

NW-121
QCA9880
3x3 11ac/n/a
5GHz Wi-Fi module

產品規格書
Product Specification Document

Rev 1.0
July 26th, 2016

1 Revision History

| Project Name | | NW-121 | Document No. |
|--------------|------|------------|---|
| Revision | | Date | Release Notes |
| From | To | | |
| | V1.0 | 2016/07/26 | Initial release (Revise from NW-121_QCA9880_PSD_v1.8_w DFS_20160623) |
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2 Introduction

NW-121 is a 3x3 11ac/n/a 5GHz single-band WiFi module. It is based on Qualcomm Atheros QCA9880 chip solution. This module uses 3x3 multiple input/multiple output (MIMO), Orthogonal Frequency Division Multiplexing (OFDM) and Direct Sequence Spread Spectrum (DSSS) communication techniques. QCA9880 provides wireless data communications at rates of up to 1.3Gbps, depending on the coding techniques employed and the range of the system.

3 Functions:

- 3.1 IEEE standard supports 802.11ac/n/a
- 3.2 Support 20/40/80MHz bandwidth with 256QAM modulation
- 3.3 Spatial multiplexing up to 1.3Gbps data rate by 3T3R.
- 3.4 Support DFS frequencies per different country's regulations.
- 3.5 RoHS compliant

4 Hardware Specifications:

| | |
|-------------------------------|---|
| Chipset Vendor | Qualcomm Atheros |
| Chipset model name | QCA9880 |
| Antenna | 3 x I-PEX connectors, 3T3R |
| Host Interface | PCI-Express |
| Form Factor | Mini-PCIe (Full Mini-Card) |
| Wireless LAN Standards | IEEE 802.11ac/n/a |
| Operating Frequency | 5.18 GHz~5.825 GHz (with DFS support) |
| Operating Voltage | 3.3V |
| WLAN Data Rate | |
| 802.11a | 54Mbps with fall back of 48, 36, 24, 18, 12, 9, 6 Mbps |
| 802.11n | HT MCS0~MCS23 (450Mbps) |
| 802.11ac | VHT MCS0~MCS9 (1300Mbps) |
| Modulation Schemes | |
| 802.11a | 64QAM (54 Mbps, 48 Mbps), 16QAM (36 Mbps, 24Mbps), QPSK (18 Mbps, 12 Mbps), BPSK (9 Mbps, 6 Mbps) |
| 802.11n | HT MCS0/8/16: BPSK, R=1/2; HT MCS1/9/17:QPSK, R=1/2; HT MCS2/10/18: QPSK, R=3/4; HT MCS3/11/19:16QAM, R=1/2; |

| | |
|----------|--|
| | HT MCS4/12/20: 16QAM, R=3/4; HT MCS5/13/21: 64QAM, R=2/3; HT MCS6/14/22: 64QAM, R=3/4; HT MCS7/15/23: 64QAM, R=5/6. |
| 802.11ac | VHT MCS0: BPSK, R=1/2; VHT MCS1: QPSK, R=1/2; VHT MCS2: QPSK, R=3/4; VHT MCS3: 16QAM, R=1/2; VHT MCS4: 16QAM, R=3/4; VHT MCS5: 64QAM, R=2/3; VHT MCS6: 64QAM, R=3/4; VHT MCS7: 64QAM, R=5/6. VHT MCS8: 256QAM, R=3/4; VHT MCS9: 256QAM, R=5/6 |

4.1 5GHz TX Power (dBm)

| 20MHz BW | CH36 | CH100 | CH140 |
|------------|------|-------|-------|
| 6Mbps | 18 | 18 | 18 |
| 9Mbps | 18 | 18 | 18 |
| 12Mbps | 18 | 18 | 18 |
| 18Mbps | 18 | 18 | 18 |
| 24Mbps | 18 | 18 | 18 |
| 36Mbps | 15.5 | 15.5 | 15.5 |
| 48Mbps | 15 | 15 | 15 |
| 54Mbps | 14 | 14 | 14 |
| HT20 MCS0 | 18 | 18 | 18 |
| HT20 MCS1 | 18 | 18 | 18 |
| HT20 MCS2 | 18 | 18 | 18 |
| HT20 MCS3 | 16 | 16 | 16 |
| HT20 MCS4 | 16 | 16 | 16 |
| HT20 MCS5 | 14 | 14 | 14 |
| HT20 MCS6 | 13 | 13 | 13 |
| HT20 MCS7 | 13 | 13 | 13 |
| VHT20 MCS8 | 13 | 13 | 13 |

| 40MHz BW | CH36 | CH100 | CH140 |
|-----------|------|-------|-------|
| HT40 MCS0 | 18 | 18 | 18 |

| | | | |
|------------|----|----|----|
| HT40 MCS1 | 18 | 18 | 18 |
| HT40 MCS2 | 18 | 18 | 18 |
| HT40 MCS3 | 16 | 16 | 16 |
| HT40 MCS4 | 16 | 16 | 16 |
| HT40 MCS5 | 14 | 14 | 14 |
| HT40 MCS6 | 13 | 13 | 13 |
| HT40 MCS7 | 13 | 13 | 13 |
| VHT40 MCS8 | 13 | 13 | 13 |
| VHT40 MCS9 | 12 | 12 | 12 |

| 80MHz BW | CH36 | CH100 | CH140 |
|-----------------|-------------|--------------|--------------|
| VHT80 MCS0 | 18 | 18 | 18 |
| VHT80 MCS1 | 18 | 18 | 18 |
| VHT80 MCS2 | 18 | 18 | 18 |
| VHT80 MCS3 | 15 | 15 | 15 |
| VHT80 MCS4 | 15 | 15 | 15 |
| VHT80 MCS5 | 13 | 13 | 13 |
| VHT80 MCS6 | 12 | 12 | 12 |
| VHT80 MCS7 | 12 | 12 | 12 |
| VHT80 MCS8 | 11 | 11 | 11 |
| VHT80 MCS9 | 11 | 11 | 11 |

4.2 5GHz RX Sensitivity (dBm)

| 20MHz BW | CH36 | CH100 | CH140 |
|-----------------|-------------|--------------|--------------|
| 6Mbps | -92 | -92 | -92 |
| 9Mbps | -92 | -92 | -92 |
| 12Mbps | -92 | -90 | -90 |
| 18Mbps | -88 | -88 | -88 |
| 24Mbps | -86 | -84 | -84 |
| 36Mbps | -80 | -80 | -80 |
| 48Mbps | -76 | -76 | -76 |
| 54Mbps | -76 | -74 | -74 |
| HT20 MCS0 | -94 | -92 | -92 |
| HT20 MCS1 | -90 | -90 | -90 |
| HT20 MCS2 | -88 | -88 | -86 |

| | | | |
|------------|-----|-----|-----|
| HT20 MCS3 | -84 | -82 | -82 |
| HT20 MCS4 | -80 | -78 | -78 |
| HT20 MCS5 | -76 | -72 | -72 |
| HT20 MCS6 | -74 | -72 | -72 |
| HT20 MCS7 | -72 | -70 | -70 |
| VHT20 MCS8 | -70 | -68 | -66 |

| 40MHz BW | CH36 | CH100 | CH140 |
|-----------------|-------------|--------------|--------------|
| HT40 MCS0 | -94 | -92 | -92 |
| HT40 MCS1 | -92 | -90 | -90 |
| HT40 MCS2 | -88 | -88 | -86 |
| HT40 MCS3 | -84 | -82 | -82 |
| HT40 MCS4 | -80 | -78 | -78 |
| HT40 MCS5 | -76 | -74 | -72 |
| HT40 MCS6 | -74 | -72 | -72 |
| HT40 MCS7 | -72 | -70 | -68 |
| VHT40 MCS8 | -66 | -66 | -66 |
| VHT40 MCS9 | -62 | -62 | -62 |

| 80MHz BW | CH36 | CH100 | CH140 |
|-----------------|-------------|--------------|--------------|
| VHT80 MCS0 | -88 | -86 | -86 |
| VHT80 MCS1 | -86 | -84 | -84 |
| VHT80 MCS2 | -82 | -80 | -80 |
| VHT80 MCS3 | -78 | -76 | -76 |
| VHT80 MCS4 | -74 | -74 | -72 |
| VHT80 MCS5 | -70 | -70 | -68 |
| VHT80 MCS6 | -68 | -68 | -68 |
| VHT80 MCS7 | -68 | -66 | -66 |
| VHT80 MCS8 | -62 | -62 | -62 |
| VHT80 MCS9 | -60 | -60 | -60 |

5 Connector Pin-out:

| Pin# | Pin Name | Description | Pin# | Pin Name | Description |
|------|---------------|---|------|---------------|--|
| 1 | WAKE_L(NA) | Output and open Drain active Low signal. This signal is used to request that the system return from a sleep/suspended state to service a function initiated wake event. | 2 | +3.3V | +3.3V |
| 3 | No Connection | - | 4 | GND | GND |
| 5 | No Connection | - | 6 | No Connection | - |
| 7 | CLKREQ_L | Output for reference clock request signal | 8 | No Connection | - |
| 9 | GND | GND | 10 | No Connection | - |
| 11 | REFCLK- | Input signal for PCI Express differential reference clock (100MHz) | 12 | No Connection | - |
| 13 | REFCLK+ | Input signal for PCI Express differential reference clock (100MHz) | 14 | No Connection | - |
| 15 | GND | GND | 16 | No Connection | - |
| 17 | No Connection | - | 18 | GND | GND |
| 19 | No Connection | - | 20 | W_DISABLE_L | Input and active low signal. This signal is used by the system to disable radio operation on add-in cards that implement radio frequency applications. When implemented, this signal requires a pull-up resistor on the card |
| 21 | GND | GND | 22 | PERST_L | Input signal for functional reset to the card |

| | | | | | |
|----|---------------|--|----|------------------|--|
| 23 | PERn0 | PCI Express x1 data interface: one differential receive pair | 24 | +3.3V | +3.3V |
| 25 | PERp0 | PCI Express x1 data interface: one differential receive pair | 26 | GND | GND |
| 27 | GND | GND | 28 | No Connection | - |
| 29 | GND | GND | 30 | No Connection | - |
| 31 | PETn0 | PCI Express x1 data interface: one differential transmit pair | 32 | No Connection | - |
| 33 | PETp0 | PCI Express x1 data interface: one differential transmit pair | 34 | GND | GND |
| 35 | GND | GND | 36 | No Connection | - |
| 37 | GND | GND | 38 | No Connection | - |
| 39 | No Connection | - | 40 | GND | GND |
| 41 | No Connection | - | 42 | No Connection | - |
| 43 | GND | GND | 44 | LED_WLAN_L (OPT) | Output and open drain active low signal. This signal is used to allow the PCI Express Mini Card add-in card to provide status indicators via LED devices that will be provided by the system |
| 45 | No Connection | - | 46 | No Connection | - |
| 47 | No Connection | - | 48 | No Connection | - |
| 49 | No Connection | - | 50 | GND | GND |
| 51 | No Connection | - | 52 | +3.3V | +3.3V |

6 Environmental Requirements:

6.1 Temperature

6.1.1 Operating Temperature Conditions

The product shall be capable of continuous reliable operation when operating in ambient temperature of 0 to +50 degree C.

6.1.2 Non-Operating Temperature Conditions

Neither subassemblies shall be damaged nor shall the operational performance be degraded when restored to the operating temperature when exposed to storage temperature in the range of -20 to +80 degree C

6.2 Humidity

6.2.1 Operating Humidity Conditions

The product shall be capable of continuous reliable operation when subjected to relative humidity in the range of 15% and 90% non-condensing.

6.2.2 Non-Operating Humidity conditions

The product shall not be damaged nor shall the performance be degraded after exposure to relative humidity ranging from 0% to 95% non-condensing

7 Product Photo:



8 Antenna information

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

- 8.1 The antenna must be installed such that 20 cm is maintained between the antenna and users, and the maximum antenna gain allowed for use with this device is 2 dBi.
- 8.2 The transmitter module may not be co-located with any other transmitter or antenna
- 8.3 Proposed antenna vendor information

| Antenna type | Manufacturer | Model | Gain |
|--------------|---------------------|---------------------|------|
| Dipole | WIESON Technologies | GY121L049S-XXX | 2dBi |
| PIFA | Aristotle | RFA-25-AP250-70-XXX | 2dBi |

9 Statements:

9.1 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.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

This End equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

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: YHI-NW121”.

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.

9.2 Canada Statement

This device complies with Industry Canada’s licence-exempt RSSs.

Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d’Industrie Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes :

- (1) l’appareil ne doit pas produire de brouillage;
- (2) l’utilisateur de l’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

Caution Exposure:

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS102 and users can obtain Canadian information on RF exposure and compliance.

Le dispositif répond à l'exemption des limites d'évaluation de routine dans la section 2.5 de RSS102 et les utilisateurs peuvent obtenir des renseignements canadiens sur l'exposition aux RF et le respect.

The final end product must be labelled in a visible area with the following:

The Industry Canada certification label of a module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the Industry Canada certification number of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Contains transmitter module IC: 9715A-NW121

The module must be installed in **L-72W**.

This End equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

The end user manual shall include all required regulatory information/warning as show in this manual.