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## PremierWave® EN Embedded System on Module Data Sheet

### General Description

PremierWave EN embedded system on module delivers a new dimension of Wi-Fi networking with the highest levels of security to virtually any electronic product. It provides affordable connectivity in a compact form factor, enabling OEMs to add Wi-Fi or wired Ethernet networking to their products on a single PCB design.



With a choice of flexible, media-independent modules ranging from Ethernet, Wi-Fi and ultra-secure Wi-Fi, the PremierWave EN takes the complexity out of RF design and networking. OEMs can focus on their core competencies while minimizing engineering risk, shortening development time and reducing development cost.

PremierWave EN has a dedicated 32-bit processor module running at 400 MHz and features 32 Kbyte Data Cache, 32 Kbyte Instruction Cache, embedded 64 Kbyte ROM, 16 Kbyte SRAM and a Memory Management Unit.

With options for up to 64Mbyte of SDRAM and up to 256Mbyte of NAND Flash, PremierWave EN can easily manage wireless connectivity and web services.

With its combination of high performance CPU, ample memory, variety of serial interface options (Serial, I2C, High Speed SPI, USB 2.0) and Linux OS, PremierWave EN can be designed as the primary host processor, for most demanding embedded applications.

PremierWave EN offers an unmatched portfolio of security technologies. PremierWave EN goes far beyond compliance with the popular 802.11i, WPA and WPA2 wireless security specifications. It ensures data integrity and privacy for highly sensitive requirements, such as medical or financial applications.

### Key Features

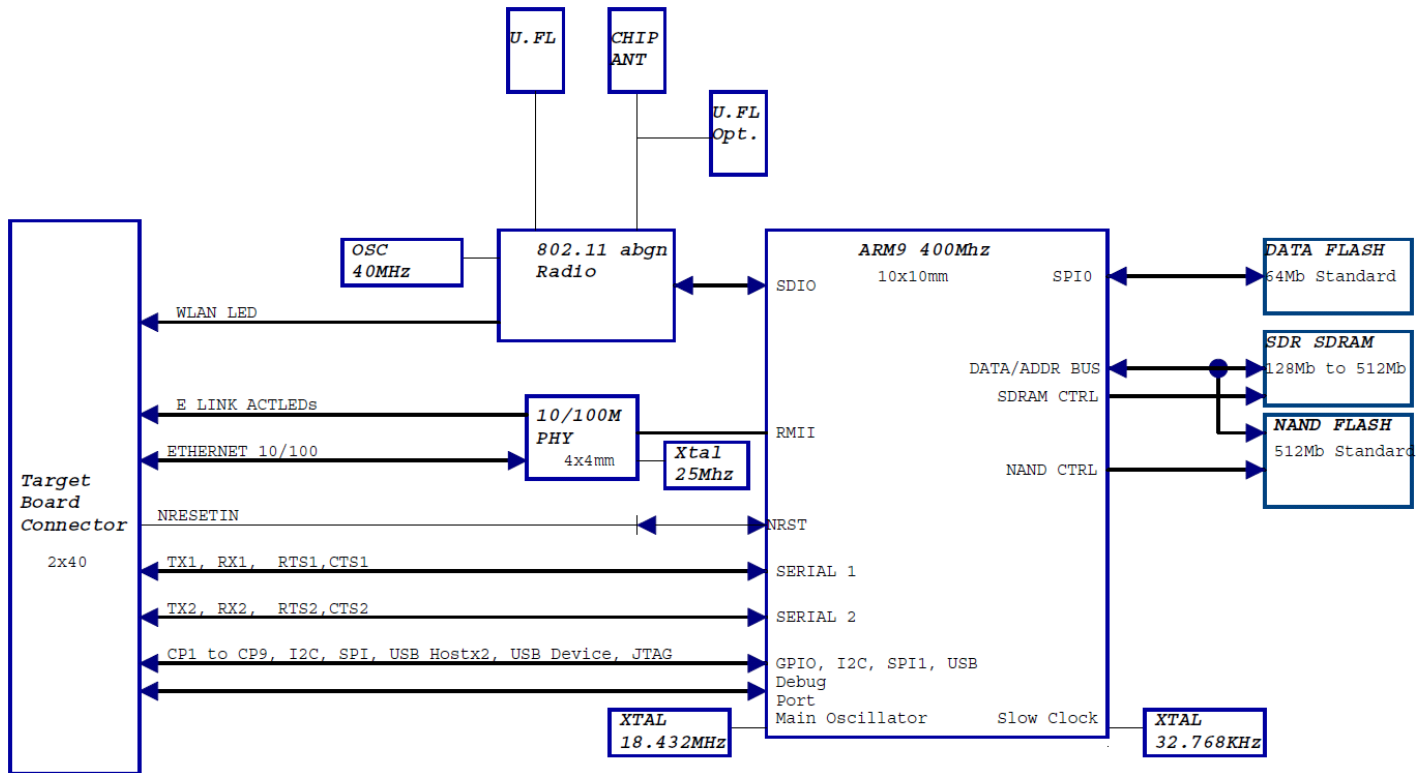
- The only complete, dual band radio, integrated solution in a compact form factor
- Up to 921 Kbps Serial Interface
- USB 2.0 Full Speed(host and device), High Speed SPI (Master/Slave)
- 9 Configurable Pins
- 10/100 Base T Ethernet MAC and PHY
- 802.11 a/b/g/n Dual band Radio
- Antenna Diversity
- Variety of management and configuration options, including web interface
- Supports most industry standard Network Protocols
- IEEE 802.11i-compliant radio with AES-CCMP and TKIP encryption
- Complete suite of 802.1x Enterprise Authentication Protocols (EAP) including EAP-TLS, EAP-TTLS, PEAP, EAP-Fast and LEAP
- End-to-end SSL TLS and SSH tunneling
- SSL Client & Server, Selectable 128/256/512/768/1024/2048 Bit Certificates
- SSH Client, 8 Server Selectable 128/256/512/768/1024 Bit Public/Private Key support
- TLS
- ENCRYPTION: AES, 3DES and RC4 Encryption for SSH & SSL
- AUTHENTICATION: SHA-1, MD5, Base-64
- RoHS and REACH compliant
- Industrial temperature: -40 to +85° C
- High-performance processor (440 MIPS at 400 MHz)
- 3.3 V power

### PremierWave Antenna SKU Options

PremierWave SKU options	Antenna Port 1 Connection	Antenna Port 2 Connection
SKU 1 with chip antenna	Internal chip antenna	U.FL for external antenna
SKU 2 without chip antenna	U.FL for external antenna	U.FL for external antenna
SKU 3 without wireless LAN	None	None



**PremierWave EN Block Diagram**



**Additional Documentation**

For supporting product documentation, or the most current version of this document, please visit the Lantronix Web site at [www.lantronix.com/support/documentation](http://www.lantronix.com/support/documentation).

Document	Description
PremierWave EN Integration Guide	Information about the PremierWave EN hardware, testing the PremierWave EN using the demonstration board, and integrating the PremierWave EN into your product.
PremierWave EN User Guide	Provides information needed to configure, use, and update the PremierWave EN firmware.
PremierWave EN Command Reference	Lists and explains PremierWave EN command line and XML commands.
PremierWave Evaluation Board Quick Start Guide	Briefly explains how to connect the PremierWave and assign an IP address.
PremierWave Evaluation Board User Guide	Provides information needed to use the PremierWave EN on the evaluation board.

**Management and Configuration**

The PremierWave EN offers the following:

- Serial & Telnet Login
- Internal WebManager (SSL Option for secure login)
- Enterprise CLI (over Serial Ports, Telnet or SSH)
- XML Configuration Records via CLI or FTP
- Windows-based DeviceInstaller software
- Firmware: Upgradeable via FTP, HTTP, Serial Port

**Mechanical, Thermal and Environmental Specifications**

Weight	8.5 grams
Temperature	Operating range: -40°C to +85°C (-40°F to 185°F) Storage range: -40°C to +85°C (-40°F to 185°F)
Relative Humidity	Operating: 5% to 95% non-condensing
Shock/Vibration	Non-operational shock: 50 g's, Non-operational vibration: 5 g's

### PCB Interface

PremierWave EN comes with an industry standard 80-pin connector (Hirose DF40C-80DP-0.4V(51)). A host board can connect to PremierWave EN by deploying a Hirose DF40C(2.0)-80DS-0.4V(51) mating connector.

### PremierWave Connector Pins and Descriptions

Pin#	Pin Name	Dir	Function Name
1	GND		Ground. Connect to unit signal ground.
2	NRESETIN	I	<b>Reset</b> (Active Low)
3	HDPB	I/O	USB Host Port B +
4	NRSTTODFLT	I	Reset Configuration to Defaults (Active Low)
5	HDMB	I/O	USB Host Port B -
6	TX1	O	UART 1 Transmit
7	GND		
8	RTS1	O	UART 1 Request To Send
9	S3V3		3.3V Power Input
10	RX1	I	UART 1 Receive
11	S3V3		3.3V Power Input
12	CTS1	I	UART1 Clear To Send
13	GND		
14	CP1	I/O	I/O Configurable Pin 1
15	S3V3		3.3V Power Input
16	CP2	I/O	I/O Configurable Pin 2
17	S3V3		3.3V Power Input
18	CP3	I/O	I/O Configurable Pin 3
19	GND		
20	CP4	I/O	I/O Configurable Pin 4
21	E_SPEED	O	Ethernet Link LED
22	GND		
23	E_LNKACT	O	Ethernet Activity LED
24	TX2	O	UART 2 Transmit
25	W_LINKLED	O	Wireless LAN Status LED
26	RTS2	O	UART 2 Request To Send
27	CP6	I/O	I/O Configurable Pin 6
28	RX2	I	UART 2 Receive
29	RSVD	I	Reserved (DO NOT CONNECT)
30	CTS2	I	UART 2 Clear To Send
31	I2CSCL	I/O	I2C Clock
32	CP5	I/O	I/O Configurable Pin 5
33	I2SDA	I/O	I2C Data
34	DBTXD	O	Debug UART Tx
35	GND		
36	DBRXD	I	Debug UART Rx
37	NSPI1_IRQ	I/O	SPI IRQ
38	CP8	I/O	I/O Configurable Pin 8
39	SPI1_MISO	I/O	SPI Master In Slave Out
40	GND		
41	NSPI1_CS	I/O	SPI Chip Select
42	CP9	I/O	I/O Configurable Pin 9
43	SPI1_MOSI	I/O	SPI Master Out Slave In
44	CP7	I/O	I/O Configurable Pin 7
45	SPI1_CLK	I/O	SPI Clock
46	WKUP	I	CPU Wakeup
47	GND		
48	S3V3		3.3V Power Input
49	DDP	I/O	USB Device Port +
50	S3V3		
51	DDM	I/O	USB Device Port -
52	S3V3		3.3V Power Input
53	GND		
54	GND		
55	HDPB	I/O	USB Host Port A +
56	ICE_NTRST	O	JTAG/Debug Signal Pins
57	HDMA	I/O	USB Host Port A -
58	TDI	I	JTAG/Debug Signal Pins
59	GND		
60	GND		
61	GND		
62	TMS	I	JTAG/Debug Signal Pins
63	ERX-	I	Ethernet Receive Data -
64	TCK	I	JTAG/Debug Signal Pins
65	ERX+	I	Ethernet Receive Data +
66	GND		
67	GND		
68	ICE_RTCK	I	JTAG/Debug Signal Pins
69	RXCT	I	Ethernet Receive Data Center Tap
70	TDO	O	JTAG/Debug Signal Pins
71	TXCT	I	Ethernet Transmit Data Center Tap
72	GND		
73	GND		
74	ICE_NTRST	O	JTAG/Debug Signal Pins
75	ETX-	O	Ethernet Transmit Data -
76	GND		
77	ETX+	O	Ethernet Transmit Data +
78	S3V3		3.3V Power Input
79	GND		
80	S3V3		3.3V Power Input

**Hardware Architecture**

Processing Unit:

- ARM9 Core based Lantronix 32-bit processor, 400MHz

**Memory**

- Up to 64Mbyte SDRAM
- Up to 256 Mbyte NAND Flash (factory default = 64Mbyte).

**Wireless Interface**

- Dual Band 802.11 a/b/g/n with an on-board antenna and option for external antennas and diversity.

**Wired Interface**

Serial Interfaces:

- Two UART – CMOS (Asynchronous) 3.3V level signals with software selectable rate (300 bps to 921 Kbps)
- USB 2.0 Full Speed (12 Mbits per sec) Host
- USB 2.0 Full Speed (12 Mbits per sec) Device Port
- Master/Slave High speed SPI interface
- I2C

Network Interfaces:

- 10/100 Base T Ethernet MAC + PHY (requires external magnetic).

**Wireless Specifications**

Wireless Standard	Channel Frequency Range	Transmit Power (Typical)	Receive Sensitivity (Typical)
802.11 b/g/n	2.412 – 2.484 GHz	17 dBm for 802.11b DSSS 17 dBm for 802.11b CCK 15 dBm for 802.11g/n OFDM	-71.0 dBm (<10% PER) @65Mbps -74.0 dBm (<10% PER) @54Mbps -94.0 dBm (<8% PER) @1Mbps
802.11 a/n	4.900 – 5.925 GHz	12 dBm	-69.0 dBm (<10% PER) @65Mbps -72.0 dBm (<10% PER) @54Mbps -88.0 dBm (<10% PER) @6Mbps

**Protocol Support**

The PremierWave EN uses Internet Protocol (IP) for network communications and Transmission Control Protocol (TCP) to assure that no data is lost or duplicated, and that everything sent arrives correctly at the target.

Other supported protocols are listed below:

- ARP, UDP, TCP, ICMP, Telnet, TFTP, AutoIP, DHCP, HTTP, and SNMP for network communications.
- TCP, UDP, and Telnet for connections to the serial port.
- FTP for firmware 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.

**Wireless and Wired Security**

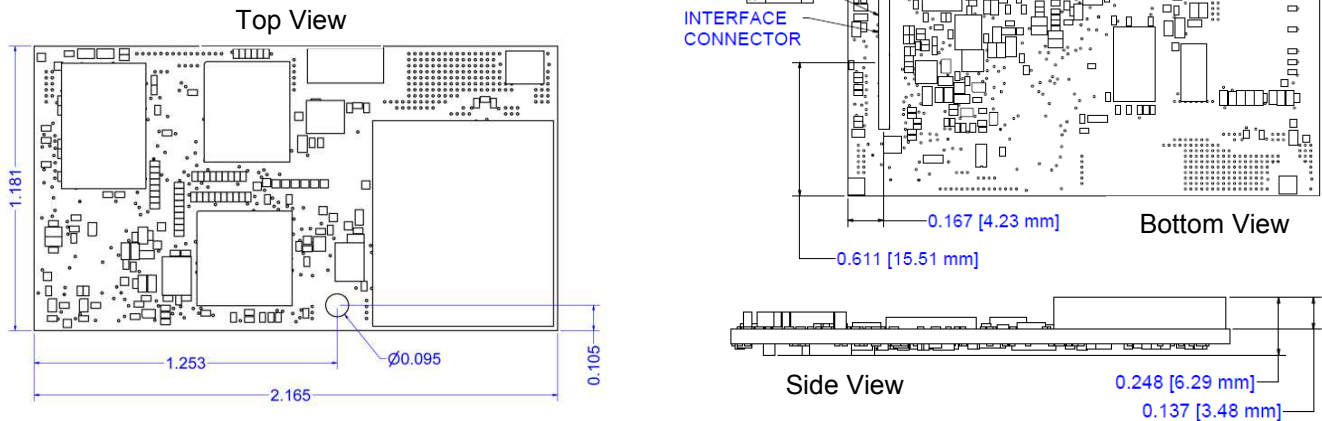
The PremierWave EN supports the following wireless security:

- IEEE 802.11i Encryption: AES-CCMP and TKIP Encryption
- Security Suite: WEP (64-bit, 128-bit), WPA, WPA2
- Authentication: PSK, EAP (EAP-TLS, EAP-TTLS, EAP-FAST, EAP-PEAP)

The PremierWave EN supports the following wired security:

- SSL Client & Server, Selectable 128/256/512/768/1024/2048 Bit Certificates
- SSH Client & 8 Server Selectable 128/256/512/768/1024 Bit Public/Private Key support
- TLS
- ENCRYPTION: AES, 3DES and RC4 Encryption for SSH & SSL
- AUTHENTICATION: SHA-1, MD5, Base-64

These drawings detail the dimensions of PremierWave EN module:



### Recommended Operating Conditions

Symbol	Parameter	Min	Typical	Max	Units
V <sub>CC</sub>	Supply voltage (typical 3.3) (+/-5%)	3.14	3.3	3.46	V
V <sub>IL</sub>	Low Level Input Voltage	-0.3		0.8	V
V <sub>IH</sub>	High Level Input Voltage	2.0		3.6	V
V <sub>OL</sub>	Low Level Output Voltage			0.4	V
V <sub>OH</sub>	High Level Output Voltage	2.6			V
I <sub>I</sub>	3.3 IO Leakage Current		+/-1		$\mu$ A
I <sub>CC</sub> (PW EN)	Module Power Down Current			200	$\mu$ A
I <sub>o</sub>	CPx pins, UART pins, Output Current			8	mA
I <sub>CC</sub> (PW EN)	Supply Current AVG (WLAN Assoc 5Ghz, No Ethernet link )		302		mA
I <sub>CC</sub> (PW EN)	Supply Current AVG (WLAN activity 5Ghz, low duty cycle, No Ethernet link)		331		mA
I <sub>CC</sub> (PW EN)	Supply Current AVG (WLAN activity 5Ghz, high duty cycle, Ethernet linked)		491		mA
I <sub>CC</sub> (PW EN)	Supply Current (WLAN TX surge, 5Ghz, Ethernet linked)		577		mA
I <sub>CC</sub> (PW EN)	Supply Current AVG (Ethernet Linked, WLAN not associated)		154		mA
I <sub>CC</sub> (PW EN)	Supply Current AVG(Ethernet high duty cycle, WLAN not associated)		199		mA
I <sub>CC</sub> (PW EN)	Supply Current AVG (Ethernet Linked, WLAN OFF)		131		mA
I <sub>CC</sub> (PW EN)	Supply Current AVG (Ethernet high duty cycle, WLAN OFF)		154		mA

## Development Kit

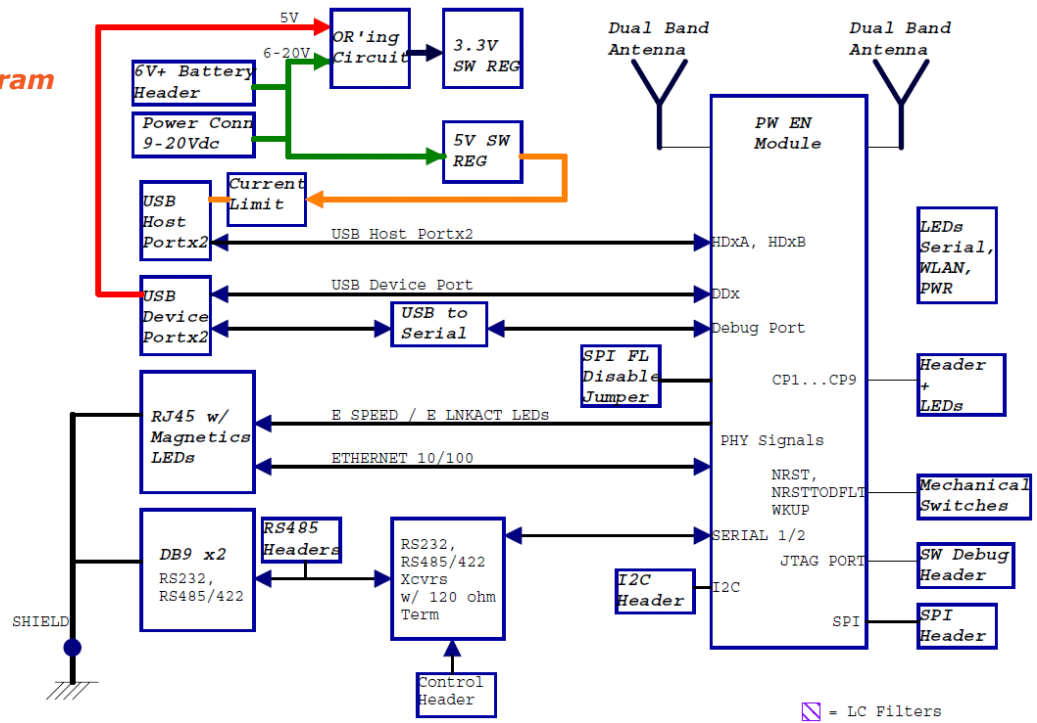
### Introduction

A PremierWave development kit is available to provide a simple, quick, and cost-effective way to evaluate the PremierWave EN. Use the development kit to integrate the PremierWave EN to your product design, and give your newly networked product a test drive.

### Features of the Development Kit

- PremierWave Evaluation Board
- 12V wall adaptor
- RS-232 cable, DB9F/F, null modem
- CAT5 Ethernet Cable
- USB Type A to Mini-Type B Cable
- 2.15dBi Dual Band Antenna
- U.FL to RP-SMA RF Cable

**Block Diagram**



**Features of the Evaluation Board**

The PremierWave Evaluation Board provides a test platform for the PremierWave EN device server product. The Evaluation Board has the following features:

- Two DB9 serial port connectors
- One RJ45 10/100 Ethernet port
- A Dual USB Host port connector
- One Mini-Type B USB device port connector, for connection to the PremierWave USB device port.
- A second Mini-Type B USB device port connector, for connection to the PremierWave CPU serial debug port
- One JTAG port connector
- LEDs for each of the 9 configurable pins
- Access to all logic level IO signals on the PremierWave via header pins

**Contact Information**

For details contact your local Lantronix representative or Lantronix directly:

- Asia Pacific Region** via e-mail at AsiaPacific\_Sales@lantronix.com
- Europe** via e-mail at EMEA@lantronix.com
- Japan** via e-mail at japan\_sales@lantronix.com
- United States** via e-mail at sales@lantronix.com or call OEM sales support at 800-422-7055

**Ordering Information**

<b>PEN100100A-01</b>	<b>PremierWave EN 802.11 abgn Device Server with internal Antenna, BULK</b> - Minimum order quantity 10 units - Available Now
<b>PEN10010SA-01</b>	<b>PremierWave EN 802.11 abgn Device Server with internal Antenna, SAMPLE</b> - Order quantities of up to 10 - Available Now
<b>PEN10010NA-01</b>	<b>PremierWave EN 802.11 abgn Device Server without internal antenna, BULK</b> - Minimum order quantity 10 units - Available Now
<b>PEN10010NASA-01</b>	<b>PremierWave EN 802.11 abgn Device Server without internal antenna, SAMPLE</b> - Order quantities of up to 10 - Available Now
<b>PWDK1000-01</b>	<b>PremierWave no module Development Kit, sample must be purchased</b> - Evaluation Board, Power Supply, RS-232 Cable, Cat 5e Cable, USB Cable (A-B) - Available Now
<b>PWEV1000-01</b>	<b>PremierWave no module Evaluation Board, sample must be purchased. Includes power supply module.</b> - Available Now

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