



ALLINKX
LINK EVERYTHING

A40-NA-01

Hardware Guide

Version: V1.0

Applicability Type

No.	Product Model	Description
1	A40-NA-01	MCP is 1Gbit Flash+1Gbit RAM, and MAIN_ANT, DIV_ANT、GNSS_ANT

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Change History

Version	Update Date	Description
V1.0	2025-8-20	Initial version

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1 Introduction

1.1 Document Introduction

This document describes the electrical characteristics, RF performance, structure size, application environment, etc. of A40-NA-01 module. With the assistance of the document and other instructions, the developers can quickly understand the hardware functions of the A40 module and develop products.

1.2 Safety Precautions

By following the safety guidelines below, you can protect the personal safety and help protect the product and work environment from potential damage. Product manufacturers need to communicate the following safety instructions to end users. In case of failure to comply with these safety rules, AllLinkX will not be responsible for the consequences caused by the user's misuse.



Road safety first! When you drive, do not use the handheld devices even if it has a hand-free feature. Please stop and call!



Please turn off the mobile device before boarding. The wireless feature of the mobile device is not allowed on the aircraft to prevent interference with the aircraft communication system. Ignoring this note may result in flight safety issue or even breaking the law.



When in a hospital or health care facility, please be aware of restrictions on the use of mobile devices. Radio frequency interference may cause medical equipment to malfunction, so it may be necessary to turn off the mobile device.



The mobile device does not guarantee that an effective connection can be made under any circumstances, for example, when there is no prepayment for the mobile device or the (U)SIM is invalid. When you encounter the above situation in an emergency, remember to use an emergency call, while keeping your device turned on and in areas where signal is strong.



Your mobile device receives and transmits RF signals when it is powered on. Radio interference occurs when it is near televisions, radios, computers, or other electronic devices.



Keep the mobile device away from flammable gases. Turn off the mobile device when near gas stations, oil depots, chemical plants or explosive workplaces. There is a safety hazard in operating electronic equipment in any potentially explosive environment.

1.3 Compliance Instructions

1.3.1 Important Notice to OEM Integrator

1. This module is limited to OEM installation ONLY.
2. This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).
3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations
4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are complaint with the transmitter(s) rule(s). The Grantee will provide guidance to the host manufacturer for Part 15 B requirements if needed.

1.3.2 Important Note

Notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify to AllLinkX Inc. that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the USI, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

1.3.3 End Product Labeling

When the module is installed in the host device, the FCC/IC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: 2BQGKA40NA00" "Contains IC: 34257-A40NA00" . The FCC ID/IC ID can be used only when all FCC/IC compliance requirements are met.

1.3.4 Antenna Installation

- (1) The antenna must be installed such that 20 cm is maintained between the antenna and users,
- (2) The transmitter module may not be co-located with any other transmitter or antenna.
- (3) Only antennas of the same type and with equal or less gains as shown below may be used with this module. Other types of antennas and/or higher gain antennas may require additional authorization for operation.

Antenna type	Band 2 Peak Gain (dBi)	Band 4 Peak Gain (dBi)	Band 5 Peak Gain (dBi)	Band 12 Peak Gain (dBi)	Band 13 Peak Gain (dBi)	Band 17 Peak Gain (dBi)	Band 66 Peak Gain (dBi)
External antenna	7.43	4.36	8.91	8.2	8.66	8.2	4.38

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

1.3.5 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.

1.3.6 Federal Communication Commission Interference Statement

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.

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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

1.3.6.1 List of applicable FCC rules

This module has been tested and found to comply with part 22, part 24, part 27, part 90, 15.247 and 15.407 requirements for Modular Approval.

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that 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. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

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

- 1) The antenna must be installed such that 20 cm is maintained 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.

1.3.6.3 Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

1.3.7 Industry 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, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

1.3.7.1 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 28 cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 28 cm de distance entre la source de rayonnement et votre corps.

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

- 1) The antenna must be installed such that 28 cm is maintained 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 installée de telle sorte qu'une distance de 28 cm est respectée entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coïmplanté 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.

1.3.7.3 IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or colocation with another transmitter), then the Canada authorization is no longer considered valid and the IC 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 Canada authorization.

NOTE IMPORTANTE:

Dans le cas où 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.

1.3.7.4 End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 28 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC:34257-A40NA00" .

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un dispositif où l'antenne peut être installée de telle sorte qu'une distance de 28cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 34257-A40NA00 ".

1.3.7.5 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 manuel.

2 Product Overview

The A40 series wireless module is a broadband wireless terminal product applicable to various network formats and multi-bands include TDD-LTE /FDD-LTE.

2.1 Product Specification

Table 2- 1 Product specification

Specification		
Operating frequency	LTE FDD: See Table 7- 6	
Data transmission	LTE FDD Rel.9	150Mbps DL/50Mbps UL (Cat 4), LTE Downlink MIMO 2×2, 4×2 (support part of R10)
Power	3.3V–4.3V (3.8V is recommended)	
Temperature	Normal: –30°C to +75°C	
	Extended: –40°C to +85°C	
	Storage: –40°C to +85°C	
Power consumption	Base current: ≤1.0mA	
	Sleep mode: ≤ 2.6mA	
	Idle mode: < 16mA (USB disconnect), < 28mA (USB connection)	
Physical characteristics	Package: LCC +LGA 144PIN	
	Size: (32±0.15) mm x (29±0.15) mm x (2.45±0.2) mm	
	Weight: 5.2±0.3g	
Interface		
Antenna	Antenna: Main x 1, GNSS x 1, DIV x 1 (Each type of antenna is different, please refer to the specific model)	
Functional Interface	USIM 3.0V/1.8V	
	USB 2.0 x 1	
	Status indicator	
	UART x 2, PCM, I ² C, SGMII, SDIO, GPIOs, ADC x 2, SPI	
Software		
Protocol stack	Embedded TCP/IP and UDP/IP protocol stack	
AT command	3GPP TS 27.007 and 27.005, and proprietary ALLLINKX AT	

Firmware update	USB (UART does not support DOWNLOAD) and DFOTA upgrade ^①
Voice service ^②	SRLTE, VoLTE, HR, FR, EFR, AMR, DTMF, Caller ID, Call Transfer, Call Hold, Call Waiting and Multi-Talk, etc.
SMS	Point-to-point MO, MT, cell broadcast; support Text and PDU modes
GNSS function ^③	GPS, GLONASS, BeiDou/Compass, Galileo, QZSS


Note:

1. When the temperature is beyond the normal operating temperature range (–30 °C to + 75 °C), the RF performance of the module may slightly exceed the 3GPP specification.

3 RF Interface

A40 series module has ANT_MAIN, ANT_DIV and ANT_GNSS three antenna interfaces. The pin definition is described in the following table.

Table 7-1 RF interface

Pin Name	I/O	Pin No.	Description
ANT_DIV	I	35	Diversity antenna
ANT_GNSS	I	47	GPS antenna
ANT_MAIN	IO	49	Main antenna

3.1 Operating Bands

The RF operating frequency bands of A40 series modules are as follows:

3.1.1 A40-NA Operating bands

Table 7-6 A40-NA Operating bands

Operating Band	Description	Mode	Tx (MHz)	Rx (MHz)
Band 2	PCS 1900MHz	LTE FDD	1850–1910	1930–1990
Band 4	AWS-1 1700	LTE FDD	1710–1755	2110–2155
Band 5	CLR 850MHz	LTE FDD	824–849	869–894
Band 12	Lower SMH blocks A/B/C 700	LTE FDD	699–716	729–746
Band 13	Lower SMH blocks A/B/C 700	LTE FDD	777–787	746–756
Band 17	Lower SMH (Blocks B–C)	LTE FDD	704–716	734–746
Band 66	Extended AWS 1 (Blocks A–I)	LTE FDD	1710–1780	2110–2180

3.2 Output Power

The RF output power of each A40 series module is shown in the following table:

3.2.1 A40-NA Output Power

Table 7-11 A40-NA Output power

Mode	Band	Tx Power(dBm)	3GPP(dBm)	Note
LTE FDD	Band 2	23±2	23±2.7	10MHz Bandwidth, 1 RB
	Band 4	23±2	23±2.7	10MHz Bandwidth, 1 RB
	Band 5	23±2	23±2.7	10MHz Bandwidth, 1 RB

Mode	Band	Tx Power(dBm)	3GPP(dBm)	Note
	Band 12	23±2	23±2.7	10MHz Bandwidth, 1 RB
	Band 13	23±2	23±2.7	10MHz Bandwidth, 1 RB
	Band 17	23±2	23±2.7	10MHz Bandwidth, 1 RB
	Band 66	23±2	23±2.7	10MHz Bandwidth, 1 RB

3.3 Receive Sensitivity

The receiving sensitivity of each series of A40 modules is shown in the following table:

3.3.1 A40-NA Receive sensitivity

Table 7- 16 A40-NA Receive sensitivity

Mode	Band	PRX (dBm)	DRX (dBm)	PRX+DRX (dBm)	3GPP (PRX+DRX) (dBm)
FDD	Band 2	-99	-99.5	-102	-94.3
	Band 4	-99	-99	-102	-96.3
	Band 5	-99	-101	-102.5	-94.3
	Band 12	-100	-101	-103.5	-93.3
	Band 13	-100	-100	-103	-93.3
	Band 17	-99.5	-99.5	-102	-93.3
	Band 66	-99	-98.5	-102	-95.8

3.4 GNSS Receiver

3.4.1 GNSS Specification

A40 series module supports GNSS function and adopts Qualcomm Gen8 technology, its specification is as follows:

Table 7- 17 GNSS specification

A40 series module adopts NMEA-0183 protocol.

Description		Condition	Typ.	Note
Power Consumption (AT+CFUN=4)		GNSS fixing	52mA	Unplug USB
		GNSS tracking	52mA	Unplug USB
TTFF	GNSS	Cold start	35s	-
		Warm start	33s	-
		Hot Start	2s	-
CN0		GNSS Signal@-130dBm	40dB-Hz	
Sensitivity	Acquisition	GNSS Signal	-148dbm	-
	tracking	GNSS Signal	-159dbm	-
Positional Accuracy	CEP-50	GNSS Signal @-130dBm	2.5m	-