

WILIBOX CPU Board
WBD-111

HARDWARE MANUAL

WILIBOX CPU Board

WBD-111

1. Product description

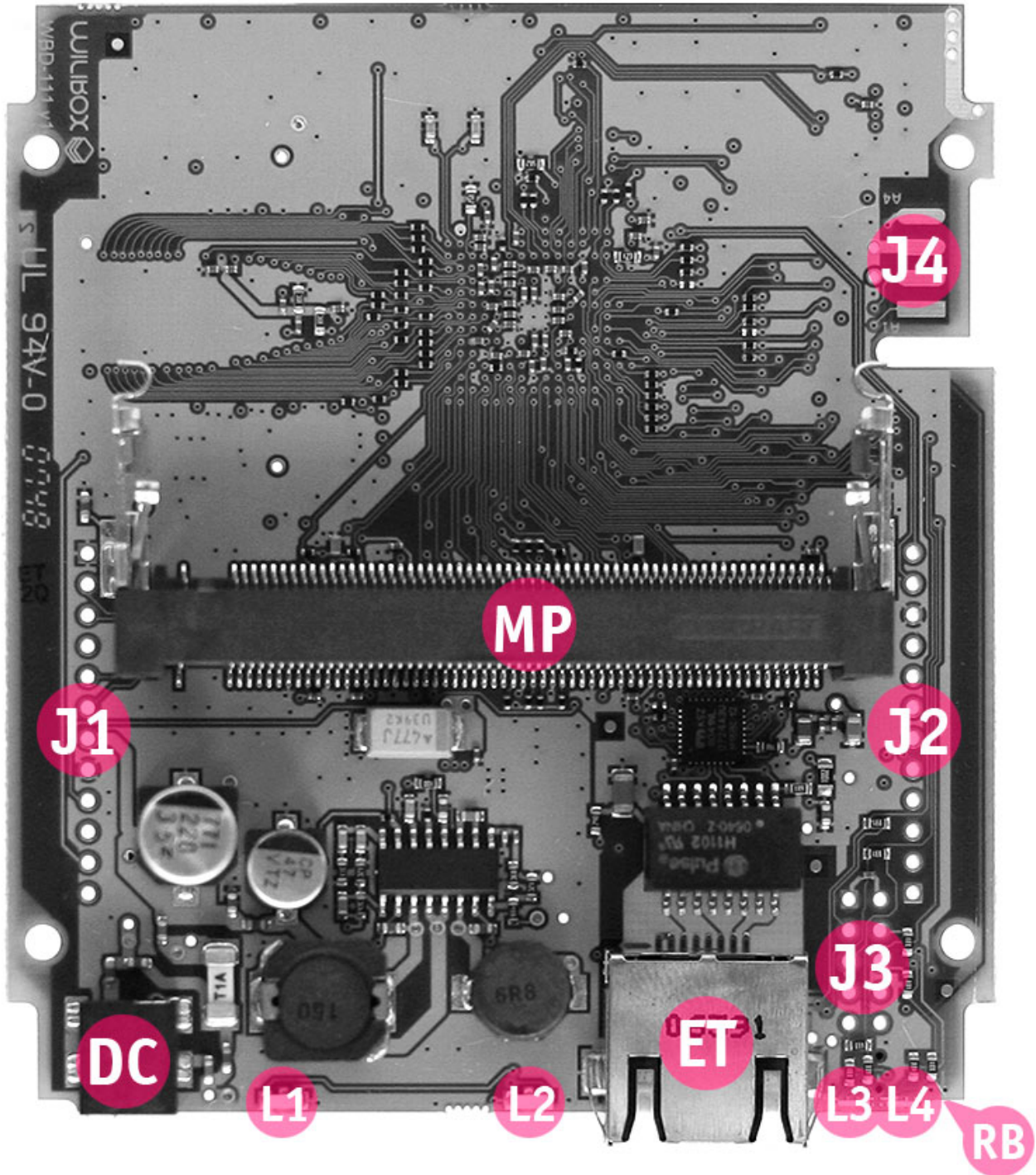
WILIBOARD WBD-111 is a small and fast single board computer designed to fit into a standard aluminum profile enclosure (86 mm) and work as a quick time-to-market solution for different applications: WISP customer premise equipment, 3G routers, WiMAX customer premise equipment, point-to-point and point-to-multipoint wireless bridges, wireless mesh repeaters and 802.11 access points.

2. Features

- 32-bit 400 MIPS ARM architecture processor with embedded MMU, data/instruction caches, network and security acceleration engines
- 32 MB RAM and 8 MB Flash
- One Mini-PCI slot accepts 802.11 and WiMAX high power radios
- One 10/100 Base-TX Ethernet port
- Low power consumption
- Accepts power from 9-24V DC power supply directly or over Ethernet, has overvoltage/overheating/61000-4-2 (ESD) ± 15 kV (air), ± 8 kV (contact) and IEC 61000-4-4 (EFT) 40 A (5/50 ns) protection
- Jumpers for stacking additional boards with access to processor GPIO pins and Hi-Speed USB 2.0
- Fits in a standard 86mm aluminum profile enclosure

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3. Details



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CPU

Storm Semiconductor (former Storlink Semiconductor) Gemini™ SL3512 Network Processor

Feature highlights

32-bit 400MIPS ARM9 RISC architecture processor

300MHz speed

Embedded MMU and 8K/16K data/instruction cache

Supports 512MByte 16-bit 333MHz (PC2700) of external DDR SDRAM

Dual USB2.0 selectable host or slave

Built-in hardware security accelerator engine

Hardware acceleration engine for TCP/IP/UDP processing

Dual 802.3 compliant Ethernet MACs with 10/100 MII and 10/100/1000 RGMII

Hardware 32-bit true random number generator

32-bit PCI 2.2 bus interface at 66MHz with four master device support

Embedded Real Time Clock

Timer, GPIO, UART, Watch Dog Timer

0.13um standard CMOS with approximately 1.3W dissipation

RAM

256Mbit (32MB) of 16-bit 333MHz double data rate (DDR) SDRAM.

Flash

64 Mbit (8MB) of 3V supply Flash memory.

Mini-PCI

Mini-PCI is an adaptation of PCI standard for small devices. It is functionally equivalent to PCI version 2.2. WBD-111 board has 1 Type III Mini-PCI socket (MP in the picture above) and supports 3.3V cards. High power radio cards with up to 5W in power usage are supported.

Ethernet

10/100 Base-TX Ethernet port features automatic MDI/MDIX switching, full duplex 10/100 Base-TX operation with auto-negotiation, 61000-4-2 (ESD) ± 15 kV (air), ± 8 kV (contact) and IEC 61000-4-4 (EFT) 40 A (5/50 ns) protection, accepts power over Ethernet (PoE functionality) with 9-24V voltage power injectors.

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LEDs

Device has 2 green LEDs (see picture above): L1 – power LED, L2 - LAN activity LED and 2 multicolor red and yellow-green LEDs which are GPIO controlled. LAN LED is turned on when Ethernet cable is connected and blinks when activity is detected on Ethernet port.

Table 1. LED control

CPU GPIO port	LED is on, when GPIO=1
GPIO0_1	L3 red (R)
GPIO0_2	L4 green (G)
GPIO0_3	L4 red (R)
GPIO0_5	L3 green (G)

Reset button

Software reset button (RB in the picture above) allows to upgrade firmware via TFTP, reset software to default configuration. For more information refer to section 5 below.

Jumpers

Jumpers J1 and J2 provide access to processor's GPIO pins, TTL level serial port and USB port. Jumpers are positioned to allow easy connection and stacking of optional daughterboards. They have pin #1 marked with a small copper square on a PCB.

Table 2. J1 connections, layout as on PCB

Pin	Connection
1	Ground
2	GPIO0_10 UART_TX
3	GPIO0_11 UART_DTR
4	GPIO0_4
5	SYS_RESET#
6	GPIO0_20
7	+9-18V
8	Ground
9	+1.2 V
10	NC
11	+2.5 V
12	NC

Table 3. J2 connections, layout as on PCB

Pin	Connection
12	USB0_DM
11	USB0_DP
10	Ground
9	+3.3 V
8	GPIO0_15 UART_RI
7	GPIO0_14 UART_CTS
6	GPIO0_13 UART_RTS
5	GPIO0_12 UART_DSR
4	GPIO0_9 UART_RX
3	GPIO0_8 UART_DCD
2	GPIO0_7
1	GPIO0_6

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Jumper J3 may be used to directly connect external LEDs and external reset button to device. All LED outputs have 330 Ohm current limiting resistors and supplied with 3.3V when turned on. External reset button should be connected to SOFT_RST and ground pins.

Table 4. J3 connections, layout as on PCB

Pin	Connection		
1	+3.3 V	2	Ground
3	+3.3 V power LED	4	R LED4
5	LAN activity LED, pull-low control	6	G LED4
7	NC	8	R LED 3
9	G LED3	10	GPI01_28 SOFT_RST

Jumper J4 allows alternative access to serial console pins, reset signal and onboard power.

For serial console connection TTL level to RS-232 converter is required. Generic cell phone USB data cable based on Prolific PL2303HX chip may be used. Parameters for WBD-111 serial console access are:

- 19200/8-N-1.

Connect data cable's:

- RX wire to UART_TX pin,
- TX wire to UART_RX pin,
- GND ground wire to Ground pin on WBD-111 device.

Dissassembly of data cable connector may be required to find out the wiring. Wires are color coded and TX, RX, GND marks should be printed on a cable's PCB. Generally RX signal wire is white, TX is blue and GND is black. Generic data cable schematics show TX wire connected to pin #1 and RX wire to pin #5 of Prolific PL2303HX chip.

Table 4. J4 connections, check the PCB for layout

Pin	Connection		
A1	UART_TX	B1	UART_RX
A2	SYS_RESET#	B1	+3.3 V
A3	Ground	B3	+1.2 V
A4	+9-18 V	B4	+2.5 V

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Power

WBD-111 can be powered by connecting 9-24V voltage power supply to DC jack (see picture above) or via Ethernet by using power injector. Insertion of power supply connector disconnects Ethernet power feed line. Device has polarity independent DC-DC converter with overvoltage and overheating protection, with two onboard SMD fuses. Power jack accepts DC 1.4/3.4 mm coaxial power connectors.

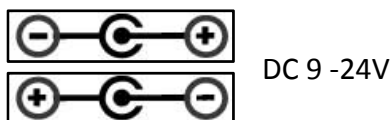


Table 6. Power consumption

Conditions	Power usage, when provided voltage is		
	9 V	12 V	18 V
Idle with no radio card and LAN disconnected	0.22A/2.0W	0.16A/1.9W	0.10A/1.8W
Idle with no radio card and LAN connected	0.24A/2.2W	0.17A/2.2W	0.11A/2.0W
With different 802.11a radio cards while idle, LAN connected	0.37A/3.3W - 0.40A/3.6W	0.26A/3.1W - 0.29A/3.5W	0.17A/3.1W - 0.18A/3.2W
With 802.11a radio card under load, 18dBm transmit power, LAN connected	0.49A/4.4W	0.35A/4.2W	0.22A/4.0W
With high power 802.11a radio card under load, LAN connected	0.87A/7.8W	0.61A/7.3W	0.39A/7.0W

4. Specifications

Electrical

Input voltage	9-24V
Operating current	0.17A Typical @ 12V

Mechanical

Dimensions	91mm x 81mm x 18mm
Weight	55g

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Environmental

Operating parameters

Temperature	-25°C to +65°C
Humidity	20% to 90% (non condensing)

Storage parameters

Temperature	-40°C to +85°C
Humidity	5% to 95% (non condensing)

5. Software

WBD-111 comes preloaded with Wilibox WILI software together with WILI-AP skin. Device can be accessed from a web browser using the following parameters:

Device IP address	192.168.2.66
Username	admin
Password	admin01

In an event of device malfunction WBD-111 firmware can be recovered via TFTP protocol. To use this feature, follow the steps:

- Setup TFTP server with an IP address 192.168.1.254 and put firmware file renamed to *fwupdate.bin* to TFTP server's directory
- Make sure that WBD-111 and TFTP server are on the same network subnet
- Power off WBD-111 board
- Press and hold reset button while connecting power to the board
- Observe LEDs and wait for firmware to flash

For more information refer to WILI User's Guide and WILI-AP SKIN User's Guide which can be found at <http://www.wiligear.com> website.