawing:

Figure 2-11. PCB Layout (Top View)



Product Information Label

The product information label contains important information about your specific unit, such as its product ID (name), bar code, part number, and MAC address.

Figure 2-12. Product Label

3: Demonstration Kit

The MatchPort b/g Demonstration Kit includes everything needed to begin to integrate the MatchPort b/g into a given product design.

Contents of the Kit

The Demonstration Kit contains the following items:

- MatchPort Demo Board
- 3.6V Power Supply
- RS-232 cable, DB9F/F, null modem
- Antenna

Note: *You must purchase the MatchPort b/g sample separately for use with this Demonstration Kit.*

Demo Board Description

The MatchPort Demo Board provides a test platform for the Lantronix MatchPort b/g device server. It supplies 3.3V power. The MatchPort Demo Board provides access to all signals to and from the MatchPort b/g device server. The demo board has two serial port interfaces (CON1 and CON2). MatchPort b/g has only one serial port interface, which connects to CON1. The CON2 serial port on the demo board is for future products that will have two serial interfaces. The MatchPort b/g Demo Board also includes an RJ45 connector for use with future products that include wired Ethernet.

Serial Interfaces

The MatchPort b/g serial interface is 3.3V logic level and typically connected to a Universal Asynchronous Receiver/Transmitter (UART). For connection to an external device, the demo board has RS-232/422/485 transceivers. CON1 support RS-232/485. Connect to a PC using a null-modem serial cable with 9-pin connectors (F/F). CON2 is a serial port for use with future devices containing two serial ports.

The table below lists the RS-232 signals and corresponding pins on the MatchPort b/g. All signals are level-shifted by the RS-232 transceivers.

Table 3-1. RS-232 Signals

MatchPort b/g PIN FUNCTION	DB9 Pin #
UART 1	**Con1**
TXD1 (Data Out)	3
RXD1 (Data In)	2
CTS1 (HW Flow Control Input)	8
RTS1 (HW Flow Control Output)	7
DCD1 (Modem Control Input)	1
DTR1 (Modem Control Output)	4

Table 3-2. RS-485 4-Wire Connector

MatchPort b/g Signal	Description	DB9 Pin #
TX+	Data Out	7
TX-	Data Out	3
RX+	Data In	2
RX-	Data In	8

Power Supply

The demo board uses an external 3.3V regulated supply (included with kit). The demo board contains additional filtering and protection.

General Control

The following table denotes the configuration of the demo board. Configuring the jumper re-routes the signals on the demo board as required for a given product. This also drives the LEDs.

Configuration Switch Bank

Table 3-4a. Demo Board JP1 Jumper Configuration

JP1 pin/Signal	JP1 pin/Signal	Function
1/CP1	2/LED12	Jumper 1-2, CP1Controls LED12
3/CP2	4/LED11	Jumper 3-4, CP2 Controls LED11
5/CP3	6/LED10	Jumper 5-6, CP3 Controls LED10
7/CP4	8/LED9	Jumper 7-8, CP4 Controls LED9
9/CP5	10/LED8	Jumper 9-10, CP5 Controls LED8

Table 3-4b. Demo Board JP7 Jumper Configuration for CON1

JP7 pin/Signal	JP7 pin/Signal	Function
1/TXD1	2/TXA	Jumper 1-2, Send TXD to RS232/485 transceiver.
3/RTS1	4/RTSA	Jumper 3-4, Send RTS to RS232/485 transceiver. In 485 mode RTS controls transmit enable.
5/CP3	6/SEL4XXA	Jumper 5-6, CP3 high selects 485 mode, low 232 mode.
7/RXD1	8/RXA	Jumper 7-8, Receive RXD from RS232/485 transceiver.
9/CTS1	10/CTSA	Jumper 9-10, Receive CTS from RS232 transceiver.
11/CP4	12/HDPX4XXA	Jumper 11-12, In 485 mode, CP4 selects full duplex when low, half duplex when high.
13/CP1	14/DTRA	Jumper 13-14, CP1 drives DTR to RS232 transceiver.
15/CP2	16/DCDA	Jumper 15-16, CP2 receives DCD from RS232 transceiver.

Table 3-4c. Demo Board JP5 Jumper Configuration

Pin/Signal	Pin/Signal	Function
1/3V3	2/3V3_UUT	MatchPort UUT power input jumper for current measurement. Jumper 1-2 must be installed to provide power to UUT.

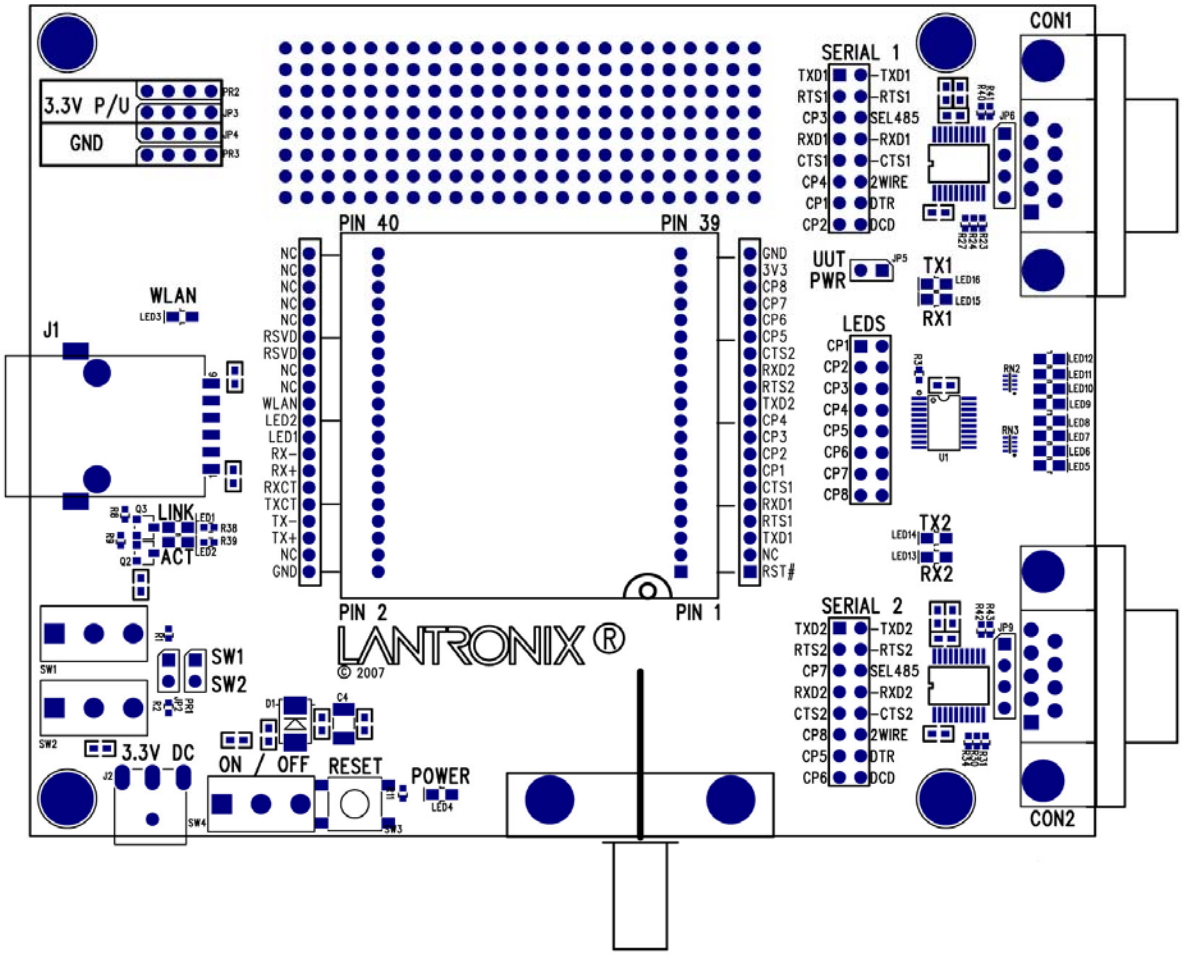
If using CPs for any combination of the above demo board configurations, please use the appropriate CP function selection as shown in Table 3-5. If assigning a CP for any function other than the serial port, the jumper for the associated CP pin should be removed from JP7 to avoid conflict with the serial port function.

Table 3-5. Demo Board Configurable Pin Jumper Configurations.

Configurable Pin	JP1 Function	JP7,JP8 Function
CP1	LED12	JP7, CON1 DTR
CP2	LED11	JP7, CON1 DCD
CP3	LED10	JP7, CON1 RS485/232 Select
CP4	LED9	JP7, CON1 RS485 Duplex Select
CP5	LED8	JP8, RESERVED

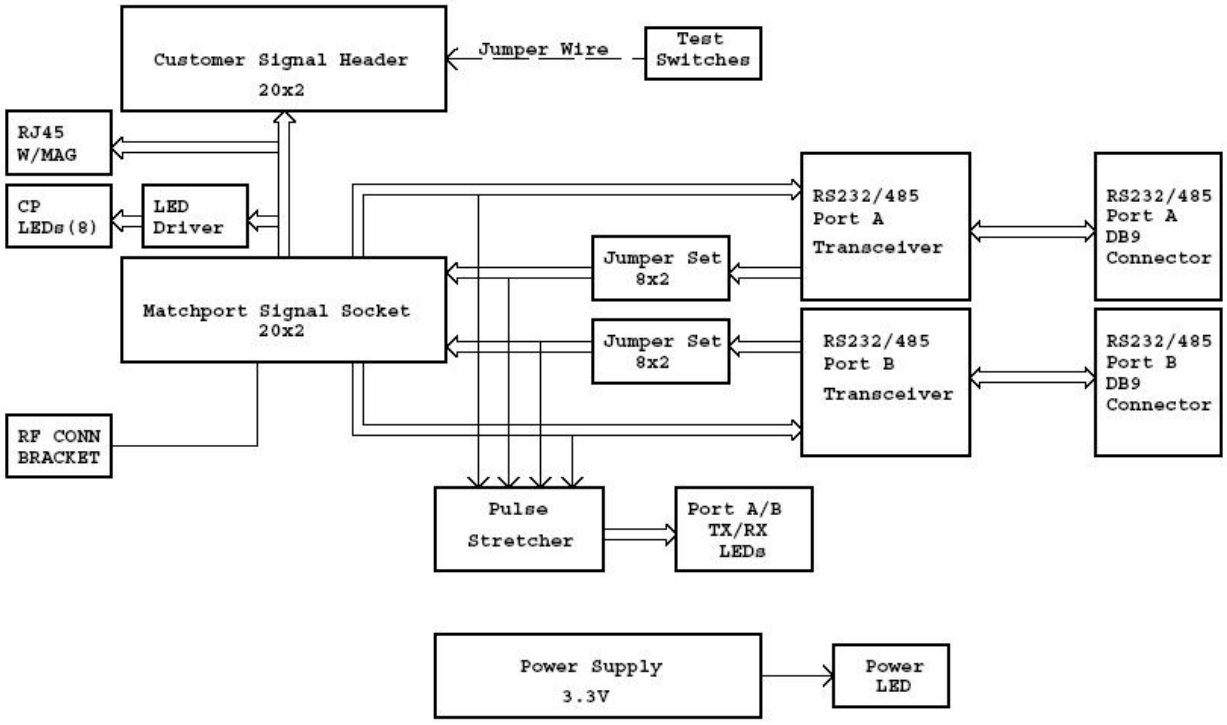
Demo Board Layout

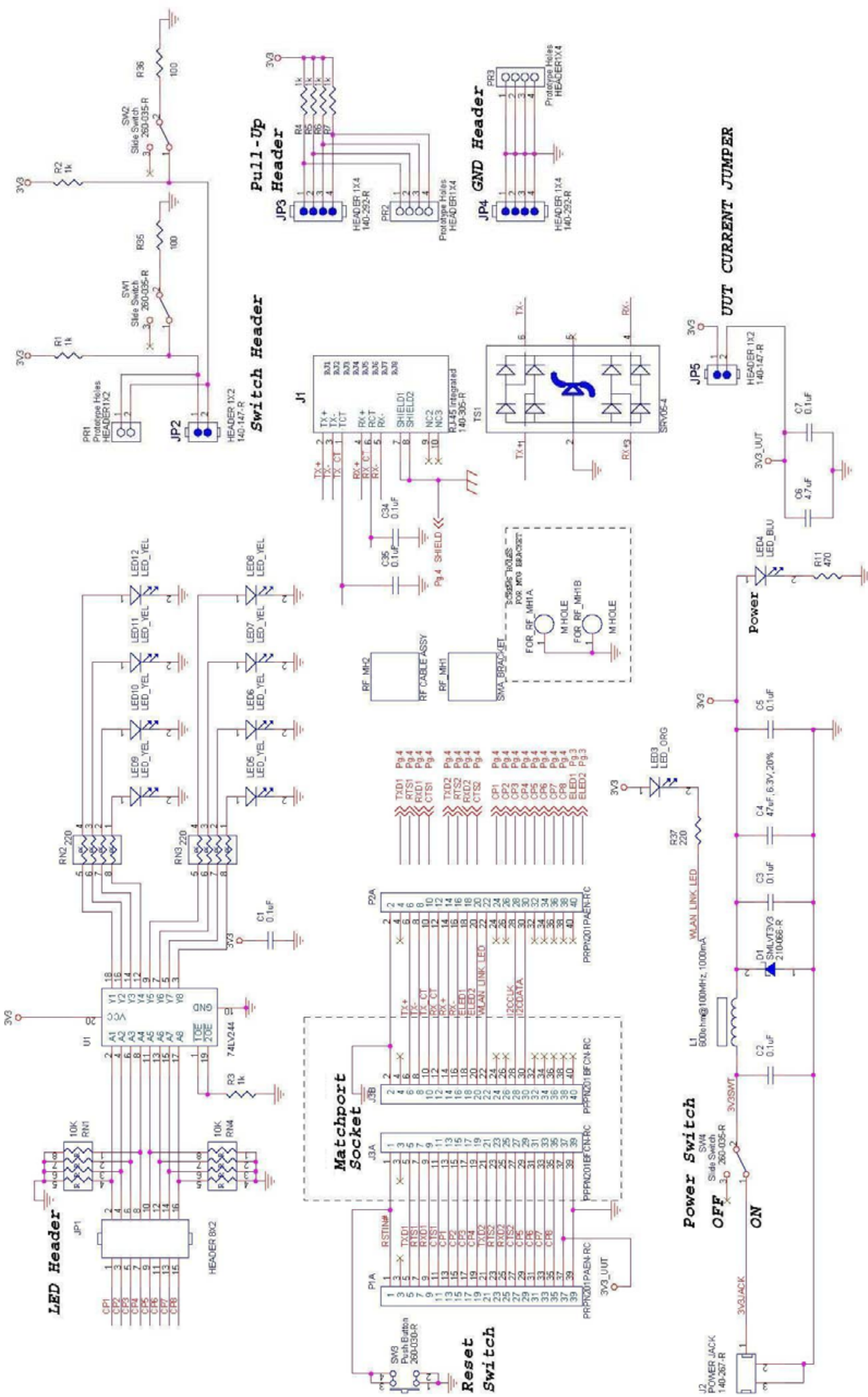
Figure 3-1. MatchPort b/g Demo Board Layout

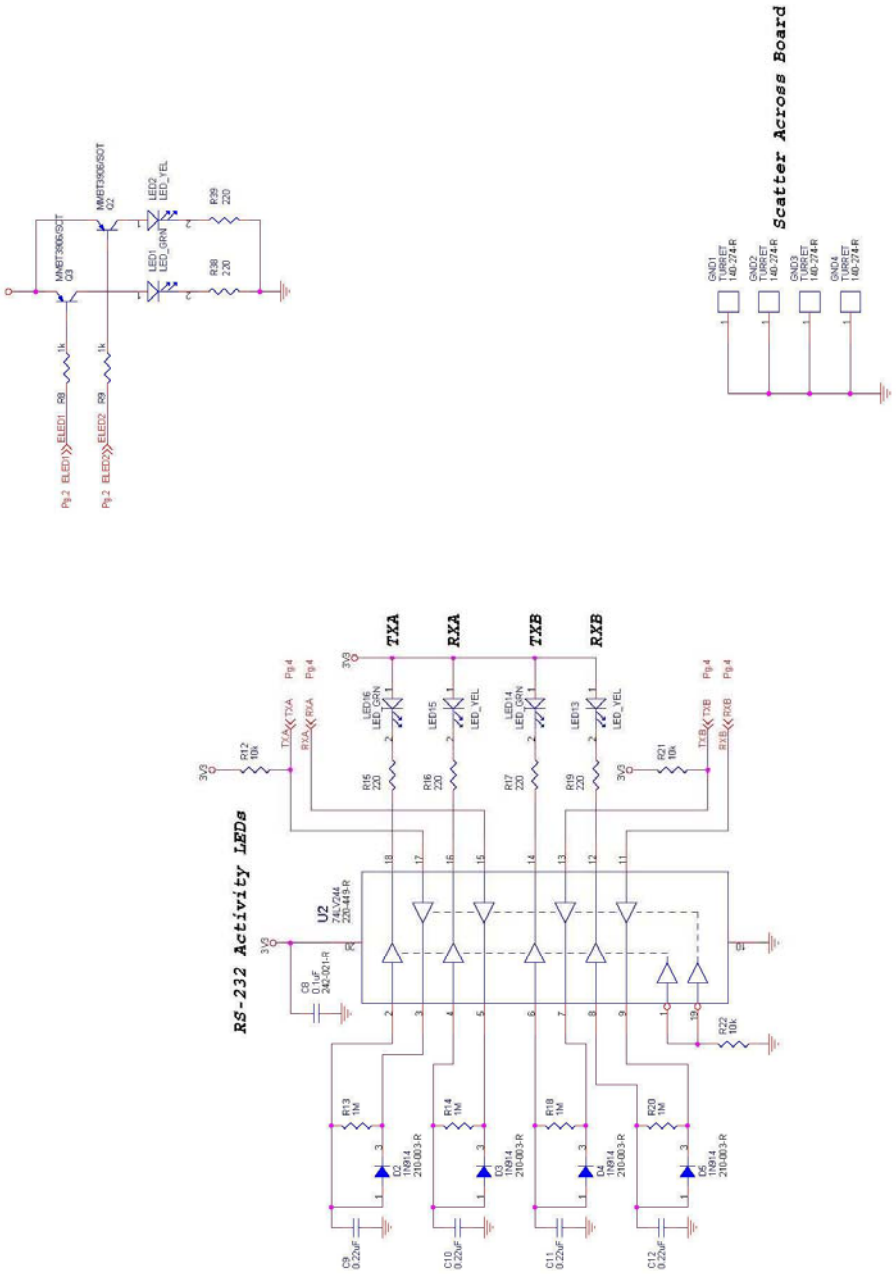


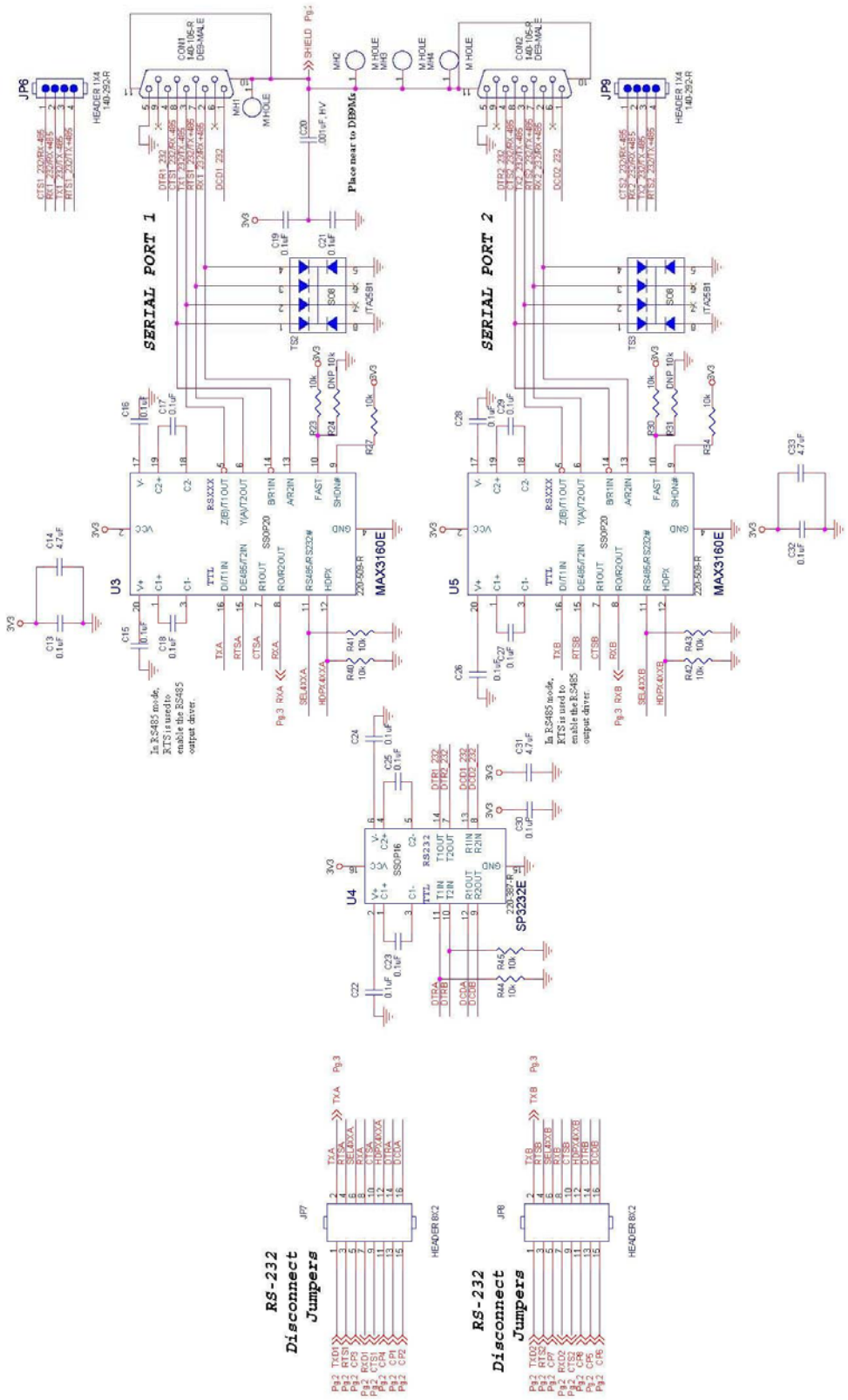
Demo Board Schematics

Figure 3-2. Demo Board Schematics




Switch Header
Pull-Up Header
GND Header
UUT CURRENT JUMPER
LED Header
Matchport Socket
Power Switch
OFF
ON
Power
Reset Switch
3V3_UUT
3V3SMT


Scatter Across Board
RS-232 Activity LEDs
TXA
RXA
TXB
RXB


SERIAL PORT 1
SERIAL PORT 2
MAX3160E
SP3232E
RS-232 Disconnect Jumpers
RS-232 Disconnect Jumpers
Place near to DB9MG
SHIELD
HEADER 8X2
HEADER 1X4

A: Compliance and Warranty Information

Compliance Information

(According to ISO/IEC Guide 22 and EN 45014)

Manufacturer's Name & Address:

Lantronix 15353 Barranca Parkway, Irvine, CA 92618 USA

Declares that the following product:

Product Name Model: MatchPort b/g Embedded Device Server

Conforms to the following standards or other normative documents:

Safety:

UL 60950-1

CAN/CSA-C22.2 No. 60950-1-03

EN 60950-1:2001, Low Voltage Directive (73/23/EEC)

EMC & Radio:

For purposes of certification, the MatchPort b/g was tested as a modular device.

CFR Title 47 FCC Part 15, Subpart B and C, Class B

FCC Module Approval

FCC Identifier: R68MTCHDRCT

Industry Canada ICES-003 Issue 4 (2004), Class B

Industry Canada RSS-Gen Issue 1 (2005)

Industry Canada RSS-210 Issue 6 (2005)

Industry Canada Module Approval IC: 3867A-MTCHDRCT

EN 301 489-1 v1.6.1 (2006-07), EMC Directive (1999/5/EC)

EN 301 489-17 v.1.2.1 (2002-08), EMC Directive (1999/5/EC)

EN 300 328 v1.7.1 (2006-10), R&TTE Directive (1999/5/EC)

Australia / New Zealand AS/NZS CISPR 22 (2006), Class B

Australia / New Zealand AS/NZS 4771 (2000 + A1:2003)

EN55022: 1998 + A1: 2000 + A2: 2003

EN55024: 1998 + A1: 2001 + A2: 2003

EN61000-3-2: 2000 + A2: 2005

EN61000-3-3: 1995 + A1: 2001

Warranty

Lantronix warrants each Lantronix product to be free from defects in material and workmanship for a period of TWO YEARS. During this period, if a customer is unable to resolve a product problem with Lantronix Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of a RMA number, the customer shall return the product to Lantronix, freight prepaid. Upon verification of warranty, Lantronix will -- at its option -- repair or replace the product and return it to the customer freight prepaid. If the product is not under warranty, the customer may have Lantronix repair the unit on a fee basis or return it. No services are handled at the customer's site under this warranty. This warranty is voided if the customer uses the product in an unauthorized or improper way, or in an environment for which it was not designed.

Lantronix warrants the media containing its software product to be free from defects and warrants that the software will operate substantially according to Lantronix specifications for a period of 60 DAYS after the date of shipment. The customer will ship defective media to Lantronix. Lantronix will ship the replacement media to the customer.

In no event will Lantronix be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss of equipment, plant or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing software, hardware, equipment or facilities, or claims against the user by its employees or customers resulting from the use of the information, recommendations, descriptions and safety notations supplied by Lantronix. Lantronix liability is limited (at its election) to:

- Refund of buyer's purchase price for such affected products (without interest).
- Repair or replacement of such products, provided that the buyer follows the above procedures.

There are no understandings, agreements, representations or warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose, other than those specifically set out above or by any existing contract between the parties. Any such contract states the entire obligation of Lantronix. The contents of this document shall not become part of or modify any prior or existing agreement, commitment or relationship.

For details on the Lantronix warranty replacement policy, go to our web site at www.lantronix.com/support/warranty