ARMXY RASPBERRY PI CM5 EMBEDDED COMPUTER DATASHEET

ARMxy BL460 Series

Version History

Version	V1.0	2024-10-19	Initial Release	

Contents

1. Overview

The BL460 series from the ARMxy family is an industrial-grade ARM controller based on the Broadcom BCM2712 quad-core Cortex-A76 processor (up to 2.4GHz). It offers flexible configurations with up to 64GB eMMC and 16GB LPDDR4X RAM, and rich I/O options including 1–3 Ethernet ports, USB 3.0, HDMI, M.2, Mini PCIe, and expandable X/Y series I/O boards.

Compatible with the Raspberry Pi ecosystem, the BL460 supports Linux, Raspberry Pi OS, Docker, Node-Red, and Qt, enabling fast development and cross-platform integration. It also supports BLIoTLink for industrial data acquisition and protocol conversion, BLRAT for remote access, and the QuickConfig tool for easy setup.

BL460 also supports Hailo AI accelerator modules via the M.2 interface. The Hailo compute module is built on Hailo's proprietary AI processor architecture, delivering high-performance, low-power AI inference for edge devices.

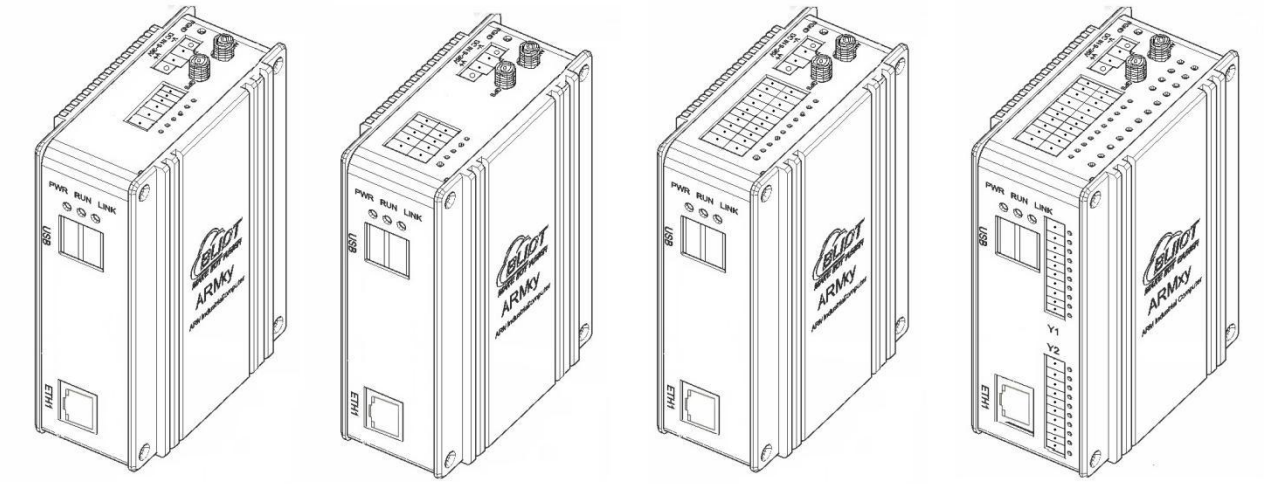
Designed for edge computing, industrial control, IoT gateways, and smart automation, the BL460 operates reliably in -20°C to +85°C environments and supports DIN-rail mounting for industrial applications.

2. Typical Application Areas

- ✓ Industrial Control
- ✓ Industrial PLC
- ✓ Edge Computing Gateway
- ✓ Blood Analyzer
- ✓ Communication Management Unit
- ✓ Testing Instruments and Equipment
- ✓ Rail Transit
- ✓ Energy Storage System
- ✓ Motion Controller
- ✓ EV Charging Pile
- ✓ Smart Manufacturing
- ✓ AGV Robot
- ✓ Industrial Robot
- ✓ Smart Devices

3. Software and Hardware Specifications

Exterior Structure and Dimensions of Product with 1 Ethernet Port:



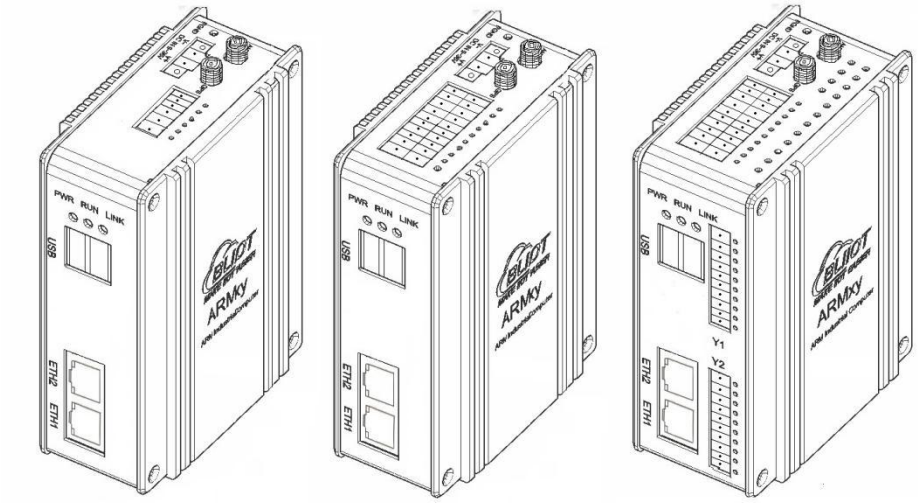
Basic
42*83*110mm

C Type
42*83*110mm

A Type
42*83*110mm

B Type
48*83*110mm

Exterior Structure and Dimensions of Product with 2 Ethernet Ports:

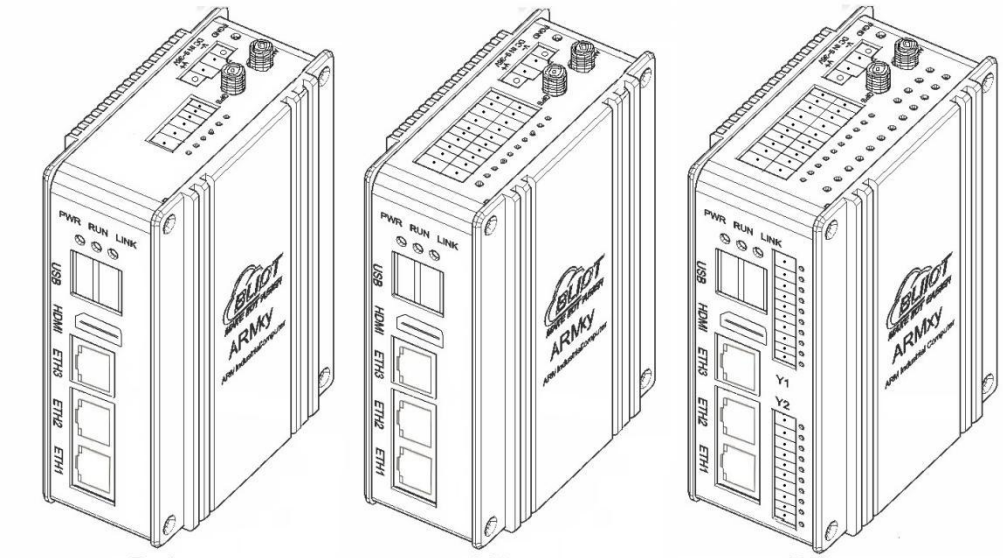


Basic
42*83*110mm

A Type
42*83*110mm

B Type
48*83*110mm

Exterior Structure and Dimensions of Product with 3 Ethernet Ports:



Basic
42*83*110mm

A Type
42*83*110mm

B Type
48*83*110mm

Hardware	Parameters
CPU	Broadcom BCM2712, 16nm
	4xCortex-A76, Clock Speed: 2.4GHz
	GPU: VideoCore VII, supports OpenGL ES 3.1, Vulkan 1.2, and 4Kp60 HEVC decoding
ROM	8/16/32/64GByte eMMC
RAM	2/4/8/16GByte LPDDR4X
ETH	RJ-45, 1~3, 1x10/100/1000M, 2x10/100M, ESD Level 3, EFT Level 3
USB	2xUSB 3.0, up to 5.0 Gbps, ESD Level 3
HDMI	1xHDMI 2.1, supports 4K@60fps
I/O Slot	X series I/O board slot: 1, X series I/O board, support RS485, RS232, RS422, DI, DO, GPIO, etc; Y series I/O board slot: 2, Y series I/O board, support RS485, RS232, RS422, DI, DO, Relay output, AI, AO, PT100, PT1000, TC etc.
LED	1xpower indicator light
	2xuser-programmable indicator light
Mini PCIe	1, Supports 4G, Wi-Fi module
M.2	1xM.2 slot, supports 2242-size SSD, Hailo AI Accelerator Module support
SIM Slot	1 slot, NANO
Antenna	2, For 4G/5G/Wi-Fi/GPS
Debug	1xMicro USB debug port

SD Slot	1(For Lite version SOM only)
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 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 6.6.78-v8-16k
Operating System	Raspberry Pi OS, Linux6.6.78
GUI development tool	Qt-5.15.11

40-pin Expansion Board

Using the WiringPi hardware control library, the 40-pin GPIO pins can be controlled easily, quickly, and intuitively.

Note:

When using the 40-pin expansion board, the enclosure provided by our company cannot be used.

GPIO14 and GPIO15 are multiplexed for the mainboard debug port.

GPIO2 and GPIO17 are multiplexed for the RUN and network indicator LEDs.

GPIO6 and ID_SD are multiplexed for the hardware watchdog.

Modifying these GPIOs will cause the above functions to fail. Therefore, it is not recommended to use the 40-pin expansion board together with the X board or Y board.

When used together with the X board:

The X board shares GPIO3, 4, 5, 7, 12, 13, 16, 22, 23, 24, 25, and 27 with the 40-pin pin s. Using both boards will interfere with the state of these GPIOs.

When used together with the Y board:

Slot 1 shares GPIO8, 9, 10, 11, and ID_SC.

Slot 2 shares GPIO1, 18, 19, 20, 21, and 26.

Modifying any of these GPIOs will cause the connection with the Y board to fail.

4. Software Ecosystem

Category	Software	Type	Highlights
Industrial Communication & Protocols	IGH EtherCAT Master	Open Source	Supports real-time EtherCATmasterfor 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 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 remotedevice 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 developments cenarios 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 scenarioexamples.
System & Security	OpenSSL	Open Source	Provides communication encryptiona nd 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 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:

BL461-CM5016032-X10

Means 2 Ethernet port, 32GB eMMC storage, 16GB LPDDR4X, and 4 RS485 ports

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

For example: BL461L-CM5016032-X10

ARMxy BL460 Model List

Model	ETH	USB	HDMI	X board I/O Slot	Y board I/O Slot	Dimension
BL460	1x10/100/1000M	2	X	1x6PIN	X	42x83x110mm
BL460A	1x10/100/1000M	2	X	1x20PIN	X	42x83x110mm
BL460B	1x10/100/1000M	2	X	1x20PIN	2	48x83x110mm
BL460C	1x10/100/1000M	2	X	1x10PIN	X	42x83x110mm
BL461	1x10/100/1000M，1x10/100M	2	X	1x6PIN	X	42x83x110mm

BL461A	1x10/100/1000M，1x10/100M	2	X	1x20PIN	X	42x83x110mm
BL461B	1x10/100/1000M，1x10/100M	2	X	1x20PIN	2	48x83x110mm
BL462	1x10/100/1000M，2x10/100M	2	1	1x6PIN	X	42x83x110mm
BL462A	1x10/100/1000M，2x10/100M	2	1	1x20PIN	X	42x83x110mm
BL462B	1x10/100/1000M，2x10/100M	2	1	1x20PIN	2	48x83x110mm

ARMxy BL460 SOM Model List

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

Model	MCU	Clock Speed	Wireless	eMMC	LPDDR4X	Temperature
CM5002000	BCM2712	2.4GHz	x	0GB (Lite)	2GB	-20~85℃
CM5002016	BCM2712	2.4GHz	x	16GB	2GB	-20~85℃
CM5002032	BCM2712	2.4GHz	x	32GB	2GB	-20~85℃
CM5004000	BCM2712	2.4GHz	x	0GB (Lite)	4GB	-20~85℃
CM5004016	BCM2712	2.4GHz	x	16GB	4GB	-20~85℃
CM5004032	BCM2712	2.4GHz	x	32GB	4GB	-20~85℃
CM5008000	BCM2712	2.4GHz	x	0GB (Lite)	8GB	-20~85℃
CM5008016	BCM2712	2.4GHz	x	16GB	8GB	-20~85℃
CM5008032	BCM2712	2.4GHz	x	32GB	8GB	-20~85℃
CM5016000	BCM2712	2.4GHz	x	0GB (Lite)	16GB	-20~85℃
CM5016016	BCM2712	2.4GHz	x	16GB	16GB	-20~85℃
CM5016032	BCM2712	2.4GHz	x	32GB	16GB	-20~85℃
CM5016064	BCM2712	2.4GHz	x	64GB	16GB	-20~85℃
CM5102000	BCM2712	2.4GHz	PCB/ext	0GB (Lite)	2GB	-20~85℃
CM5102016	BCM2712	2.4GHz	PCB/ext	16GB	2GB	-20~85℃
CM5102032	BCM2712	2.4GHz	PCB/ext	32GB	2GB	-20~85℃
CM5104000	BCM2712	2.4GHz	PCB/ext	0GB (Lite)	4GB	-20~85℃
CM5104016	BCM2712	2.4GHz	PCB/ext	16GB	4GB	-20~85℃
CM5104032	BCM2712	2.4GHz	PCB/ext	32GB	4GB	-20~85℃
CM5108000	BCM2712	2.4GHz	PCB/ext	0GB (Lite)	8GB	-20~85℃
CM5108016	BCM2712	2.4GHz	PCB/ext	16GB	8GB	-20~85℃
CM5108032	BCM2712	2.4GHz	PCB/ext	32GB	8GB	-20~85℃
CM5108064	BCM2712	2.4GHz	PCB/ext	64GB	8GB	-20~85℃
CM5116000	BCM2712	2.4GHz	PCB/ext	0GB (Lite)	16GB	-20~85℃
CM5116016	BCM2712	2.4GHz	PCB/ext	16GB	16GB	-20~85℃
CM5116032	BCM2712	2.4GHz	PCB/ext	32GB	16GB	-20~85℃
CM5116064	BCM2712	2.4GHz	PCB/ext	64GB	16GB	-20~85℃

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
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
X23	4	x	4	4	x	20PIN
X26	2	x	8	4	x	20PIN
X28	2	x	12	x	x	20PIN

Y Series I/O Board Model List

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) + 4xPuls

				e 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: ±6 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	N/A	Ambient temperature: +40°C, device starts and	Compliant	Meets basic low-temperature

	60068-2-1		operates normally		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 wit h the basic requirements of the Chinese GB/T national standards and corresponding IEC sta ndards, demonstrating stable operation in standard industrial environments.

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

- Low/High-Temperature Tests: Validates the device's operational capability under basic ind ustrial 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
- Linux 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 in cluded.

9. Technical Support & Services

- ◆ Provide system firmware images, file system images, kernel driver source code, and a v ariety of demo programs.
- ◆ Offer a comprehensive platform development kit and introductory tutorials to save softwa re organization time and simplify application development.
- ◆ Provide a rich set of development examples for reference to simplify application develop ment, 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
- ✓ 4G/5G/Wi-Fi/Bluetooth Development Cases
- ✓ 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