

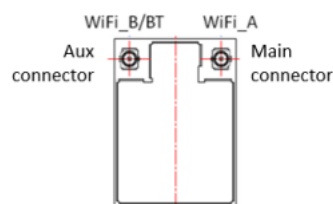
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AW-CM276NF Wi-Fi and BT Module

Introduction:

The AW-CM276NF is manufactured by AzureWave Technologies, Inc., Leveraging the advanced NXP 88W8997 chipset, this M.2 Type 1216 module integrates dual-band IEEE 802.11a/b/g/n/ac Wave 2 Wi-Fi and Bluetooth 5.3 in a compact form factor, supporting 2x2 MU-MIMO for superior throughput and low-latency connections, it delivers blazing-fast speeds across 2.4 GHz and 5 GHz bands. AW-CM276NF supports PCIE and SDIO3.0 for WLAN and high speed UART interfaces for Bluetooth to the host processor.

Module antenna configuration



Module antenna configuration

Features	Description
Product Description	IEEE 802.11 2X2 WiFi 5 MIMO Wireless LAN + Bluetooth 5.3 Combo LGA Module
Major Chipset	NXP 88W8997
Host Interface	WiFi + BT ● PCIe2.0 + UART ● SDIO3.0 + UART (For Host configuration interface, please refer to section 2.3)
Dimension	12 mm X 16 mm x 1.85 mm(Max) (Tolerance remarked in mechanical drawing)
Form factor	M.2 1216 130pins LGA package
Antenna	I-PEX MHF4 Connector Receptacle (20449) Main : WiFi → TX/RX Aux : WiFi/Bluetooth → TX/RX
Weight	0.5 g

FCC Information of AW-CM276NF from AzureWave Technologies, Inc.

Original Company Name:	AzureWave Technologies, Inc.
Original Model:	AW-CM276NF
Original FCC ID:	TLZ-CM276NF
The original granted date is:	07/30/2020

ISED Information of AW-CM276NF from AzureWave Technologies, Inc.

Original Company Name:	AzureWave Technologies, Inc.
Original IC:	6100A-CM276NF
Original Marketing Name (PMN):	IEEE 802.11 2x2 MU-MIMO ac/a/b/g/n Wireless LAN +Bluetooth NGFF Modul
Original Model (HVIN):	AW-CM276NF
Original Firmware (FVIN):	16.68.1.p70
The original granted date is:	4th AUG2020

UTEC, Inc. New FCC and ISED Information

New Company Name:	UTEC, Inc.
New Model:	AW-CM276NF
New FCC ID:	2AK6N-CM276NF
New ISED:	703A-CM276NF

FCC Compliance Statements

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.

Note: 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 to 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.

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

Radiation Exposure Statement

This equipment complies with the FCC radiation exposure limits set forth for an uncontrolled environment. This device should be operated with a minimum separation distance of 20 cm (8 inches) between the equipment and a person's body.

End Product Labeling

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

Contains FCC ID: 2AK6N-CM276NF.

This module is intended for OEM integrators only per FCC KDB 996369 D03 OEM Manual v01r01 guidance. The following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01r01 rule sections:

2.2 List of applicable FCC rules

This module has been tested for compliance to FCC Part 15.

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable.

2.5 Trace antenna designs

Not applicable.

2.6 RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

The following antenna has been certified for use with this module. Antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

Manufacturer	Manufacturer Part Number	Antenna Type	Number of Antennas
Quectel	YEBM001L1AH-2RHCMA0B	Monopole	2 - MIMO Wi-Fi; Wi-Fi +BT

Highest Peak Gain with Cable Loss (dBi) [values found in spec sheets]							
Test State	2.4 Ghz	5.15-5.35 GHz	5.47-5.725 GHz	5.725-5.850 GHz	Cable loss	Connector Type	Cable length
FS (With Cable Loss)	4.67 dBi	2.9 dBi	2.97 dBi	2.2 dBi	2.4G: 3 dB/m@20°C 5G: 5 dB/m@20°C	RP SMA Male	1000mm
MP (With Cable Loss)	4.18 dBi	2.98 dBi	2.98 dBi	2.75 dBi			

Electrical	
Frequency Range	2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical – Detail						
Band	Band	Wi-Fi 2G	Wi-Fi 5G		Wi-Fi 6G	
Specification	Freq. (MHz)	2400–2500	5150–5350	5470–5725	5725–5850	5925–7125
Max. VSWR	FS	1.2	2.1	2.4	2.5	2.8
	MP	1.5	1.8	2.1	2.2	2.5
Max. Return Loss (dB)	FS	-21.6	-9.1	-7.8	-7.4	-6.4
	MP	-13.3	-11.2	-9.1	-8.6	-7.2
AVG Eff. (%)	FS	50.8	40.2	39.4	36.6	40.8
	MP	48.4	55.5	49.2	48.0	41.9
AVG Gain (dB)	FS	-2.9	-4.0	-4.1	-4.4	-3.9
	MP	-3.1	-2.6	-3.1	-3.2	-3.8
Max. Peak Gain (dBi)	FS	4.7	2.9	3.0	2.2	3.5
	MP	4.2	3.0	3.0	2.8	3.9
VSWR	FS	≤ 2.8				

FS: In Free Space
MP: On Metal Plane

Note that this magnetic mount antenna is to be installed on a metal surface, so the MP gains should be used.

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AK6N-CM276NF". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re-evaluation or new certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

2.11 Note EMI Considerations

It is recommended that a host manufacturer use D04 Module Integration Guide as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant results due to module placement to host components or properties.

For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode, see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

2.12 How to make changes

The OEM/host integrator must:

- follow mechanical, electrical and RF integration rules per the assembly drawings.
- Preserve module shielding, ground and antenna constraints.
- Perform EMC and RF exposure validations at host level.
- Apply correct external labeling and user notices.

Any modifications to the module or its integration that could affect compliance, such as changes to:

- Antenna type or placement
- Shielding or enclosure design
- PCB layout or RF parameters

must be approved prior to implementation to maintain FCC and ISED certification.

For approval requests, please contact UTEC, INC. Product Compliance:

Email: Compliance_ECOE@carrier.com

Phone: +1 (260) 358-0888

Address: UTEC, Inc.

111 E. Wayne St.

Suite 800

Fort Wayne, IN 46802

As long as all 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 cannot 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 cannot 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.

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/warnings as shown in this manual.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

Installation Procedure

- Pre-check: Confirm approved antenna, enclosure, and board stackup per assembly drawings.
- Mounting: Install the module per drawing provided.
- Power-Up: Load factory firmware [FW-ID]; enable US region profile.
- Labeling: Check the information with FCC and ISED

ISED Canada Compliance Statements

This device contains licence-exempt transmitter(s) / receiver(s) that comply with ISED Canada's license exempt RSS standard(s).

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'ISDE 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, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Radiation Exposure Statement

In order to comply with ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

Déclaration d'exposition aux radiations

Afin de se conformer aux exigences d'exposition RF ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps.

This device is intended only for OEM integrators under the following conditions: (for module device use)

- 1) The antenna must be installed and operated with greater than 20cm between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

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.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

- 1) L'antenne doit être installé et exploité avec plus de 20 cm entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coimplanté avec un autre émetteur ou antenne.

Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires Sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

Transmit Antenna

This radio transmitter (703A-CM276NF) has been approved by Innovation, Science and Economic Development Canada 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.

Manufacturer	Manufacturer Part Number	Antenna Type	Number of Antennas
Quectel	YEBM001L1AH-2RHCMA0B	Monopole	2 - MIMO Wi-Fi; Wi-Fi +BT

Highest Peak Gain with Cable Loss (dBi) [values found in spec sheets]							
Test State	2.4 Ghz	5.15-5.35 GHz	5.47-5.725 GHz	5.725-5.850 GHz	Cable loss	Connector Type	Cable length
FS (With Cable Loss)	4.67 dBi	2.9 dBi	2.97 dBi	2.2 dBi	2.4G: 3 dB/m@20°C 5G: 5 dB/m@20°C	RP SMA Male	1000mm
MP (With Cable Loss)	4.18 dBi	2.98 dBi	2.98 dBi	2.75 dBi			

Electrical	
Frequency Range	2400–2500 MHz, 5150–5850 MHz, 5925–7125 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical – Detail						
Band	Band	Wi-Fi 2G	Wi-Fi 5G		Wi-Fi 6G	
Specification	Freq. (MHz)	2400–2500	5150–5350	5470–5725	5725–5850	5925–7125
Max. VSWR	FS	1.2	2.1	2.4	2.5	2.8
	MP	1.5	1.8	2.1	2.2	2.5
Max. Return Loss (dB)	FS	-21.6	-9.1	-7.8	-7.4	-6.4
	MP	-13.3	-11.2	-9.1	-8.6	-7.2
AVG Eff. (%)	FS	50.8	40.2	39.4	36.6	40.8
	MP	48.4	55.5	49.2	48.0	41.9
AVG Gain (dB)	FS	-2.9	-4.0	-4.1	-4.4	-3.9
	MP	-3.1	-2.6	-3.1	-3.2	-3.8
Max. Peak Gain (dBi)	FS	4.7	2.9	3.0	2.2	3.5
	MP	4.2	3.0	3.0	2.8	3.9
VSWR	FS	≤ 2.8				

FS: In Free Space

MP: On Metal Plane

Note that this magnetic mount antenna is to be installed on a metal surface, so the MP gains should be used.

IMPORTANT NOTE:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid, and the IC ID cannot 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 Canada authorization.

NOTE IMPORTANTE:

Dans le cas 0b ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé Sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

The final end product must be labeled in a visible area with the following: "Contains IC: 703A-CM276NF".

Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contains IC: 703A-CM276NF".

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 l'utilisateur final quant 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 manuel.

Caution:

- (i) 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;
- (ii) 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;
- (iii) 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 as appropriate;
- (iv) where applicable, antenna type(s), antenna model(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 7.3.2.4 or 7.3.5.3 shall be clearly indicated.

Avertissement:

- (i) les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les memes canaux;
- (ii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis pour les dispositifs utilisant les bandes de 5 250 à 5 350 MHz et de 5 470 à 5 725 MHz doit être conforme à la limite de la p.i.r.e.;
- (iii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5 725 5 850 MHz) doit être conforme la limite de la p.i.r.e. spécifiée, selon le
- (iv) lorsqu'il y a lieu, les types d'antennes (s'il y en a plusieurs), les numéros de modèle de l'antenne et les pires angles d'inclinaison nécessaires pour rester conforme l'exigence de la p.i.r.e. applicable au masque d'élévation, énoncée à la section 7.3.2.4 ou 7.3.5.3, doivent être clairement indiqués