ARMXY EMBEDDED

COMPUTER DATASHEET

ARMxy BL410 Series

Version History

Version	V1.0	2024-3-30	Initial Release	

Contents

1. Overview

The ARMxy BL410 series is a versatile industrial ARM controller designed for flexible I/O configuration. It is based on the Rockchip RK3568J/RK3568B2 processor, featuring aquad-core ARM Cortex-A55 architecture with clock speed up to 1.8GHz/2.0GHz. The device is equipped with 8/16/32GB eMMC storage and various combinations of 1/2/4GB LPDDR4X RAM. Additionally, it includes a built-in 1TOPS computing power Neural Processing Unit (NPU) for supporting deep learning tasks.

The BL410 series ARM embedded computer offers a rich array of interfaces including 3 x 10/100M Ethernet ports, 2 x USB 2.0 ports, 1 x optional HDMI 2.0a port, 1 x optional X series IO board, 2 x optional Y series IO boards. These interfaces support various functions such as communication, PWM output, pulse counting, and data acquisition and control. The BL410 also supports hardware decoding of 1080P@60fps videos.

Additionally, it features a built-in Mini PCIe interface to support communication modules such as Bluetooth, Wi-Fi, and 4G modules.

BL410 series ARM-based embedded computers support the Linux-5.10.209 and Linux-RT-5.10.209 kernels, as well as operating systems such as Ubuntu 20.04, Debian 10.13, and Android 13. They also support Docker containers, Node-Red, and graphical user interface development tools like Qt-5.15.2. In addition, BL410 is compatible with BLIoTLink industrial protocol conversion software for data collection and transformation, and can seamlessintegration with various mainstream IoT cloud platforms and industrial SCADA software. Users can leverage the BLRAT for remote access and maintenance of the BL410 embedded computer. Additionally, with support for Node-Red, users can rapidly develop IoT applications on the BL410.

The BL410 series ARM embedded computer has undergone rigorous electrical performance design and high-low temperature testing to ensure stability and reliability. It is designed for DIN35 rail mounting, making it suitable for various industrial application environments.

This embedded computer is widely used in industrial IoT, photovoltaic power generation and energy storage systems, automation control, and transportation and rail applications.

2. Typical Application Areas

- Industrial Control
- Edge Computing
- Data Acquisition
- Energy Storage Systems
- Photovoltaic Power Generation
- IoT Gateway
- Rail Transportation
- Smart Devices

3. Software and Hardware Specifications

Exterior Structure and Dimensions of Product with 1 Ethernet Port:

Standard Model

C Model

A Model

B Model

Exterior Structure and Dimensions of Product with 2 Ethernet Ports:

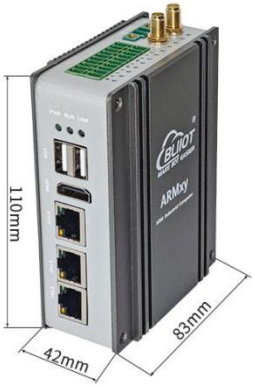
Standard Model

A Model

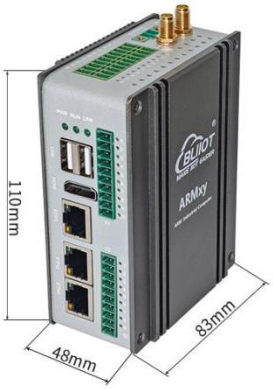
B Model

Exterior Structure and Dimensions of Product with 3 Ethernet Ports:

Standard Model



A Model



B Model

Hardware	Parameters
CPU	Rockchip RK3568J/RK3568B2, 22nm
	ARM Cortex-A55 cores (64-bit) with a clock speed of 1.4GHz in normal mode and up to 1.8GHz in overdrive mode.
	RK3568B2 clock speed 2.0GHz
	NPU: 1 TOPS Supports INT8/INT16/FP16/BFP16 Supports TensorFlow/PyTorch/Caffe/MXNet deep learning frameworks
	Encoder: Supports 4K@60fps H.265/H.264 video decoding

	Decoder: Supports 1080P@60fps H.265/H.264 video encoding
ROM	8/16/32GByte eMMC
RAM	1/2/4GByte LPDDR4X
ETH	RJ-45, 1~3, 3x10/100M, ESD Level 3, EFT Level 3
USB	2x USB2.0 HOST(USB1, USB2), supports high-speed 480Mbps, ESD Level 3
HDMI	1x HDMI2.0a, support 1080P@120fps, 4K@60fps
I/O Slot	X series I/O board slot: 1, X series I/O board, support RS485, CAN, RS232, RS422, DI, DO, GPIO, etc; Y series I/O board slot: 2, Y series I/O board, support RS485, CAN, RS232, RS422, DI, DO, Relay output, AI, AO, PT100, PT1000, TC, etc.
LED	1x power indicator light
	2x user-programmable indicator light
Mini PCIe	1, Supports Bluetooth, Wi-Fi, 4G module, etc.
SIM Slot	1 slot, NANO
Antenna	2, For 4G/Wi-Fi/GPS
Debug	1x Micro USB debug port
SD Slot	1
Reset	1 reset button
Watchdog	Onboard independent hardware watchdog
Power	Rated DC 24V, supports wide voltage range of 12-24VDC Equipped with reverse polarity protection and overcurrent protection 3-pin terminal block with screw terminals
Grounding	1-pin GND terminal
Installation	DIN35 rail mounting, wall mounting
Material	Aluminum alloy casing + stainless steel
Dimension	110*83*42mm or 110*83*48mm

Software	Parameters
Kernel	Linux-5.10.209, Linux-RT-4.19.232
File System	Buildroot-201802, Ubuntu20.04
GUI development tool	Qt-5.15.2

4. Software Ecosystem

Category	Software	Type	Highlights
Industrial Communication & Protocols	IGH EtherCAT Master	Open Source	Supports real-time EtherCATmaster for high-precision motion control and synchronized I/O.
Data Acquisition Edge Processing	BLIoTLink	Proprietary	Data acquisition and protocol conversion, supporting multiple protocols and API-based secondary development.
	Node-RED	Open Source	Low-code logic orchestration tool,supporting visual flow design and custom nodes.
	Vnode	Open Source	Lightweight edge computing node,suitable for high-efficiency data pipeline processing.
Industrial Control & Execution	OpenPLC	Open Source	Open-source PLC, suitable for simple logic control and local automation.
	CODESYS Runtime	Licensed	Industrial control platform, supporting full IEC61131-3 programming and motion control.
	Beremiz	Open Source	Open-source IEC61131-3 compliant PLC integrated development environment for machine automation,providing tools to create HMI.
	NexPLC	Proprietary	Next-generation industrial control and operation & maintenance integrated platform, supporting cloud-based collaboration.
Visualization & Monitoring	FUXA	Open Source	Lightweight web-based SCADA, suitable for rapid configuration and small to medium monitoring projects.
	Ignition	Open Source	Enterprise-level industrial platform,supporting integrated SCADA, MES, and IoT deployment.
	Grafana	Open Source	Professional time-series data visual

			ization and analytic dashboards, supporting multiple data sources.
Communication &Middleware	Nginx/Apache	Open Source	Web portal for exposing and securely managing edge services.
AI / Machine Vision	YOLOv5/8 OpenCV	Open Source	Complete edge AI vision stack, supporting object detection and image prepossessing.
	TensorFlow Lite, PyTorch Mobile	Open Source	Lightweight AI model inference frameworks, supporting edge-side intelligent analysis.
Remote Operation & Maintenance Management	BLRAT	Proprietary	Secure remote operation & maintenance channel, supporting remoted evice debugging and maintenance.
	QuickConfig	Proprietary	Graphical gateway configuration and management tool, supporting one-click deployment and monitoring.
Development & Support Environment	Python, C/C++, Node.js, Java	Open Source	Multi-language development support, suitable for diverse development scenarios and performance requirements.
	Python 3, Node.js	Open Source	Provides standard runtime, supporting scripting and containerized applications.
	Docker, Kubernetes(K3s)	Open Source	Supports application containerization and cluster management, enabling micro services architecture.
	API Documentation, Deployment Guides, Sample Projects	Proprietary / Open Source	Provides comprehensive technical documentation and typical scenario examples.
System & Security	OpenSSL	Open Source	Provides communication encryption and secure tunneling to ensure data transmission security.
	iptables	Open Source	Kernel-level firewall for network protection.
	Encryption Chip Demo	Proprietary	Encapsulates SHA-256 encryption and authentication algorithms.
	Wireshark, tcpdump	Open Source	Network protocol analysis for security monitoring.
	Prometheus + Grafana	Open Source	System resource monitoring and alerting, supporting visualized operati

			on & maintenance.

5. Product Selection

The ARMxy series ARM embedded controllers adopt a flexible design concept, allowing users to customize ROM and RAM combinations by choosing different System-on-Module(SOM) boards as needed. Additionally, various X and Y boards can be selected to achieve diverse I/O configurations, catering to the requirements of different application scenarios.

Product naming convention

Host Model Number - SOM Model Number - X Board Model Number - Y1 Board Model Number - Y2 Board Model Number

For example, if we had a specific product configuration:

Host Model: BL410

SOM Model: SOM410

X Board Model: X10

The complete product name would be:

BL410-SOM410-X10

Means 1 Ethernet port, 8GB eMMC storage, LPDDR4X is 1GByte, and 2 RS485

If you need to add Wi-Fi, then you would append "W" to the host model number.

For example: BL410W-SOM410-X10

If you need to add a 4G module, you would append "L" to the host model number.

For example: BL410L-SOM410-X10

ARMxy BL410 Model List

Model	ETH	USB	HDMI	X board I/O Slot	Y board I/O Slot	Dimension
BL410	1x10/100M	2	X	1x6PIN	X	42x83x110mm
BL410A	1x10/100M	2	X	1x20PIN	X	42x83x110mm
BL410B	1x10/100M	2	X	1x20PIN	2	48x83x110mm
BL410C	1x10/100M	2	X	1x10PIN	X	42x83x110mm
BL411	2x10/100M	2	X	1x6PIN	X	42x83x110mm
BL411A	2x10/100M	2	X	1x20PIN	X	42x83x110mm
BL411B	2x10/100M	2	X	1x20PIN	2	48x83x110mm
BL412	3x10/100M	2	1	1x6PIN	X	42x83x110mm
BL412A	3x10/100M	2	1	1x20PIN	X	42x83x110mm

BL412B	3x10/100M	2	1	1x20PIN	2	48x83x110mm

ARMxy BL410 SOM Model List

You can select the appropriate ROM, RAM, and temperature grade based on your requirements.

Model	MCU	Clock Speed	Kernel	NPU	eMMC	LPDDR 4X	Temperature
SOM410	RK3568J	1.8GHz	4 x A55	1TOPS	8GByte	1GByte	-40~85°C
SOM411	RK3568J	1.8GHz	4 x A55	1TOPS	16GByte	2GByte	-40~85°C
SOM412	RK3568J	1.8GHz	4 x A55	1TOPS	32GByte	4GByte	-40~85°C
SOM413	RK3568B2	2.0GHz	4 x A55	1TOPS	8GByte	1GByte	0~70°C
SOM414	RK3568B2	2.0GHz	4 x A55	1TOPS	16GByte	2GByte	0~70°C
SOM415	RK3568B2	2.0GHz	4 x A55	1TOPS	32GByte	4GByte	0~70°C

X Series I/O Board Model List

You can select the appropriate X series I/O board based on your requirements, ensuring that the number of pins on the X series IO board is compatible with the industrial computer's casing.

Model	RS232/RS485	CAN	DI	DO	GPIO	PIN
X10	2	x	x	x	x	6PIN
X11	x	2	x	x	x	6PIN
X12	1	1	x	x	x	6PIN
X13	x	x	2	2	x	6PIN
X14	x	x	4	x	x	6PIN
X15	x	x	x	4	x	6PIN
X16	x	x	x	x	4	6PIN
X20	4	x	x	x	x	10PIN
X21	3	1	x	x	x	10PIN
X22	2	2	x	x	x	10PIN
X23	4	x	4	4	x	20PIN
X24	3	1	4	4	x	20PIN
X25	2	2	4	4	x	20PIN
X26	2	x	8	4	x	20PIN
X27	1	1	8	4	x	20PIN
X28	2	x	12	x	x	20PIN

X29	1	1	12	x	x	20PIN
X30	x	x	x	x	16	20PIN

Y Series I/O Board Model List

You can select the appropriate Y series I/O board based on your requirements, as the Y series I/O modules are compatible with all Y slots. When the Y63 is selected, you can not choose second Y-series I/O board.

Model	Description	Model	Description
Y01	4xDI+4xDO(NPN)	Y41	4xAO, 0~20mA/4~20mA
Y02	4xDI+4xDO(PNP)	Y43	4xAO, 0~5V/0~10V
Y11	8xDI(NPN)	Y46	4xAO, ±5V/±10V
Y12	8xDI(PNP)	Y51	2xRTD, 3-Wire PT100
Y13	8xDI(Dry Contact)	Y52	2xRTD, 3-Wire PT1000
Y21	8xDO(PNP)	Y53	2xRTD, 4-Wire PT100
Y22	8xDO(NPN)	Y54	2xRTD, 4-Wire PT1000
Y24	4xDO(Relay)	Y56	Resistance Measurement
Y31	4xAI, Single-ended, 0~20mA/4~20mA	Y57	Voltage Measurement
Y33	4xAI, Single-ended, 0~5V/0~10V	Y58	4xTC
Y34	4xAI, Differential, 0~5V/0~10V	Y63	4xRS485 or RS232
Y36	4xAI, Differential, ±5V/±10V	Y95	4xPWM Output(NPN) + 4xPulse Counter Input
Y37	4xIEPE	Y96	4xPWM Output(PNP) + 4xPulse Counter Input

Ordering Notes

Y01: DI channels support dry contacts or NPN-type wet contact sensors.

Y02: DI channels support dry contacts or PNP-type wet contact sensors.

Y58: Supports thermocouples of types J, K, T, E, R, S, B, and N

6. Electromagnetic Compatibility Testing

Test	Item	Standard	Level	Condition	Result	Remarks
Electromagnetic Emission	Conducted Emission	GB/T 9254 Class A/	Class A	150 kHz - 30 MHz	PASS	Complies with limits for general

		CISPR 32 Class A				industrial environments
	Radiated Emission	GB/T 9254 Class A/ CISPR 32 Class A	Class A	30 MHz - 1 GHz	PASS	Complies with limits for general industrial environments
Immunity Testing	ESD	GB/T 17626.2/IEC 61000-4-2	Level III	Contact discharge: ±4 kV; Air discharge: ±8 kV	PASS	—
	Radiated RF Immunity	GB/T 17626.3/ IEC 61000-4-3	Level III	Field strength: 10 V/m, 80 MHz – 1 GHz	PASS	—
	EFT	GB/T 17626.4/ IEC 61000-4-4	Level III	Power lines: 2 kV; Signal lines: 1 kV	PASS	—
	Surge	GB/T 17626.5/ IEC 61000-4-5	Level III	Differential mode: 2 kV; Common mode: 4 kV	PASS	—
	Voltage Dips and Interruptions	GB/T 17626.11/ IEC 61000-4-11	Level III	Voltage dip: 70% for 500 ms; Complete interruption: 10 ms	PASS	—
	Power Frequency Magnetic Field Immunity	GB/T 17626.8/ IEC 61000-4-8	Level III	Test intensity: 30 A/m, 50 Hz	PASS	—

7. Environmental Suitability Testing

Test Item	Standard	Level	Condition	Result	Remarks
Low-Temperature Startup & Operation	GB/T 2423.1-2008/IEC 60068-2-1	N/A	Ambient temperature: +40°C, device starts and operates normally	Compliant	Meets basic low-temperature startup requirements for industrial environments.
High-Temperature Startup & Operation	GB/T 2423.2-2008/IEC 60068-2-2	N/A	Ambient temperature: +85°C, device starts and operates normally	Compliant	Meets basic high-temperature startup requirements for industrial environments.
Constant Damp Heat	GB/T 2423.3-2016/IEC 60068-2-78	N/A	Ambient temperature: +40°C, relative humidity: 85%, powered operation for 48 hours	Compliant	Ensures stable operation in humid environments.

Sinusoidal Vibration	GB/T 2423.10-2019/IEC 60068-2-6	N/A	Frequency range: 5 Hz to 500 Hz, acceleration: 2g, 10 cycles per axis (3 axes)	Compliant	Validates vibration resistance during transportation and installation.
Free Fall	GB/T 2423.7-2018/IEC 60068-2-31	N/A	With packaging: Free fall from 0.8 meters, 1 drop per face (6 faces total)	Compliant	Ensures impact resistance during transportation.
IP	GB/T 4208-2017/IEC 60529	IP30	Dust protection: Prevents entry of solid foreign objects ≥2.5mm in diameter	Compliant	Meets industrial environmental protection requirements.

Test Conclusion

After undergoing fundamental environmental adaptability testing, the device fully complies with the basic requirements of the Chinese GB/T national standards and corresponding IEC standards, demonstrating stable operation in standard industrial environments.

The following results ensure the device meets a wide range of industrial application scenarios:

- Low/High-Temperature Tests: Validates the device's operational capability under basic industrial environmental conditions.
- Vibration and Free Fall Tests: Ensures reliability during transportation and installation.
- IP Test: Complies with fundamental protection requirements for industrial environments.

8. Packing List

- One ARM embedded controller
- One set of DIN35 mounting brackets
- Ubuntu file system
- Pressure-free terminal blocks configured according to selected accessories
- When purchasing Wi-Fi and 4G modules, antennas for Wi-Fi and 4G modules will be included.

9. Technical Support & Services

- ◆ Provide system firmware images, file system images, kernel driver source code, and a variety of demo programs.
- ◆ Offer a comprehensive platform development kit and introductory tutorials to save software organization time and simplify application development.
- ◆ Provide a rich set of development examples for reference to simplify application development, including:
- ✓ Linux, Linux-RT, Qt Application Development Examples

- ✓ BLIoTLink Industrial Protocol Data Collection and Cloud Platform Integration Development Case
- ✓ BLRAT Remote Access Usage Case
- ✓ Node-Red IoT Application Development Case
- ✓ Docker Container Technology, MQTT Communication Protocol Examples
- ✓ Baremetal (Bare-Metal), RT-Thread (RTOS) Development
- ✓ Demonstration Examples of Android Operating System
- ✓ Android Application Development Guide
- ✓ ROS Operating System Demonstration Example Based on Debian
- ✓ Demonstration Examples of Domestic Operating Systems SylixOS and KylinOS
- ✓ Example of AMP Development Based on Linux + RT-Thread/Baremetal
- ✓ Example of NPU Development:
- ✓ IgH EtherCAT Master, CAN Development Examples
- ✓ 4G/Wi-Fi Development Examples
- ✓ HDMI Multimedia Display Development Examples
- ✓ Assistance with Product Customization and Development
- ✓ Customized Research and Development (R&D) and Manufacturing
- ✓ Provide Long-Term After-Sales Service

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