# User manual
# 802.11a/b/g/n mini-PCI Module
# WMIA-198Nv2
# (Atheros AR9220)


**Version:0.90**

# Revised History

| Version | Purpose | Date | Editor |
|---|---|---|---|
| 0.90 | Initial Doc | 2010/12/10 | Jane Jian |
| | | | |
| | | | |
| | | | |

# TABLE OF Contents

# 1.Product Features

- **Atheros AR9220**
- **2 antennas to support 2T2R**
- **WEP, WPA, WPA2**
- **Driver Support: Linux2.6 above**

# 2. Product Specification

## 2.1 Main Chipset

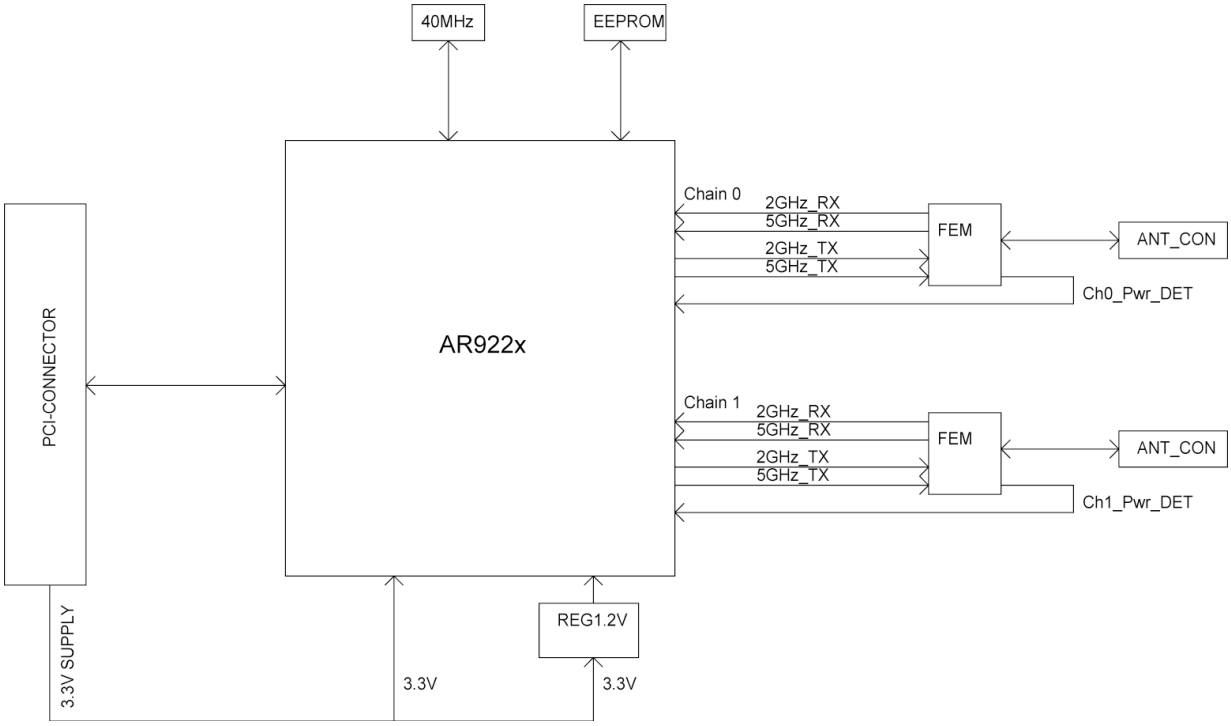
MAC/BB/RF: Atheros AR9220

## 2.2 Function Specification

| | |
|---|---|
| Interface | ●32-bit mini-PCI Type III A, |
| LEDs | NA |
| Antenna | ●2x UFL antenna connectors, 2T2R |
| Input Power | ●DC 3.3V ± 0.1V |
| Data Rate | ●802.11b: 11, 5.5, 2, 1 Mbps;<br>●802.11g: 54, 48, 36, 24, 18, 12, 9, 6 Mbps<br>●802.11a: 54, 48, 36, 24, 18, 12, 9, 6 Mbps<br>●802.11n: Up to 300Mbps |

| | | | |
|---|---|---|---|
| Operating Frequency | ●2.412GHz~ 2.472GHz ISM Band (Subject to Local Regulations)<br>●5.18GHz ~ 5.825GHz(Subject to Local Regulations) | | |
| Transmit Output Power (Tolerance: ±1.5dBm) | 802.11b: 16dBm | 802.11g: 17dBm | 802.11gn: 2.4G:<br>18dBm (HT20)@2Tx<br>16dBm (HT40)@2Tx |
| | | 802.11a: 15dBm | 802.11an: 5G:<br>13dBm (HT20)@2Tx<br>11dBm (HT40)@2Tx |
| Receive Sensitivity (Tolerance: ±2dBm) | 802.11b: 8%PER<br>●-91dBm @11Mbps | 802.11g: 10% PER<br>●-77dBm @54Mbps | 802.11gn: 2.4GHz 10%PER<br>●-74dBm@MCS7,HT20<br>●-73dBm@MCS7,HT40 |
| | | 802.11a: 10% PER<br>●-76dBm @54Mbps | 802.11an: 5GHz 10%PER<br>●-73dBm@MCS7,HT20<br>●-69dBm@MCS7,HT40 |
| Power consumption | Tx Mode:(Continue)<br>800 mA ± 100mA | Rx Mode : (Continue)<br>300mA ± 50mA | Standby Mode:<br>TBD |
| Security | WEP, WPA, WPA2 | | |
| Driver | Linux2.6 above | | |

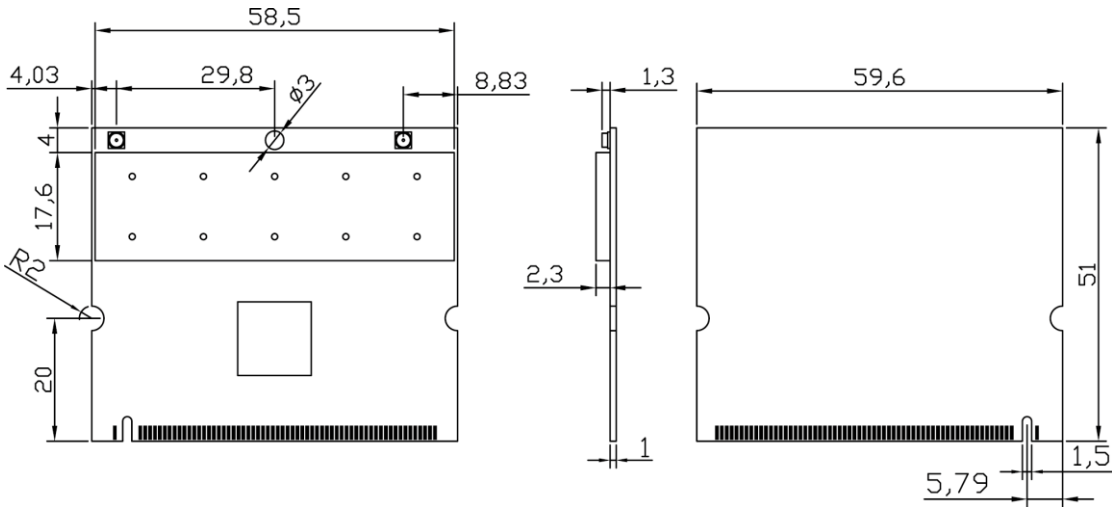
## 2.3 Block Diagram



## 2.4 Mechanical Drawing

**Dimension: 58.5x51x3.3mm (± 0.15mm)**

**Weight: 10g**



## 2.5 Transmit Power & Receive Sensitivity

| | Data rate | Tx Output Power (±1.5dBm) | Receive Sensitivity (±2dBm) |
|---|---|---|---|
| 802.11n, 2.4GHz HT20 | MCS0 | 20dBm | -92dBm |
| | MCS1 | 20dBm | -91dBm |
| | MCS2 | 20dBm | -89dBm |
| | MCS3 | 20dBm | -85dBm |
| | MCS4 | 20dBm | -82dBm |
| | MCS5 | 20dBm | -80dBm |
| | MCS6 | 19dBm | -78dBm |
| | MCS7 | 18dBm | -74dBm |
| 802.11n, 2.4GHz HT40, @2Tx | MCS0 | 20dBm | -91dBm |
| | MCS1 | 20dBm | -88dBm |
| | MCS2 | 20dBm | -87dBm |
| | MCS3 | 20dBm | -84dBm |
| | MCS4 | 19dBm | -81dBm |
| | MCS5 | 18dBm | -78dBm |
| | MCS6 | 17dBm | -77dBm |
| | MCS7 | 16dBm | -73dBm |
| 802.11n, 5GHz HT20, @2Tx | MCS0 | 19dBm | -91dBm |
| | MCS1 | 19dBm | -89dBm |
| | MCS2 | 19dBm | -87dBm |
| | MCS3 | 19dBm | -83dBm |
| | MCS4 | 18dBm | -80dBm |
| | MCS5 | 18dBm | -76dBm |
| | MCS6 | 17dBm | -75dBm |
| | MCS7 | 13dBm | -73dBm |
| 802.11n, 5GHz HT40, @2Tx | MCS0 | 18dBm | -88dBm |
| | MCS1 | 18dBm | -86dBm |
| | MCS2 | 18dBm | -84dBm |
| | MCS3 | 18dBm | -81dBm |
| | MCS4 | 17dBm | -78dBm |
| | MCS5 | 17dBm | -73dBm |
| | MCS6 | 15dBm | -72dBm |
| | MCS7 | 11dBm | -69dBm |
| 802.11a, 5GHz | 6Mbps | 17dBm | -91dBm |
| | 9Mbps | 17dBm | -91dBm |
| | 12Mbps | 17dBm | -90dBm |
| | 18Mbps | 17dBm | -88dBm |
| | 24Mbps | 17dBm | -84dBm |
| | 36Mbps | 17dBm | -81dBm |
| | 48Mbps | 15dBm | -77dBm |
| | 54Mbps | 15dBm | -76dBm |
| 802.11g, 2.4GHz | 6Mbps | 20dBm | -93dBm |
| | 9Mbps | 20dBm | -92dBm |
| | 12Mbps | 20dBm | -91dBm |
| | 18Mbps | 20dBm | -89dBm |
| | 24Mbps | 20dBm | -87dBm |
| | 36Mbps | 20dBm | -83dBm |
| | 48Mbps | 19dBm | -79dBm |
| | 54Mbps | 17dBm | -77dBm |
| 802.11b , 2.4GHz | 1 ~ 11Mbps | 16 ~ 18dBm | |

## 3. EEPROM Information

| | |
|---|---|
| **Reg Domain** | ETSI1_WORLD |
| **Reg Domain Code** | 0x37 |
| **Device ID** | TBD |
| **Vendor ID** | TBD |

# 4. Environmental

## 4.1 Operation

Operating Temperature: 0 ~ +60℃

Relative Humidity: 15% ~ 95% (non-condensing)

## 4.2 Storage

Temperature: -20 ~ +80 C

## 4.3 Operation power

DC 3.3V ± 0.1V

**Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that

interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:
Radiation Exposure Statement:
The product comply with the US portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/CANADA

(When the device is indoor use, below sentence add)

Operation of this device is restricted to indoor use only

**This device is intended only for OEM integrators under the following conditions:**

1) The transmitter module may not be co-located with any other transmitter or antenna,
2) For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

**IMPORTANT NOTE**

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

**End Product Labeling**

The final end product must be labeled in a visible area with the following: “Contains FCC ID: CM6-WMIA198N”.

**Manual Information to the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.