# ARMXY EMBEDDED

# COMPUTER DATASHEET

ARMxy BL350 Series

Version History

| | | | | |
|---|---|---|---|---|
| Version | V1.0 | 2024-12-19 | Initial Release | |
| | | | | |

# Contents

1. Overview ..... 2
2. Typical Application Areas ..... 2
3. Software and Hardware Specifications ..... 3
4. Software Ecosystem ..... 5
5. Product Selection ..... 7
6. Electromagnetic Compatibility Testing ..... 10
7. Environmental Suitability Testing ..... 11
8. Packing List ..... 12
9. Technical Support & Services ..... 12

# 1. Overview

ARMxy Series BL350 industrial ARM embedded computer is designed based on the TI Sitara AM62x processor, offering single-core, dual-core, or quad-core ARM Cortex-A53 (up to 1.4 GHz) and a single-core ARM Cortex-M4F (up to 400MHz) multi-core architecture. It uses advanced 16nm process technology, integrates a 3D graphics accelerator, and features high performance and low power consumption. The BL350 Series supports Linux-5.10.168, Linux-RT-5.10.168 kernel, Yocto 3.1 (dunfell), Debian 12 operating systems, and integrates Docker container, Node-Red visual development tool, and Qt-5.14.2 graphical interface development framework.

BL350 is compatible with BLIoTLink industrial protocol conversion software for data collection and transformation, and can seamless integration with various mainstream IoT cloud platforms and industrial SCADA software. Users can leverage the BLRAT for remote access and maintenance of the BL350 embedded computer. BL350 also comes with the QuickConfig tool, enabling quick configuration, system management. Additionally, it supports AI-assisted application development and “what-you-see-is-what-you-get”programming, making the creation of intelligent industrial solutions faster and more intuitive.

The BL350 Series is professionally designed for electrical performance and has passedhigh and low temperature testing. It can operate stably in extreme temperatures from -40 to85℃ and harsh electromagnetic environments, supports DIN35 rail mounting, and meets the needs of various industrial applications.

# 2. Typical Application Areas

- ✓ Industrial Control
- ✓ Energy Storage Systems EMS/BMS
- ✓ Industrial PLC
- ✓ Motion Controllers
- ✓ Edge Computing Gateway
- ✓ EV Charging Stations
- ✓ Blood Analyzers
- ✓ Smart Manufacturing
- ✓ Communication Management Unit
- ✓ AGV Robots
- ✓ Testing Instruments & Equipment
- ✓ Industrial Robots
- ✓ Rail Transit
- ✓ 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:

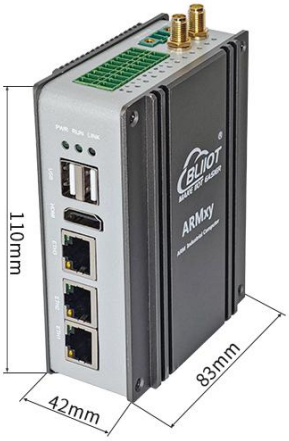

Standard Model


A Model

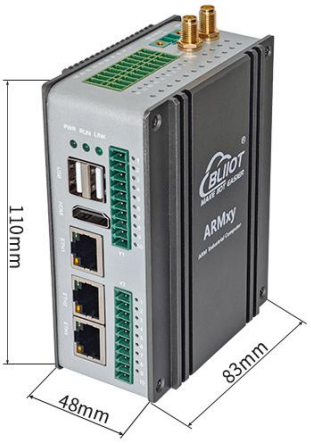

B Model

Exterior Structure and Dimensions of Product with 3 Ethernet Ports:


Standard Model




A Model




B Model

| Hardware | Parameters |
|---|---|
| CPU | TI Sitara AM6231/AM6232/AM6254, 16nm |
| | 1/2/4xARM Cortex-A53(64-bit), clock speed 1.4GHz |
| | 1xCortex-M4F, dedicated real-time processing unit, clock speed 400MHz |
| | 1xCortex-R5F, clock speed 400MHz<br>Note: The Cortex-R5F is primarily responsible for system startup, resource management, and power management functions. |
| | 1xPRU-ICSS, with two 32-bit programmable real-time units (PRU0 and PRU1), clock speed 333MHz<br>Note: PRU-ICSS supports GPIO, UART, and I2C expansion but does not support industrial communication protocols or Ethernet expansion. |
| | 3D GPU: Graphics accelerator, supports OpenGL 3.x/2.0/1.1 and Vulkan 1.2 (AM6254 only) |
| | Encoder: Supports 1080P@60fps H.264 |
| | Decoder: Supports 1080P@60fps H.265 and 1080P@60fps H.264 |
| ROM | 4/8GByte eMMC |
| RAM | 512MB/1/2GByte DDR4 |
| ETH | RJ-45, 1~3, 3x10/100M adaptive, ESD Level 3, EFT Level 3 |
| USB | 2xUSB 2.0 HOST (USB1, USB2), speed up to 480Mbps, ESD Level 3 |
| HDMI | 1xHDMI 2.0, supports 1080P@60fps |

| | |
|---|---|
| **I/O Slot** | X series I/O board slot: 1, X series I/O board, support RS485, CAN, RS232, DI, DO, GPIO, etc;<br>Y series I/O board slot: 2, Y series I/O board, support RS485, CAN, RS232,DI, DO, Relay output, AI, AO, PT100, PT1000, TC, IEPE, etc. |
| **LED** | 1xpower indicator light |
| | 2xuser-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** | 1xMicro 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<br>Equipped with reverse polarity protection and overcurrent protection<br>2-pin terminal block with screw terminals |
| **Grounding** | 1-pin GND terminal |
| **Installation** | DIN35 rail mounting, wall mounting |
| **Material** | Aluminum alloy casing + stainless steel |
| **Dimension** | 110x83x42mm or 110x83x48mm |

| Software | Parameters |
|---|---|
| **Kernel** | Linux 5.1.168 |
| **File System** | Yocto 3.1(dunfell), Debian12 |
| **GUI development tool** | Qt-5.14.2 |

# 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 visualization 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 Mo | Open Source | Lightweight AI model inference frameworks, supporting edge-side inte |

| | | | |
|---|---|---|---|
| | bile | | lligent 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 operation & maintenance. |

# 5. Product Selection

The ARMxy series ARM embedded controllers adopt a flexible design concept, allowing users to customizeROM 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 ModeNumber - Y2 Board Model Number

For example, if we had a specific product configuration:

Host Model: BL350

SOM Model: SOM351

X Board Model: X10

The complete product name would be:

BL350-SOM351-X10

Means 1 Ethernet port, 8GB eMMC storage, DDR4 is 1GByte, and 2 RS485

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

For example: BL350W-SOM351-X10

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

For example: BL350L-SOM351-X10

**ARMxy BL350 Model List**

| Model | ETH | USB | HDMI | X board I/O Slot | Y board I/O Slot | Dimensions |
|---|---|---|---|---|---|---|
| BL350 | 1x10/100M | 2 | X | 1x6PIN | X | 42x83x110mm |
| BL350A | 1x10/100M | 2 | X | 1x20PIN | X | 42x83x110mm |
| BL350B | 1x10/100M | 2 | X | 1x20PIN | 2 | 48x83x110mm |
| BL350C | 1x10/100M | 2 | X | 1x10PIN | X | 42x83x110mm |
| BL351 | 2x10/100M | 2 | X | 1x6PIN | X | 42x83x110mm |
| BL351A | 2x10/100M | 2 | X | 1x20PIN | X | 42x83x110mm |
| BL351B | 2x10/100M | 2 | X | 1x20PIN | 2 | 48x83x110mm |
| BL352 | 3x10/100M | 2 | 1 | 1x6PIN | X | 42x83x110mm |
| BL352A | 3x10/100M | 2 | 1 | 1x20PIN | X | 42x83x110mm |
| BL352B | 3x10/100M | 2 | 1 | 1x20PIN | 2 | 48x83x110mm |

## ARMxy BL350 SOM Model List

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

| Model | MCU | Clock Speed | Kernel | eMMC | DDR4 | Temperature |
|---|---|---|---|---|---|---|
| SOM350 | AM6232 | 1.4GHz | 2 x A53 +M 4F | 4GByte | 512MB | -40~85°C |
| SOM351 | AM6232 | 1.4GHz | 2 x A53 +M 4F | 8GByte | 1GByte | -40~85°C |
| SOM352 | AM6254 | 1.4GHz | 4 x A53 +M 4F | 8GByte | 1GByte | -40~85°C |
| SOM353 | AM6254 | 1.4GHz | 4 x A53 +M 4F | 8GByte | 2GByte | -40~85°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 I/O 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-ser iesI/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/ CISPR 32 Class A | Class A | 150 kHz - 30 MHz | PASS | Complies with limits for general 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, | Compliant | Validates vibration |

| | | | | | |
|---|---|---|---|---|---|
| | | | 10 cycles per axis (3 axes) | | 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
- Debian12 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:
- ✓ BLIoTLink Industrial Protocol Data Collection and Cloud Platform Integration Development Case

- ✓ Linux, Linux-RT Application Development Examples
- ✓ BLRAT Remote Access Usage Case
- ✓ Node-Red IoT Application Development Case
- ✓ Docker Container Technology, MQTT Communication Protocol Examples
- ✓ Cortex-A53 and Cortex-M4F Inter-Core Communication Example
- ✓ Graphical Interface Development Tool Qt-5.14.2 Software Development Kit
- ✓ Yocto, Debian12 Operating System Demonstration Example
- ✓ Cortex-M4F Development Examples
- ✓ IPC Multi-Core Communication Development Examples
- ✓ EtherCAT Development Examples
- ✓ 4G/Wi-Fi Development Examples
- ✓ X Board, Y Board, and Other Peripheral Drivers
- ✓ Assistance with Product Customization and Development
- ✓ Customized Research and Development (R&D) and Manufacturing
- ✓ Provide Long-Term After-Sales Service

Shenzhen Beilai Technology Co.,Ltd

https://bliiot.com