



WPJ558 HW Manual



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REVISION HISTORY

Revision	Information / Changes
Rev 1.0.0	First release for WPJ558 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.

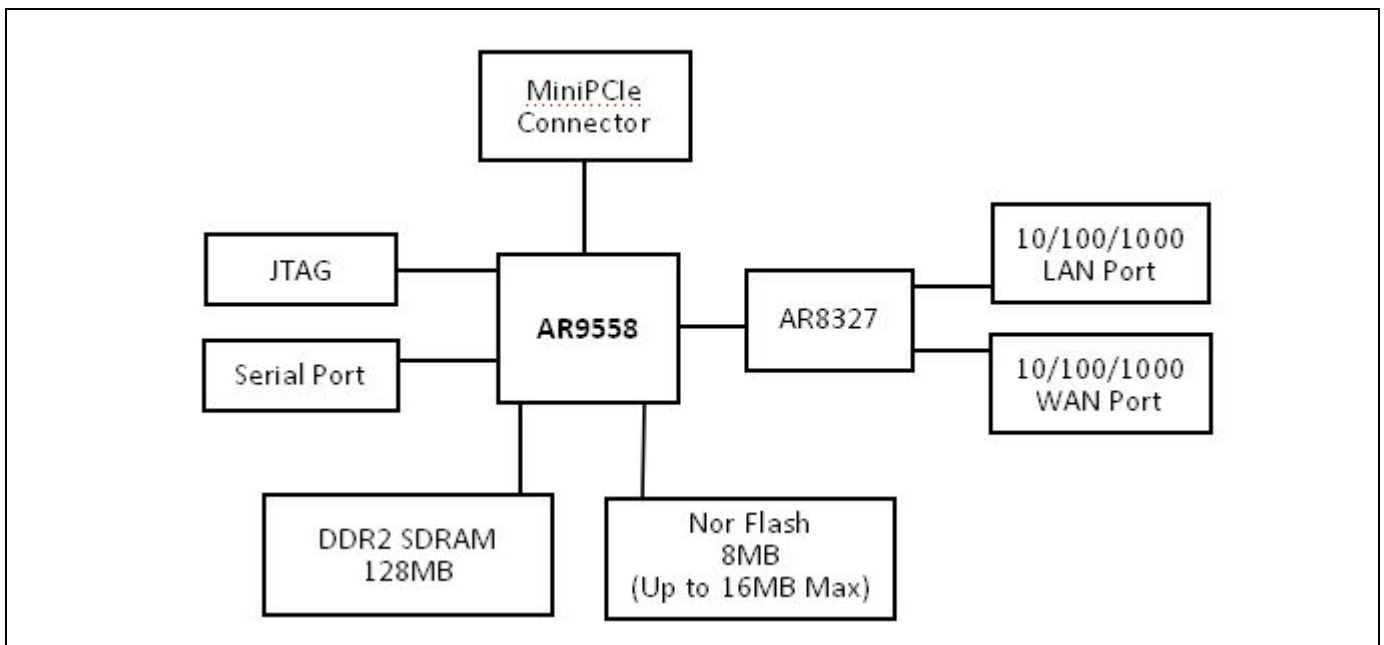
PURPOSE	WHY IS DEVELOPMENT KIT USEFUL?
Develop Open-WRT firmware on WPJ558 (using uboot loader)	Serial Converter can be used to debug the Open-WRT firmware on uboot loader.
Port Own Firmware Over to WPJ558	Serial Converter can be used to debug the Serial Output messages.
Port Own Firmware and Loader Over to WPJ558	Serial Converter can be used to debug the Serial Output messages.

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



KEY FEATURES

GENERAL INFORMATION

PROCESSOR	Atheros AR9558
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/b/g/n, 802.11ac
DEBUG INTERFACE	Serial (TTL) / JTAG (ARM-standard 14 pin) Optional JTAG Programmer** available Optional Serial Converter*** available
OPERATING TEMPERATURE	-20°C to 70°C
LED INDICATORS	6 LEDs total: Power, LAN, Signal LED 1,2,3,4
OTHER FEATURES	Status LED, Push-Button Reset Surge Arrestors, buzzer(Optional)
DIMENSIONS	117 mm x 105mm x 17 mm
ENCLOSURE	Support MJE

INFORMATION OF POWER

POWER OVER ETHERNET	Standard 802.3af PoE input
TYPICAL OPERATING POWER	8.6w
DC SUPPLY	24V ~ 56V DC Supply
MINIPCIE SLOTS	Support power : 3.3V and 5V supports all Compex WLE series

* 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	Description	GPIO Bit
0	EJTAG_TCK	12	Reserved
1	EJTAG_TDI	13	Reserved
2	EJTAG_TDO	14	RSS4 /DIAG LED
3	EJTAG_TMS	15	RSS3 LED
4	BUZZER	16	Reserved
5	SPI_CS_L	17	SWRST
6	SPI_CLK	18	Reserved
7	SPI_MO_SI	19	Reserved
8	SPI_MI_SO	20	Reserved
9	UART_SIN	21	Reserved
10	UART_SOUT	22	RSS2 LED
11	S17_INTn	23	RSS1 LED

Interface Connectors

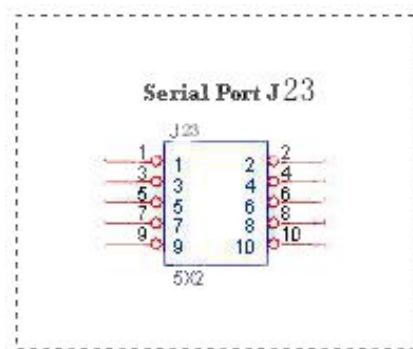
The board interface connector pin assignments and signal descriptions are included in the following sections. The connectors are listed in the section below and the connector locations are shown in the following diagrams.

Connector	Function	Connector	Function
J25	power	J12/J13	Ethernet Ports
J50	USB signal	J22	JTAG Port
J5	5V	J34	Mini-PCIE Slot
J6	3.3V	JP2	Serial Port
J25	Power Jack	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 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

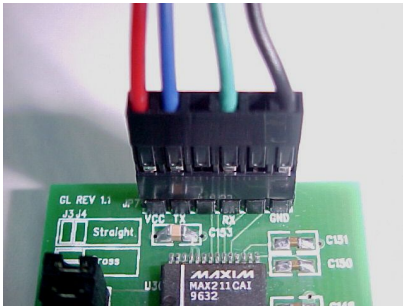
Precaution when using Serial Converter

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.

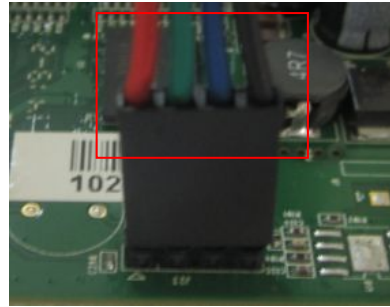
Serial Converter Pin Layouts

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) – Red
Pin 2	TX – Green	Pin 5	RX – Green
Pin 4	RX - Blue	Pin 3	TX - Blue
Pin 6	GND – Black	Pin 7	GND – Black



Arrangement of Cables on Serial Converter to the board



Arrangement of Cables on the board itself

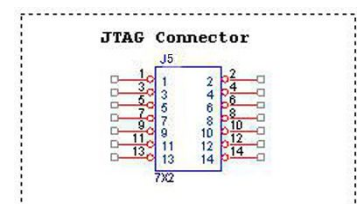
JTAG Port Header

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) signals is shown below.

PIN	SIGNAL	PIN	SIGNAL
1	TX+/POE+	5	TX-/POE+
2	TX-/POE+	6	RX-/POE-
3	RX+/POE-	7	RX+/POE-
4	TX+/POE+	8	RX-/POE-

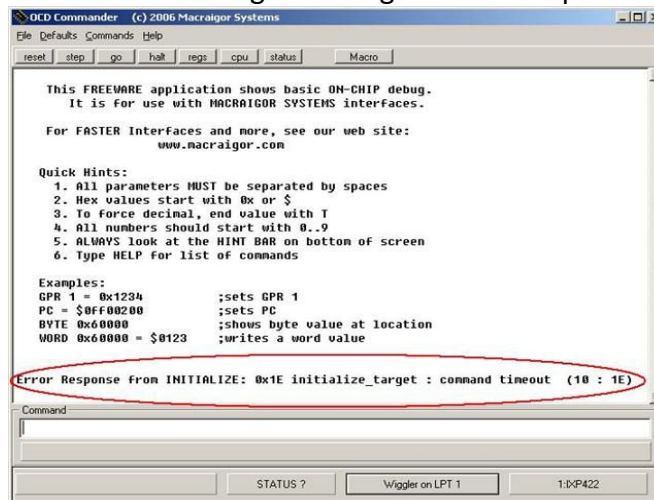
JTAG PROCESS

Minimum Requirement

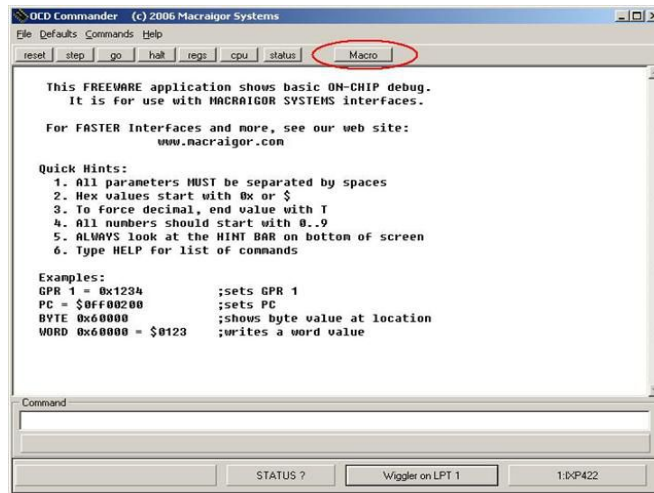
1. OCD Commander ver2.5.4
2. upbios.tst file (same for all Compex device)
3. uboot.bin file
4. JTAG cable

Steps

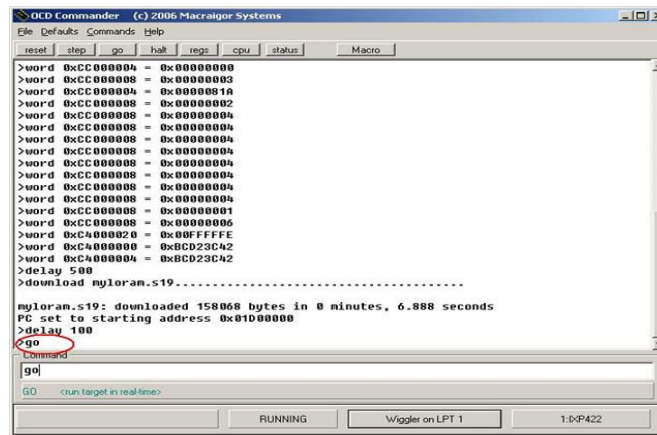
1. Install the OCD Commander to your PC
2. Plug the JTAG cable to the JTAG port of the device
3. Run OCD Commander Program, Set "Target Processor" for the particular device, Click "OK"
4. If there is this error message "Error Response from INITIALIZE....", please check the JTAG cable connection. Close 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 WPJ558 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 WPJ558 + ath9k with patches from Complex.

- 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 WPJ558 + 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
```

OpenWRT Firmware will be in *bin/openwrt-ar71xx-wpJ558.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: madwifi
 Mode: ap
 ESSID: OpenWRT
 IP Address: 192.168.1.1

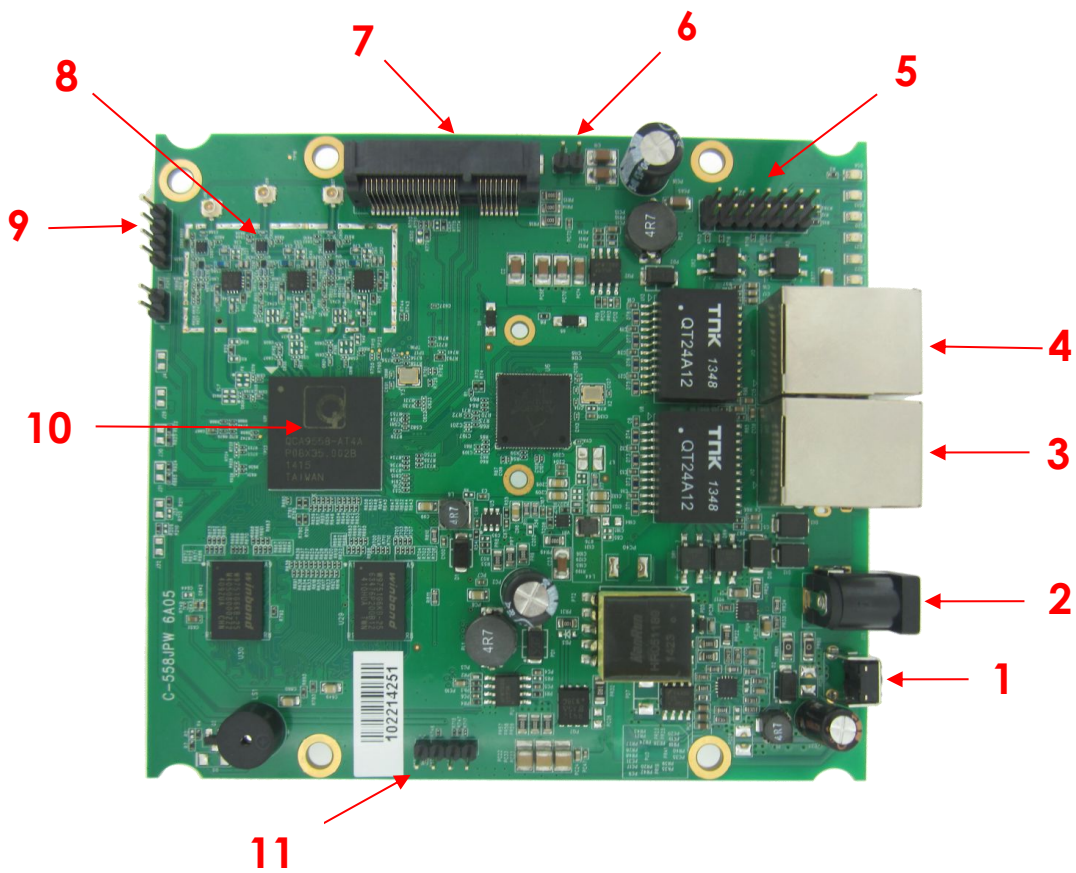
Please refer to <http://madwifi.org/> for more information.

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 ~ 56V DC Supply
3	LAN port	10/100/1000 Base T Ethernet port
4	WAN/LAN port	10/100/1000 Base T Ethernet port
5	JTAG port	JTAG jumper header for programming
6	5V Pin	① After connecting this two pin with Jumper, the board can provide on-board 5V to the radio card. ② Plug 5V cable to the 5V pin, the cable can provide external 5V power. Refer to RMF.
7	mini-PCIE slot	9.2mm height mini-PCIE slot
8	Radio	2.4GHz On-board radio(23dBm/perchain)
9	USB Pin	Support USB Port and USB Extension
10	AR9558	Main Chipset
11	Serial port	Serial port connection header