



# WBD 111 v2.6

## Hardware Manual

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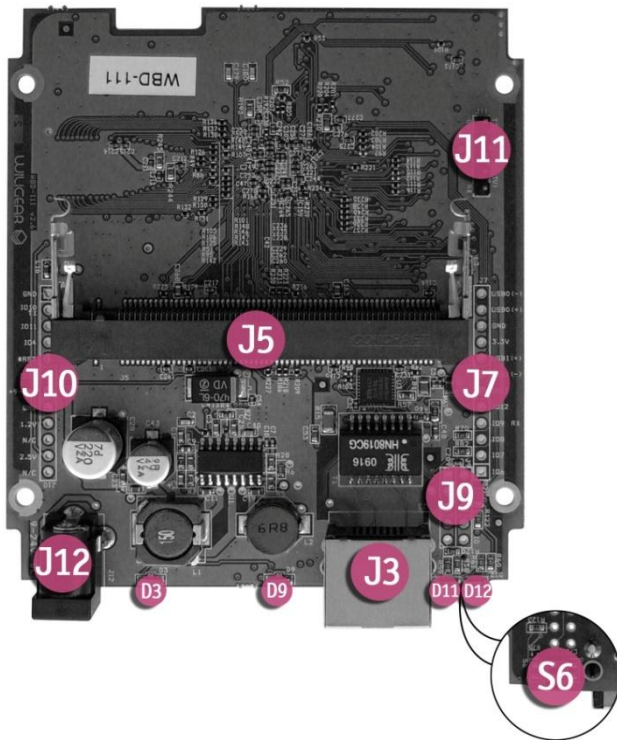
## Product Description

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.

## 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 9-18V DC power supply directly or over Ethernet, has overvoltage/overheating/6kV electrostatic discharge protection and is polarity insensitive
- 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

# WBD 111 Details



Item	Signification
J5	Type III Mini-PCI socket
J10	Jumper to processor's GPIO
J7	Jumper to processor's GPIO
J9	Jumper of external LEDs and external reset button.
J11	Alternative access to serial console pins, reset signal and onboard power jumper.
J12	Power connector
J3	Ethernet connector
D3	Power LED
D9	LAN activity LED
D11	GPIO controlled LED
D12	GPIO controlled LED
S6	Reboot button (on the reverse)

Figure 1 – WBD-111 version 2.6 View

## 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
- Built-in hardware security accelerator engine
- Hardware acceleration engine for TCP/IP/UDP processing
- 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, electrostatic discharge (ESD) protection rated at 6 kV, accepts power over Ethernet (PoE functionality) with 9-18V voltage power injectors.

## LEDs

Device has 2 green LEDs (see *Figure 1 – WBD-111 version 2.6 View* *Figure 1 – WBD-111*): D3 – power LED, D9 - LAN activity LED and 2 multicolor red and 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.

CPU GPIO port	LED is on, when GPIO=1
GPIO0_1	D11 red (R)
GPIO0_2	D12 green (G)
GPIO0_3	D12 red (R)
GPIO0_5	D11 green (G)

## Reset button

Software reset button (S6 in the *Figure 1 – WBD-111 version 2.6 View*) allows upgrading firmware via TFTP, reset software to default configuration. For more information refer to section 5 below.

## Jumpers

Jumpers **J10** and **J7** provide access to processor's GPIO pins, TTL level serial port and USB ports. 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.

J10 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	+1.2V	
10	NC	
11	+2.5V	
12	NC	

Table 1 – J10 connections, layout as on PCB

J7 Pin	Connection	
12	USB1_DM	
11	USB1_DP	
10	Ground	
9	+3.3V	
8	USB0_DP	
7	USB0_DM	
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	

Table 2 – J7 connections, layout as on PCB

Jumper **J9** may be used to directly connect external LEDs and external reset button to device. All LED outputs have 330 Ohm current limiting resistors. Power and multicolor LEDs are supplied with 3.3V when turned on. LAN activity LED (pin #5) is wired differently and turned on by "low" signal. External reset button should be connected to SOFT\_RST and ground pins.

J9 Pin	Connection	J9 Pin	Connection
1	+3.3V	2	Ground
3	+3.3V power LED	4	R D12
5	LAN activity LED, pull-low control	6	G D12
7	NC	8	R D11
9		10	GPIO1_28      SOFT_RST

Figure 2 – J9 connections, layout as on PCB

Jumper **J11** allows alternative access to serial console pins.

For serial console connection TTL level to RS-232 converter is required. The FTDI TTL-232R-3V3 USB - TTL Level Serial Converter cable allows connecting a TTL level device to the USB.

Optionally the 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:

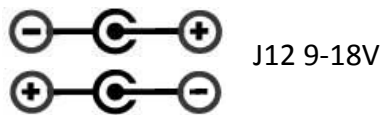
- RX wire to UART\_TX pin,
- TX wire to UART\_RX pin,
- GND ground wire to Ground pin on WBD-111 device.

J11 Pin	Connection
1	Ground
4	UART_RX
5	UART_TX

Figure 3 – J11 connections, check the PCB for layout

## Power

WBD-111 can be powered by connecting 9-18V voltage power supply to J12 jack (see *Figure 1 – WBD-111 version 2.6 View*) 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 J12 2.5/6.4 mm coaxial power connectors.



Conditions	9V	12V	18V
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

Table 3 – Power consumption according provided voltage

# Specifications

## Electrical

Input voltage	9-18V
Operating current	0.17A Typical @ 12V

## Mechanical

Dimensions	90mm x 81mm x 18mm
Weight	55g

## 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)

## Software

WBD-111 comes preloaded with WILIBOX WILI software. 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:

1. Setup TFTP server with an IP address 192.168.1.254 and put firmware file renamed to *fwupdate.bin* to TFTP server's directory
2. Make sure that WBD-111 and TFTP server are on the same network subnet
3. Power off WBD-111 board
4. Press and hold reset button while connecting power to the board
5. 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.