



AIRETOS[®] E98 Class Driver Installation Manual

Product: IEEE 802.11ac/a/b/g/n WiFi Module

AEX-QCA98x0 Wireless Module Based product with Qualcomm QCA98x0 Chipset

DCN: 09A-CPD21-B1

Release Date: September 12, 2022

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Revision History

Releases	Date	Notes
Version 1.0	20 April 2022	Initial Release
Version 1.1	12 September 2022	Minor adjustments, added Appendix



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1. Document Conventions

TEXT CONVENTION	Bold	<p>Bold type within paragraph text indicates commands, file names, directory names, paths, output, or returned values.</p> <p>Example: The DK Client package will not function unless you use the <code>wdreg -install</code> batch file.</p>
	<i>Italic</i>	<p>Within commands, italics indicate a variable that the user must specify.</p> <p>Example: <code>mem_alloc size_in_bytes</code></p> <p>Titles of manuals or other published documents are also set in italics.</p>
	Courier	<p>The Courier font indicates output or display.</p> <p>Example: <code>Error: Unable to allocate memory for transfer!</code></p>
	Menu	<p>The Menu character tag is used for menu items.</p> <p>Example: Choose Edit > Copy.</p>
	[]	Within commands, items enclosed in square brackets are optional parameters or values that the user can choose to specify or omit.
	{ }	Within commands, items enclosed in braces are options from which the user must choose.
		Within commands, the vertical bar separates options.
	...	An ellipsis indicates a repetition of the preceding parameter.
	>	<p>The right angle bracket separates successive menu selections.</p> <p>Example: Start > Programs > DK > <code>wdreg -install</code>.</p>
	“ ”	Within command, items are in window menu selection.
NOTICES		<p>NOTE: This message denotes neutral or positive information that calls out important points to the text. A note provides information that may apply only in special cases.</p>



2. Introduction

Thank you for using this high-speed QCA9880 SERIES 802.11ac/abgn PCI-E WLAN wireless network card. This wireless network adaptor is the first Qualcomm-Atheros Dual Band modular design compliant with the IEEE 802.11AC standard. It follows the 11AC protocol by supporting wider channel bandwidth (80 MHz) at 5Ghz and wider 256-QAM, plus other features that improve network bandwidth, reliability and the efficiency of wireless connections.

2.1 Product Description

Key Features:

- 11AC Dual Band (DB) backwards compatible with 802.11abgn, up to 1300 Mbps dynamic data transfer rate at 3x3 11ac Dual Band mode. Full 802.11ac/abgn MU-MIMO two antenna Wi-Fi.
- Advanced QFN, On-chip CPU for Host Wi-Fi offload, 80Mhz channel bandwidth, 4 Gbit/s bus bandwidth, evolved QAM base band modulation technologies and 1.3Gbps WLAN peak throughput the AEX-QCA9880-NX is setting new standards.
- Extended Operating Temperature Grade: (-20°C ~ 70°C)
- Three antenna connectors, for MIMO 3Tx3R (3 Transmit & 3 Receive) technology
- Transmission Beamforming (TxBF) with enhanced Tx power accuracy and high aggregate power
- PCI-E 2.0 standard specification with up to 4 Gbit/s bandwidth (backwards compatible to 1.x)



3. System Requirements

Minimum Requirements:

- 32-bit PCI Express Bus
- RAM: 1 GB
- Processor 1 GHz
- Hard disk space: 16 GB for 32-bit OS or 20 GB for 64-bit OS
- Graphics card: DirectX 9 or later with WDDM 1.0 driver
- Display resolution: 800 x 600
- Operating System; Windows 7 OS

4. Preparation

This manual is demonstrating how to properly install the driver into a Windows 7, 8 or 10 OS for the AIRETOS E98 Class.

4.1 Software

Download the driver package and save it into a dedicated location (ex. C:\).

4.2 Hardware

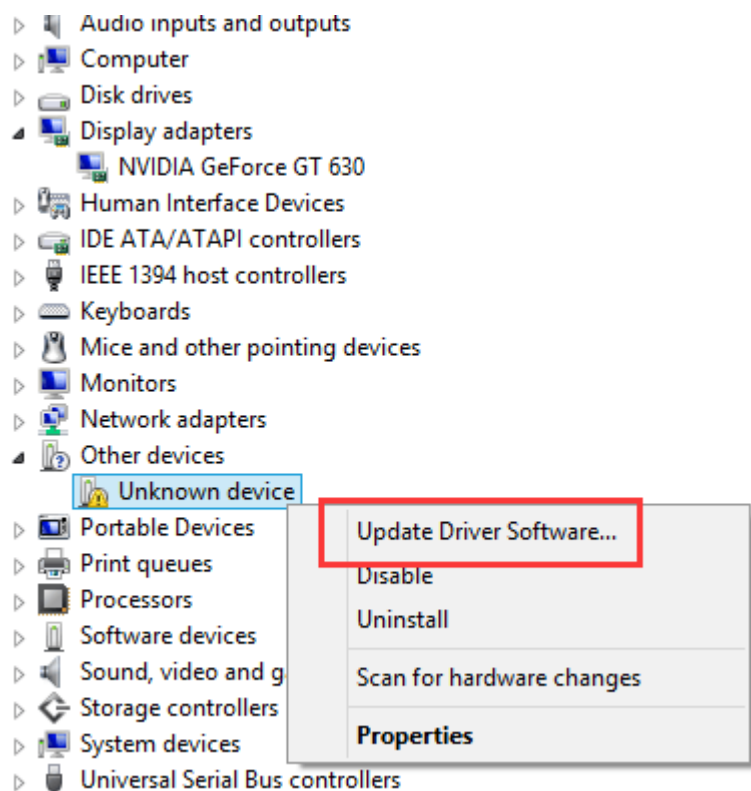
Please be noticed that you should turn off the computer before the hardware installation. Have the correct AIRETOS E98 adaptor for your system and ensure the adaptor is installed in the system, in the correct position for the PCIe slot. Once you have the hardware installed, you can start the driver installation process.



5. Windows Driver Installation / Uninstallation

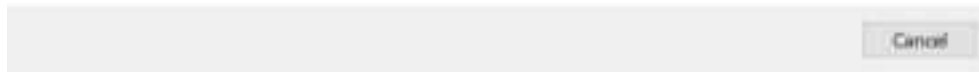
5.1 Windows 10 Driver Installation

1. Once the system is booted open Device Manager, which can be found using the search menu, and locate the Unknown Device. Right-click on the Unknown Device and select “Update Driver Software”.





2. On the new window that appears select “Browse my computer for drivers” and locate the folder of the driver that you have downloaded.



- Once done press on “Finish” to complete the installation.

3. Restart your computer to apply changes.



5.2 Driver Uninstallation

This section guides on how to uninstall the driver from your system.

1. To remove the driver from the OS, go to Device Manager, by clicking the search bar at the bottom left-hand side corner and type in “**Device manager**”.
2. Locate the device, right-click on it and choose Uninstall. Alternatively, the driver can be uninstalled inside the properties window.
3. Restart your computer to apply changes.

6. Regulatory Compliance Notice

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 or more 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.

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

RF exposure statements

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



This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 30 centimeters between the radiator and your body or nearby persons.

CFR 47 FCC PART 15 SUBPART C (15.247) and SUBPART E (15.407) has been investigated. It is applicable to the modular transmitter.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

This radio transmitter 2AE3B-AEX-QCA98X has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Unique antenna connector must be used on the Part 15 authorized transmitters used in the host product.

Antenna Type	Brand	Antenna Model	Maximum Gain (dBi)	
			2.4 GHz	5GHz
Chip	ethertronics	M830520	1 dBi	2.6 dBi
FPC	OXFORDTEC	WAFH-2DBI-15	2.7 dBi	2.6 dBi
Dipole	OXFORDTEC	WAND2DBI-SMA	2 dBi	3 dBi
Dipole	OXFORDTEC	WAND5DBI-SMA	3 dBi	5 dBi
PCB	OXFORDTEC	WAPH2DB4-15	2.18 dBi	2.69 dBi

Length of RF cable: 150mm

Connector type of RF cable: I-PEX/MHF1 to RP-SMA(F)

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:
“Contains Transmitter Module FCC ID: 2AE3B-AEX-QCA98X” Or “Contains FCC ID: 2AE3B-AEX-QCA98X”



The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

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.

Industry Canada statement:

This device complies with Industry Canada license-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:

- 1) The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
- 2) For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
- 3) For devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate; and

Avertissement:

- 1) Le dispositif fonctionnant dans la bande 5150-5250 MHz est réservé uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
- 2) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limitation P.I.R.E.;



3) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisant la bande 5725-5850 MHz doit se conformer à la limitation P.I.R.E spécifiée pour l'exploitation point à point et non point à point, selon le cas.

Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 30cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 30 cm de distance entre la source de rayonnement et votre corps.

This radio transmitter (IC: 20662-AEXQCA98X) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (20662-AEXQCA98X) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés cidessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Antenna Type	Brand	Antenna Model	Maximum Gain (dBi)	
			2.4 GHz	5GHz
Chip	ethertronics	M830520	1 dBi	2.6 dBi
FPC	OXFORDTEC	WAFH-2DBI-15	2.7 dBi	2.6 dBi
Dipole	OXFORDTEC	WAND2DBI-SMA	2 dBi	3 dBi
Dipole	OXFORDTEC	WAND5DBI-SMA	3 dBi	5 dBi
PCB	OXFORDTEC	WAPH2DB4-15	2.18 dBi	2.69 dBi

If the ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the



module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:
“Contains IC: 20662-AEXQCA98X”.

Si le numéro de certification ISDE n'est pas visible lorsque le module est installé à l'intérieur d'un autre appareil, alors l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut utiliser un libellé comme celui-ci: “ Contient IC: 20662-AEXQCA98X”.

Plaque signalétique du produit final:

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 20662-AEXQCA98X".

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.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module. Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et

avertissements comme indiqué dans ce manue

Must use the device only in host devices that meet the FCC RF exposure category, which means the device is installed and used at distances of at least 30cm from persons.

The end user manual shall include FCC Part 15 /ISED RSS GEN compliance statements related to the transmitter as show in this manual.

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B, ICES 003.

Host manufacturer is strongly recommended to confirm compliance with FCC/ISED requirements for the transmitter when the module is installed in the host.

Must have on the host device a label showing Contains FCC ID: 2AE3B-AEX-QCA98X, Contains IC: 20662-AEXQCA98X

The use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual.

If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone



modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

l'hôte doit utiliser l'instrument uniquement dans des dispositifs qui répondent à la fcc / (catégorie d'exposition rf mobile, ce qui signifie le dispositif est installé et utilisé à une distance d'au moins 30 cm de personnes.

le manuel de l'utilisateur final doit inclure la partie 15 / (fac rss gen déclarations de conformité relatives à l'émetteur que de montrer dans ce manuel.

le fabricant est responsable de la conformité de l'hôte, le système d'accueil avec le module installé avec toutes les autres exigences applicables du système comme la partie 15 b, ics - 003. accueillir le fabricant est fortement recommandé de confirmer la conformité avec les exigences de la fcc / (émetteur lorsque le module est installé dans l'hôte.

le dispositif d'accueil doivent avoir une étiquette indiquant contient FCC ID: 2AE3B-AEX-QCA98X, contient IC : 20662-AEXQCA98X

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應避免影響附近雷達系統之操作。

高增益指向性天線只得應用於固定式點對點系統。



7. Appendix

Specifications

Solution Design

■ Chipset

Qualcomm Atheros QCA9880-AR1A

■ Standard

IEEE 802.11 a/n/ac Wi-Fi

■ Industrial Reference

- Based on Qualcomm Atheros reference design XB140 5ghz Single Band

Appearance

■ Communications Interface

- Mini PCIE format, PCI Express Standard 2.0 host I/O

■ Form Factor

- Mini PCIE format, standard mPCIE dimensions – Full and half size card

Antenna

■ Configuration

- Three Streams (3 chains), 3x3, 3 Connectors, MIMO

■ Type

- Three on-board I-PEX U.FL. connector receptacles



Wireless Parameters

■ Frequency Band

- 5.15-5.25 GHz (FCC UNII-low band) for US/Canada, Japan and Europe
- 5.25-5.35 GHz (FCC UNII-middle band) for US/Canada and Europe 5.47-
- 5.725 GHz for Europe
- 5.725-5.825 GHz (FCC UNII-high band) for US/Canada

■ Data Transfer Rates

- WLAN 5GHz: 11ac: Up to 1300Mbps (dynamic)
- 11n: Up to 450Mbps (dynamic)
- 11a: Up to 54Mbps (dynamic)

■ Media Access Control

- CSMA/CA with ACK

■ Channel

- 2.4GHz: 1-13 (14 only for Japan)
- 5GHz: 36-48 149-165

■ Channel Spacing

- 5GHz: 36-48 149-165

■ Spreading / Modulation

- 802.11ac/n: OFDM (BPSK,QPSK,16-QAM,64-QAM), MRC, STBC, LDPC, ML Demodulation

■ RF Receive Sensitivity (Typical)

- 802.11a: 54M less than -76 dBm
- 802.11n 5G: HT20 MCS7 less than -76 dBm
- HT40 MCS7 less than -76 dBm
- 802.11ac 5G: VHT20 MCS8 less than -76 dBm
- VHT40 MCS8 less than -76 dBm
- VHT80 MCS8 less than -72 dBm

■ Operating Range

- The transmission speed may vary according to the environment



■ Wireless Security

- WEP 64-bit and 128-bit encryption
- WPA (Wi-Fi Protected Access)
- WPA2 (Wi-Fi Protected Access)

Modalities

- Infrastructure, Client, Bridge, Ad-hoc

Safety & Regulatory

- Compliant with FCC, CE and IC
- Compliant with RoHS.

Protocol

- IEEE WLAN Network
 - 802.11ac, 802.11n , 802.11a, 802.11d, 802.11e, 802.11j and 802.11i

Host System Requirements

- Operating System
 - Linux, Linux Open Source, Qualcomm-Atheros Embedded Platform (Windows on request)

Environment

- Operating Temperature
 - -40 ° ~ +80 ° Celsius
- Storage Temperature
 - -45° ~ +85° Celsius
- Operating Humidity
 - 0%~95% non-condensing
- Storage Humidity
 - 0%~95% non-condensing

Electrical

- Power Consumption
 - Transmit Packet Test HT 40*: TBC mA max
 - Receiver Packet Test HT 40*: TBC mA max



Mechanical

■ Dimensions

- 28mm x 26mm x 2.35mm (with shielding)

■ Weight

- 8.1 g

Packing

■ Packing style

- ESD Sleeves in Carton Bulk Package

■ Package Contents

- Module only