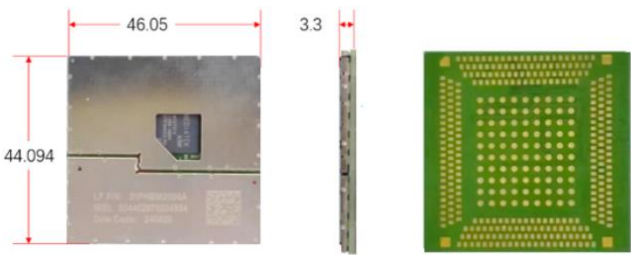


FIH 31PHBM2000A

Smart automotive LTE module

Support Wi-Fi, multi-GNSS function



31PHBM2000A is a smart automotive LTE module, which is designed by FIH, with strictly follow IATF 16949:2016 global technical specification and quality management standard for automotive industry. This NAD module could afford harsh environmental tests and has superior performance for ESD and EMC. It is a solution designed specifically for automotive industry, on intelligent connected vehicle application field.

31PHBM2000A is an intelligent vehicle module based on MTK MT2731 platform, which is dual-core high performance ARM®Cortec-A53 MPCore™ operating up to 1.46GHz Soc, equipped with Linux OS (version: Yocto Telematics Baseline (Poky/meta-mediatek-ivt) 12.0.0 (nostromo)) operating system.

31PHBM2000A is suitable for Automotive applications based on its LTE/WCDMA/GSM communication, 802.11 a/b/g/n/ac 1T1R WLAN, And multi-GNSS system (GPS, Glonass, Beidou, Galileo and QZSS) features, which support good network connection, and achieve fast and accurate positioning performance.

The 31PHBM2000A integrates rich interfaces such as PCIE, USB, RGMII, UART, I2C and SPI interfaces, greatly expanding its application in vehicle multimedia area. It can support rich in car functions such as navigation, entertainment, etc.



Main features

- ✓ Aimed at IATF 16949:2016 quality management standard for automotive industry.
- ✓ Operation temperature range (-40° C ~ +85° C) 、 excellent EMI capacity for harsh vehicle application environment request
- ✓ Based on MTK dual core ARM®Cortec-A53 MP Core TM processor.
- ✓ Full mode network coverage
- ✓ Integrated multiple constellation GNSS receivers, to meet fast and accurate positioning in harsh environments.



ARM Cortex-A53  
1.46GHz dual-core



Linux OS



LTE Cat4  
Max 150Mbps (Downlink)  
Max 50Mbps (Uplink)



IEEE 802.11  
a/b/g/n/ac



GPS/Glonass/Beidou/Galileo/QZSS



LTE Cat 4	31PHBM2000A
Area/Operation	North America/AT&T
CPU	MT2731, dual-core high performance ARM®Cortec-A53 MPCore™ Operating up to 1.46GHz
Memory	1GB NAND+1GB LPDDR4
Operation system	Linux OS version: Yocto Telematics Baseline (Poky/meta-mediatek-ivt) 12.0.0 (nostromo)
Module size (mm)	44.094 × 46.05 × 3.3
Package	LGA
Weight (g)	13.6
Temperature range	
Operation temperature range	-40° C ~ +95° C
Storage temperature range	-40° C ~ +95° C
Bands information	
LTE-FDD	B2/B4/B5/B7/B12/B13/B17/B25/B26/B66/B71
LTE-TDD	NA
WCDMA	B2/B4/B5
EVDO/CDMA	NA
GSM/EDGE	NA
WLAN	2.4/5 GHz, 802.11a/b/g/n/ac (Not support MIMO)
Bluetooth	NA
GNSS	GPS/Glonass/Beidou/Galileo/QZSS
Certification	
Operator TA	AT&T*
Regulatory/Conformance TA	FCC/PTCRB
Environmental	
Regulatory compliant	RoHS/REACH/POPs
Data transfer speed	
LTE-FDD (Mbps)	150 (downlink) / 50 (uplink)
LTE-TDD (Mbps)	NA
DC-HSPA+ (Mbps)	42 (downlink) / 5.7 (uplink)
WCDMA (kbps)	384 (downlink) / 384 (uplink)
EVDO (Mbps)	NA
EDGE (kbps)	NA
GPRS (kbps)	NA
Highlight features	
3GPP E-UTRA	Release 9
Bandwidth	1.4/3/5/10/15/20 MHz
Rx-diversity	Yes
DL MIMO 2 × 2	Yes
(U)SIM Card detection	Yes
DSDS	No
Dual screen display	NA
Upgrade through USB	Yes
Upgrade through OTA	Yes

Notes:  
1. \*: Under development/Planned.

LTE Cat 4 31PHBM2000A characteristic	
Interfaces	
Display	NA
Audio (analog)	x2, support 2 Diff input and 1 Diff output
MSDC	x1, 1 set with 8-bit data lines
USB	x1, support USB 2.0 OTG
(U)SIM	x2, support 1.8/3.0 V USIM card; Support SIM slot or eSIM
UART	x2, 1 set supports HW flow control with CTS/RTS pin 1 set for debug
PCIE	x1, support PCIe gen2,RC mode
ADC	x2, ADC channel with 12-bit resolution
I2C	x2, 1 set supports push-pull and OD mode, speed up to 400K/1 set supports GPIO mode
Audio(digital)	x1, support I2S
SPI	x3, support HW master interface
RGMII	x1, support GbE with MDIO
GPIO	x6
Antenna	x4, Main Ant, Diversity Ant, WIFI2.4G/5G, GNSS Ant
Electrical Characteristics	
Power supply	3.6V~4.2V, 4.0V Typ.
Power consumption	TBD

Notes:  
\*: Under development.

INTEGRATION INSTRUCTIONS

This modular transmitter complies with FCC Rules Part 15C, Part 22,24,27,90

Specific operational use conditions

This module can be used in IOT devices, the input voltage to the module is nominally 4V, and the Operating Temperature is -40°C ~ 85°C.

Antenna Change Notice to Host manufacturer

Recommend using antenna which certified with this module mentioned in this manual.  
If you desire to increase antenna gain and either change antenna type or use same antenna type certified, a Class II permissive change application is required to be filed by us, or you (host manufacturer) can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application, based on the new emissions testing. Please perform testing on frequency bands where the antenna gain is highest, worst-case band-edges based on original filing, and only on frequency bands where the antenna gain is highest.

a list of all antenna types

Antenna Type	Max. Antenna Gain
Dipole Antenna	2.4G WIFI: 2.5dBi 5G WIFI: U-NII-1:-3.02dBi, U-NII-3:-2.37dBi
Dipole Antenna	(Max allowed gain): WCDMA B2:7dBi; B4: 4dBi; B5:9.42dBi LTE B2:8dBi; B4: 5dBi; B5:9.41dBi, B7:8dBi, B12:8.7dBi, B13:9.16dBi, B17: 8.74dBi, B25: 8.0dBi; B26:9.36dBi; B66:5dBi,

	B71:8.48dBi
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**Instruction to Host product manufacturer when choosing external connector**

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

**Labelling and compliance statement instruction for host product manufacturer**

Please notice that 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 FCC ID: **RYQ31PHBM2000A**” any similar wording that expresses the same meaning may be used.

§ 15.19 Labelling requirements shall be complied on end user device.  
Labelling rules for special device, please refer to §2.925, § 15.19 (a)(5) and relevant KDB publications. For E-label, please refer to §2.935.  
FCC regulatory Compliance Statement mentioned in this manual shall be properly included in host product manual per FCC Rules.  
The host product manufacturer shall be aware not to provide information to the end user on how to install or remove this module in your host product manual.

**Guide on test modes and additional testing requirements**

Host product manufacturer is ultimately responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, additional transmitter(s) in the host, etc.).  
For test modes, please contact original manufacturer for help.

**Disclaimer on additional testing, Part 15 Subpart B compliance of Host Product**

This modular transmitter is only FCC authorized for the specific rule parts listed on our grant, 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.  
Host manufacturer in any case shall ensure host product which is installed and operating with the module is in compliant with Part 15B requirements.  
Please note that For a Class B or Class A digital device or peripheral, the instructions furnished the user manual of the end-user product shall include statement set out in §15.105 *Information to the user* or such similar statement and place it in a prominent location of host product manual. Original texts from FCC Rules are as following you may refer to:  
For Class B

*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 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 regulatory compliance statement**

**§15.19 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.

**§15.21 Information to user**

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

**RF Exposure compliance statement**

This module complies with FCC 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 and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

**ISED compliance statement**

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

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

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The user manual for LE-LAN devices shall contain instructions related to the restrictions mentioned in the above sections, namely that:

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;

le dispositif utilisé dans la bande 5150-5250 MHz est réservé à une utilisation en intérieur afin de réduire le risque de brouillage préjudiciable aux systèmes mobiles par satellite dans le même canal;

**ISED Radiation Exposure statement**

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps. Cet émetteur ne doit pas être colocalisé ou fonctionner en conjonction avec une autre antenne ou un autre émetteur.

Please notice that if the IC 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 IC:6989A-31PHBM2000A" any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit

## 31PHBM2000A

hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit :

Contient IC: 6989A-31PHBM2000A est le numéro d'homologation du module

This radio transmitter [IC: 6989A-31PHBM2000A] 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.