WPJ344
User Manual

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REVISION HISTORY

Revision	Information / Changes
Rev 1.0	First release for WPJ344 BareBoard

REASONS USING DEVELOPMENT KIT

The Development Kit is especially useful for customers who are developing their firmware. Below are the reasons how we have made it more user-friendly for you.

PURPOSE	WHY IS DEVELOPMENT KIT USEFUL?
Develop Open-WRT firmware on WPJ344 (using uboot loader)	Serial Converter can be used to debug the Open-WRT firmware on uboot loader.
Port Own Firmware Over to WPJ344	Serial Converter can be used to debug the Serial Output messages.
Port Own Firmware and Loader Over to WPJ344	Serial Converter can be used to debug the Serial Output messages. JTAG Programmer can be used to load in your loader.

Ordering Options - Standard Configurations*

Currently item codes are not available, please contact our sales team at sales@compex.com.sg

* Configurations are subjected to change without notice

BLOCK DIAGRAM

```
                    ┌──────────────┐
                    │  MimoPCIE    │
                    │  connector   │
                    └──────┬───────┘
                           │
┌──────────┐        ┌──────┴───────┐        ┌──────────┐      ┌──────────────┐
│  JTAG    │────────│              │        │          │──────│ 10/100/1000  │
└──────────┘        │   AR9344     │────────│  AR8334  │      │  LAN Port    │
                    │              │        │          │      └──────────────┘
┌──────────┐        │              │        │          │      ┌──────────────┐
│Serial Port│───────│              │        │          │──────│ 10/100/1000  │
└──────────┘        └──────┬───────┘        └──────────┘      │  WAN Port    │
                           │                                   └──────────────┘
              ┌──────────────┐    ┌──────────────┐
              │ DDR2 SDRAM   │    │  Nor Flash   │
              │    128M      │    │    8MB       │
              └──────────────┘    │(Up to 16MB Max)│
                                  └──────────────┘
```
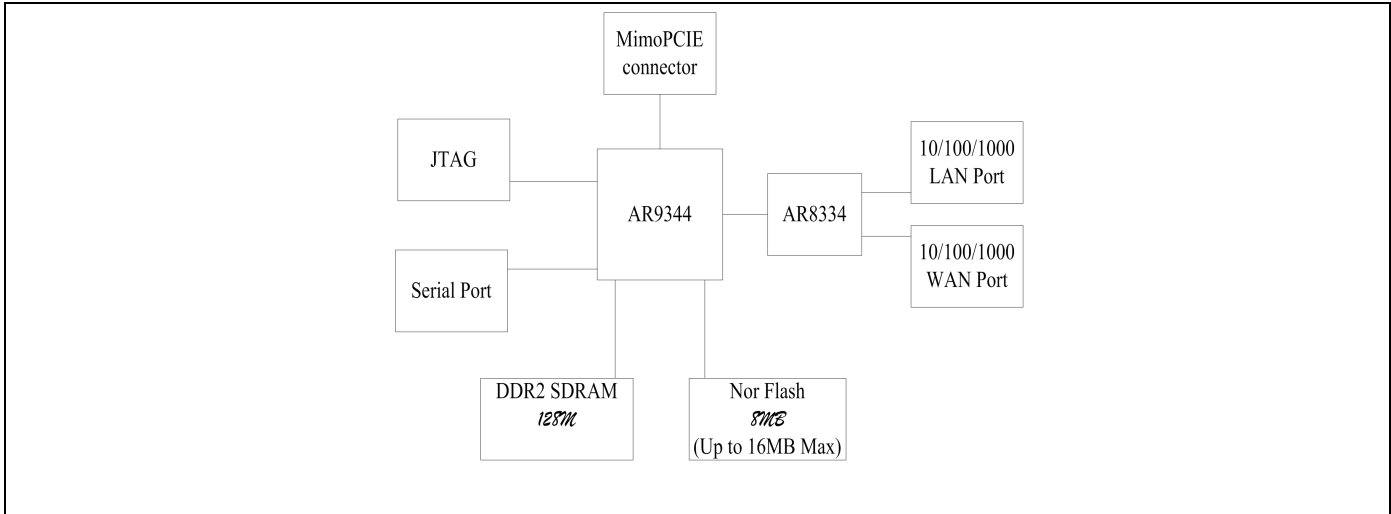
KEY FEATURES

GENERAL INFORMATION

PROCESSOR	Atheros AR9344
MEMORY	128MB DDR2 SDRAM
NOR FLASH	NOR Flash 8MB (Up to 16MB max.)
PHYSICAL PORTS	9.2mm height mini-PCIE slot 2 Gigabit ports with Auto-MDI/X
RADIO SUPPORTED	802.11a/c 802.11a/n,802.11b/g/n, 802.11a/b/g/n
DEBUG INTERFACE	Serial (TTL) / JTAG (ARM-standard 20 pin) Optional JTAG Programmer** available Optional Serial Converter*** available
OPERATING TEMPERATURE	-20°C to 70°C
LED INDICATORS	6 LEDs total: Power, Ethernet, Signal LED 1,2,3,4
OTHER FEATURES	Status LED Push-Button Reset Surge Arrestors (Optional)
DIMENSIONS	117 mm x 105mm x 17 mm
ENCLOSURE	support MMJ344

INFORMATION ON POWER

POWER OVER ETHERNET	Passive PoE: 24-48V, IEEE 802.3af/at PoE (HV) Passive PoE: 12-24V(LV)
TYPICAL OPERATING POWER	5W
DC SUPPLY	24V ~ 48V DC Supply (HV) 9V~24V DC(LV)
MINIPCIE SLOTS	Support power ： 3.3V and 5V supports all Compex WLE series, including 802.11ac radio)

* Depend on Order Configuration
** JTAG Programmer available to reprogram the flash in case of loader corruption.
*** Serial Converter available to change the TTL signals on board to RS232 signals for debugging

CONFIGURATION AND INSTALLATION

GPIO Bit Mapping

GPIO Bit	Description
0	Jtag
1	Jtag
2	Jtag
3	Jtag
4	J1 12th pin
5	SPI Flash
6	SPI Flash
7	SPI Flash
8	SPI Flash
9	J23 third pin
10	J23 2nd pin
11	J1 2nd pin
12	Reset button SW1&SW2 and J10 11th pin
13	J1 fourth pin
14	J32 2nd pin，DS19
15	J30 2nd pin，DS20
16	J1 sixth pin
17	Reset button SW1&SW2 and J10 11th pin
18	J1 eighth pin
19	J1 tenth pin
20	J31 2nd pin，DS21
21	J33 2nd pin，DS22
22	J32 2nd pin，DS19
23	J2 power
24	J50 USB signal
25	J5 5V
26	J9 5V
27	J6 3.3V

Interface Connectors

The board interface connector pin assignments and signal descriptions are included in the following sections. The connectors are listed in the section below and the connector locations are shown in the following diagrams.

Connector	Function
J25	Power Jack
J12/J13	Ethernet Ports
J5	JTAG Port
J14	Mini-PCIE Slot
J23	Serial Port
SW2	Reset Button

Serial Port Header

The Serial Port (J23) Header signaling is shown in the following table.

Pin	Signal
1	VCC – 3.3V
2	UART 0 Transmit Data
3	UART 0 Receive Data
4	GND

Note:

Our Serial port Implementation requires an external high-impedance serial port not usually available with the serial ports of the notebooks/computers. You will need a Serial Converter available in the market. For our customers' convenience, it is bundled together with the board Development Kit.
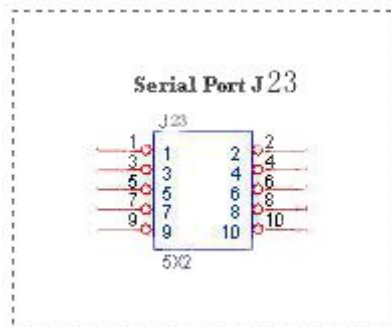
Serial Port J23

Serial Console Settings

The serial console settings used together with the serial port is given below.
This serial port uses TTL signals, and therefore you have to use serial converter using MAX-211 IC (or other IC in the market that convert TTL signals to RS232 signals) in order to use it with the PC.

Baud Rate	115200
Data	8 Bit
Parity	None
Stop	1 Bit
Flow Control	None

Precaution when using Serial Converter

Please attach the serial converter first on the board serial header, before attaching the power supply. This is to ensure that there is no surge of power to the serial converter, and prevent any damage the chipset on the serial converter.

Serial Converter Pin Layouts

Cables on the serial converters are provided. You can use the 6 Pin (Fixed) to 4 Pin (Fixed) provided. The pin layouts of the serial converters for use with the board are as follows:

Pin Assignment (Serial Converters)	Signal (Serial Converters)	Connected to Pin on WPJ344	Signal (WPJ344)
Pin 1	VCC(3.3V) – Red	Pin 1	VCC (3.3V)
Pin 2	TX – Blue	Pin 5	RX
Pin 4	RX - Green	Pin 3	TX
Pin 6	GND – Black	Pin 7	GND
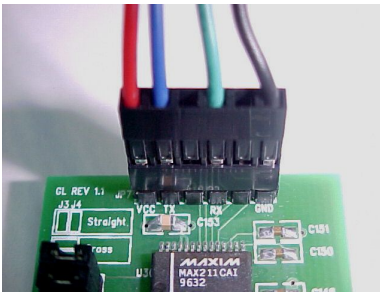
Arrangement of Cables on Serial Converter to the board
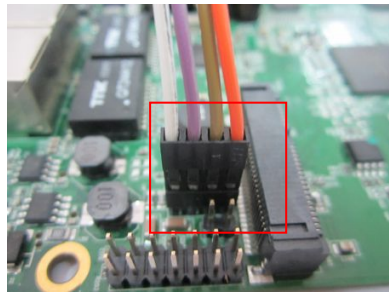
Arrangement of Cables on the board itself

JTAG Port Header

The primary purpose of the board JTAG Port Header is to facilitate program download into Flash memory.

Pin	Signal	Pin	Signal
1	TRST_N	2	GND
3	TDI	4	GND
5	TDO	6	GND
7	TMS	8	GND
9	TCK	10	GND
11	RESET	12	NC
13	DINT	14	3V3

Note:

Normally, it has a JTAG Programmer compatible with the board. It is bundled with the board Development Kit. This JTAG programmer is able to download file onto the Flash, and thus recover a corrupted loader.
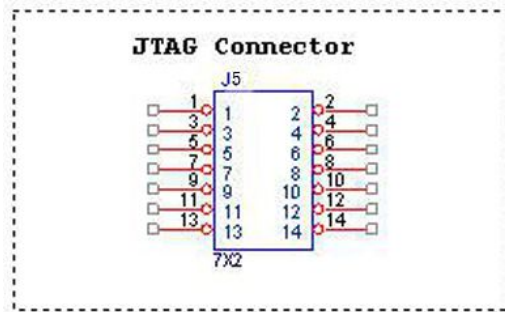
Ethernet Connectors

The board contains 2 X 10/100/1000 Base-T Ethernet Channels. The Ethernet Channels are available through standard 8-pin RJ45 connectors.

Ethernet Connectors(P1/P2) signaling is shown below.

Pin	Signal
1	MX1+
2	MX1-
3	MX2+
4	MX3+
5	MX3-
6	MX2-
7	MX4+
8	MX4-

JTAG Process

Minimum Requirement

1. OCD Commander ver2.5.4
2. upbios.tst file (same for all Compex device)
3. uboot.bin file
4. JTAG cable

Steps

1. Install the OCD Commander to your PC
2. Plug the JTAG cable to the JTAG port of the device
3. Run OCD Commander Program
   Set "Target Processor" for the particular device
   Click "OK"
4. If there is this error message "Error Response from INITIALIZE....", please check the JTAG cable connection. Close the OCD Commander Program and go back to Step 3.
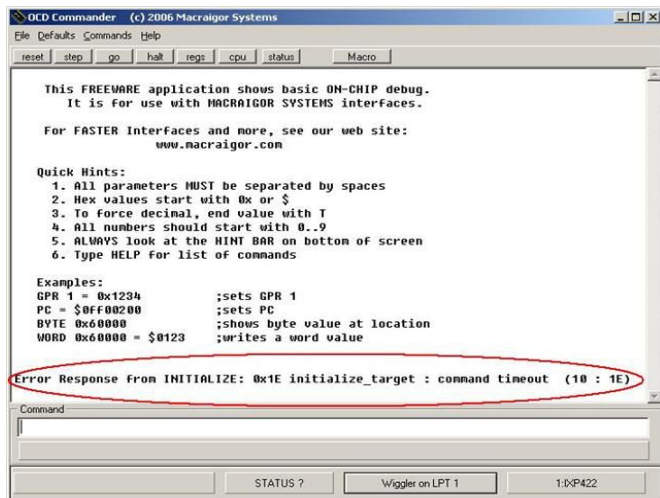
5. Click on the "Macro" and choose a specific .mac file.
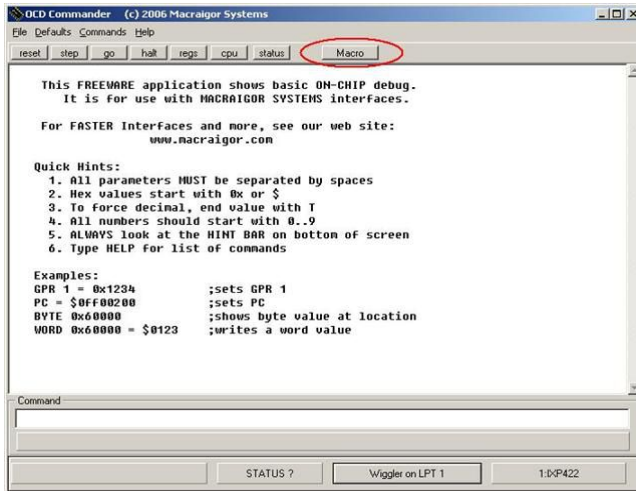
6. Let it run until u see "go"
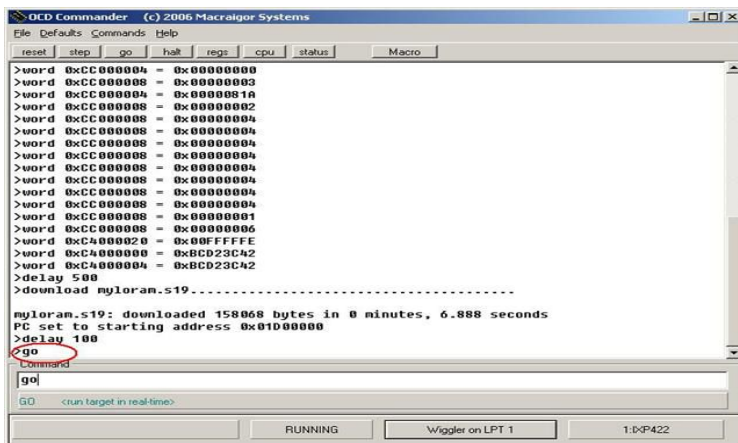
7. Open command prompt

8. tftp upbios.tst

9. tftp uboot.bin (please observe the DIAG LED is off)

10. If either step 9 or step 10 fail, please start from step 3 again.

11. Power off the device and unplug JTAG cable

12. Power on the device and tftp the firmware into the device.

13. Reboot when done.

Build and Install Process
(For OpenWRT firmware on uboot Loader)

Minimun Requirement
1:OpenWRT will only be supported on WPJ344 with 8MB NOR flash and above.
2:Please ensure that the Ethernet connection is able to ping address = 192.168.1.1

Compiling OpenWRT on WPJ344 + ath9k with patches from Compex.
- Recommended Linux host: CentOS 6.x, Debian 6.x
- During the first build of openwrt, about 300MB of various source files
- will be downloaded from the internet.The downloaded files will be put in openwrt/dl.

Patches from Compex (support ath9k): sdkowrt-130603.tar.bz2
For first build:
$ cd
$ tar jxf sdkowrt-130603.tar.bz2
$ cd sdkowrt-130603
$ make
The compiled firmware is in:
sdkowrt-130603/openwrt/bin/ar71xx/openwrt-ar71xx-generic-wpj35-squashfs-factory.img
For subsequent build:
$ cd
$ cd sdkowrt-130603/openwrt
$ make

Compiling OpenWRT on WPJ344 + ath10k for 11ac radios, with patches from Compex.
- Recommended Linux host: CentOS 6.x, Debian 6.x
- During the first build of openwrt, about 300MB of various source files
- will be downloaded from the internet.The downloaded files will be put in openwrt/dl.
Patches from Compex (support ath10k): sdkath10k-130716.tar.bz2
For first build:
$ cd
$ tar jxf sdkath10k-130716.tar.bz2
$ cd sdkath10k-130716
$ make
The compiled firmware is in:
sdkath10k-130716/openwrt/bin/ar71xx/openwrt-ar71xx-generic-wpj344-squashfs-factory.img
For subsequent build:
$ cd
$ cd sdkath10k-130716/openwrt
$ make

For WPJ344, use WPJ35 firmware, they use the same firmware
OpenWRT Firmware will be in bin/openwrt-ar71xx-wpJ344.bin

Upgrade Firmware with Serial Console
Power on the device, press Esc button from Keyboard. It would be directed to the u-boot loader mode.
- Open the tftp server (Tftpd32.exe) and select the location of firmware folder.
- To flash the firmware type the following the command
- #cpximg <copy the file's name>
- Wait to complete the firmware loading. Reboot the device after update successfully.

Upgrade Firmware using TFTP [uboot loader version is b130802 onwards
- Press and hold the reset button while power up the board.
- Release the button after 1 second
- Wait for the Diagnostic led to blink fast.
- Open the command prompt and type the following command.
- #tftp –i 192.168.1.1 put <firmware.img>
- Diagnostic led is always on while writing flash.
- Diagnostic led blinks slowly after flash firmware.
- Power off and power on again to reboot the device.

Default Configurations
LAN (bridge eth0+ath0):
IP Address: 192.168.1.1
Wireless (ath0):
Driver:ath9K/ath10K
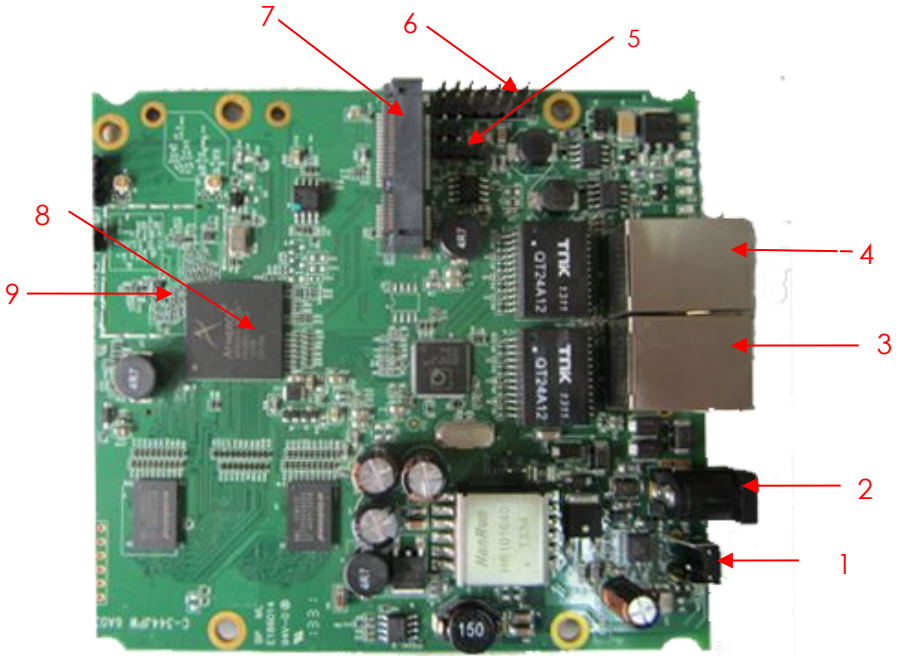Mode: ap
ESSID: OpenWRT
IP Address: 192.168.1.1

Please refer to http://madwifi.org/ for more information.

Use of Compex Patches
1. MAC Address from loader
2. Can detect that it is a Compex board

Appendix I

Board Features

TOP SIDE OF BOARD

No:	Feature	Descriptions
1	Reset button	For board reset and startup mode control
2	DC Jack	24V ~ 48V DC Supply (HV) 9V~24V DC(LV)
3	WAN port	10/100/1000 Base T Ethernet port

4	LAN port	10/100/1000 Base T Ethernet port (POE in)
5	Serial port	Serial port connection header
6	JTAG port	JTAG jumper header for programming
7	mini-PCIE slot	9.2mm height mini-PCIE slot
8	AR9344	802.11a/c 802.11a/n,802.11b/g/n, 802.11a/b/g/n
9	Radio	On-board 11abgn radio