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BKHD-1338-12-2L Motherboard User Manual

VER 1.0A

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Disclaimer

Safety Guide

To ensure optimal performance of BKHD products, please read the user manual in its entirety. Before checking product-specific details, we kindly ask that you carefully read these safety instructions.

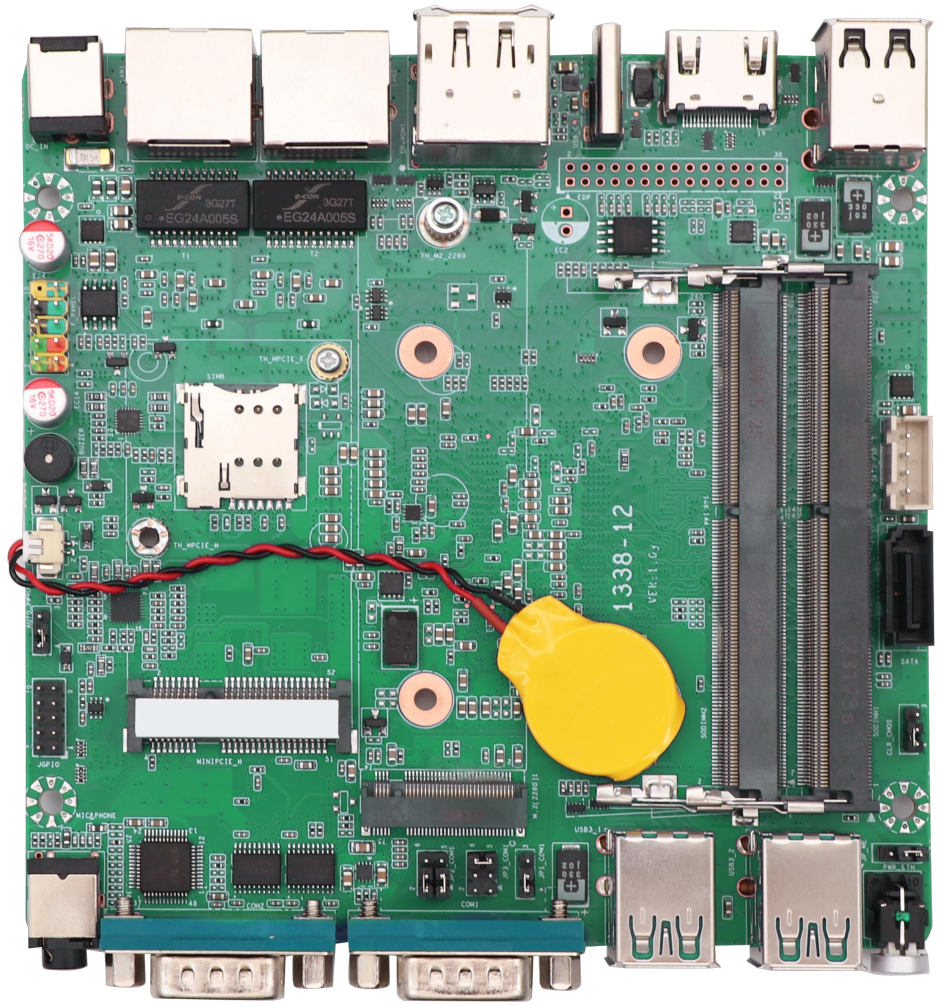
Product Version Identification

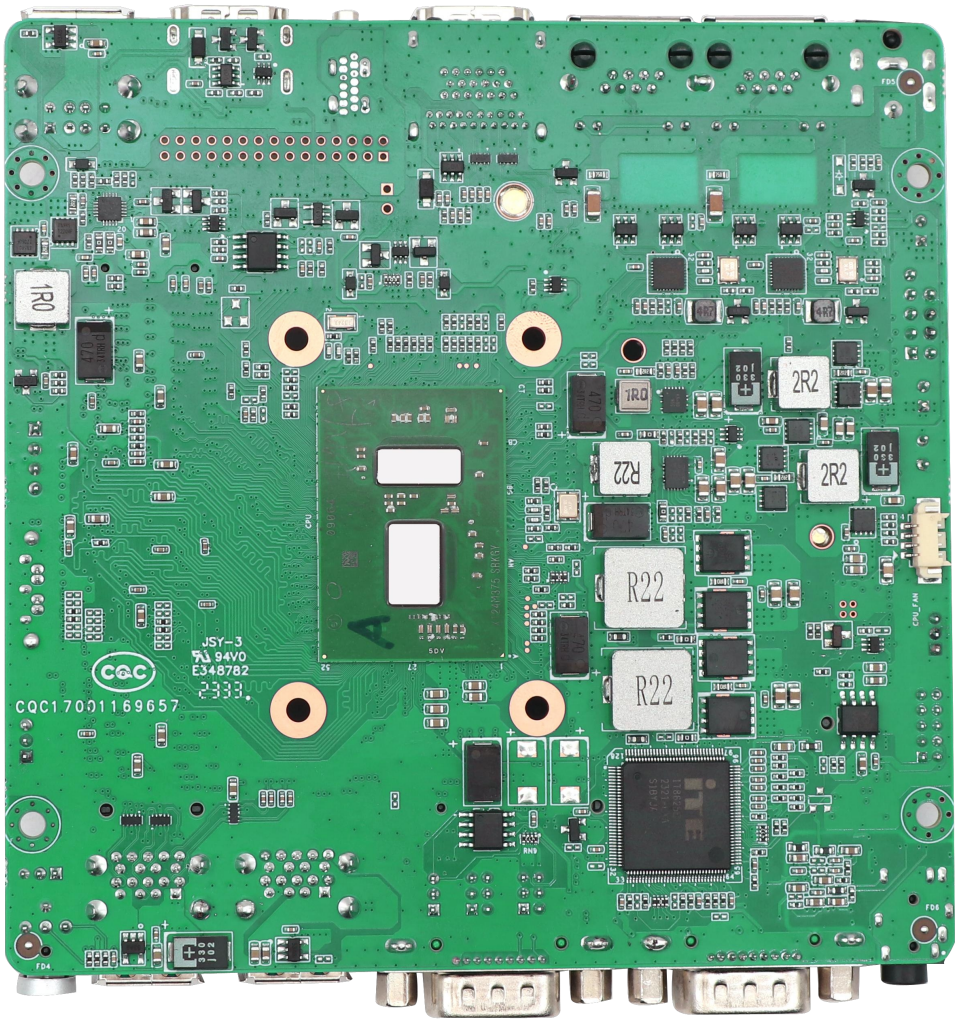
You can find the version of this motherboard on the motherboard itself, marked as "REV: X.X". X.X represents numbers, for example, "REV: 1.0" means the motherboard version is 1.0. When updating the motherboard's BIOS, drivers, or referring to other technical data, please pay attention to the product version marking.

Catalog

Product Images

Please be advised that products manufactured in different batches may exhibit slight variations in appearance. To ensure the most accurate representation, please refer to the actual received goods.





Product Profile

The 1338-12-2L is a compact industrial embedded motherboard powered by the Intel Celeron N Series platform. It supports up to 16GB DDR4 SO-DIMM memory, SATA 6Gb/s, and M.2 Key-M SSD storage. With dual Gigabit Ethernet, rich USB, dual serial ports, GPIO, SIM slot, mPCIe, audio, DP, and dual HD outputs, it offers strong integration flexibility for industrial control, smart terminals, digital signage, HMIs, edge gateways, and automation systems. Its -20°C to 55°C operating range ensures reliable performance in demanding environments.

Main features:

Compact Industrial Embedded Platform

The 1338-12-2L adopts a compact 121.6x 121.6 mm motherboard design, making it ideal for space-limited embedded systems and industrial devices. Based on the Intel Celeron Processor N Series platform, it delivers stable computing performance and power-efficient operation for industrial control, smart terminals, edge computing, and automation applications.

DDR4 Memory and Flexible Storage Options

The motherboard supports DDR4 SO-DIMM memory up to 16GB with a maximum frequency of 2933 MHz, ensuring reliable system performance for embedded workloads. It provides one SATA 6Gb/s interface and one M.2 Key-M 2280 slot with PCIe 3.0 x1 signal, allowing flexible storage configuration for operating systems, application software, log files, and local data.

Dual Gigabit Ethernet Connectivity

Equipped with two Realtek 8111 Gigabit Ethernet controllers and two RJ45 LAN ports, the board provides reliable wired network connectivity for industrial communication, remote device management, data transmission, and embedded gateway applications. The dual-LAN design is suitable for network separation, control network access, and communication redundancy in embedded systems.

Multi-Display Output with Intel UHD Graphics

Integrated Intel UHD Graphics supports 1x DP and 2x HD display outputs, enabling flexible visual system configurations. The board is suitable for HMI terminals, industrial control panels, digital signage players, information display systems, interactive kiosks, and multi-screen embedded applications.

Rich I/O and Expansion Capability

Integrates multiple industrial and commercial I/O interfaces, including USB 3.0, USB 2.0, USB-C, DB9 COM RS232/RS485, DB9 COM RS232, audio, GPIO, SIM card slot, front panel header, CPU fan connector, and one mPCIe expansion slot. These interfaces allow easy connection to peripherals, sensors, communication modules, control devices, and custom embedded equipment.

Motherboard Specifications

Processor	Product Collection	Intel Celeron Processor N Series
	Sockets Supported	FCBGA1338
Memory specifications	Memory Type	DDR4 SO-DIMM
	Maximum Capacity	16GB
	Maximum Frequency	2933 MHz
Storage specifications	SATA	1*SATA 6Gb/s
	M.2	1*M.2 Key-M 2280 (PCIe 3.0 x1)
Network features	Ethernet	2*1GbE
	Controller	2*Realtek 8111
Extension interface	mPCIe	1*mPCIe
Display functions	Port	1*DP/2*HD
	Chip	Intel UHD Graphics
Backplane I/O	Ethernet	2*RJ45
	COM	1*DB9 COM RS232/RS485, 1*DB9 COM RS232
	Display	1*DP/2*HD
	USB	2*USB-A 3.0, 2*USB-A 2.0, 1*USB-C
	Button	1*Power Button
	Audio	1*Jack Audio
	Power supply	1*Jack DC 5.5/2.5mm
Onboard I/O	SATA	1*SATA Data connector/1*SATA Power socket
	SIM	1*SIM Card solts
	Fan	1*CPU fan power socket
	Pins	1*F_PANEL
		1*J_GPIO
Power supply mode	DC	12V
Motherboard size	Specification	121.6*121.6 (mm)
Work Environment	Temperature	-20~55℃
	Humidity	5%~90% (Relative humidity, no condensation)

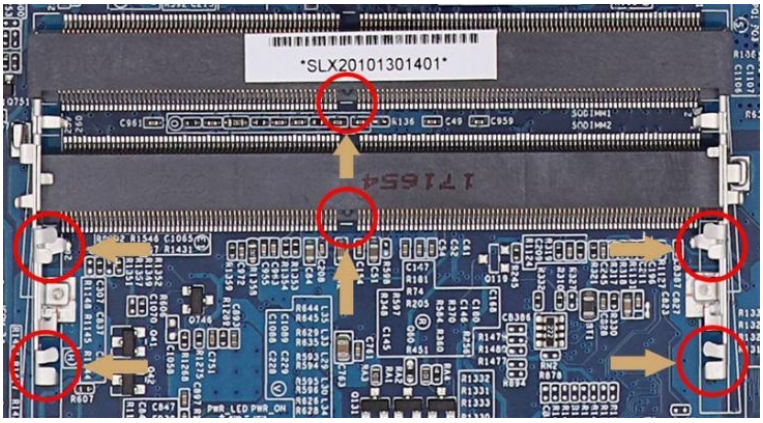
Motherboard Installation

Safety Precautions

- Do not remove the serial number or warranty stickers from the motherboard. Doing so may void your product warranty.
- Always shut down the system and unplug the power cord from the outlet before installing or removing the motherboard or any hardware components.
- Ensure all connectors and sockets are securely and firmly fastened when installing expansion cards or hardware devices.
- Avoid touching the circuit traces and electronic components on the motherboard to prevent short circuits and physical damage.
- Wear an anti-static wrist strap when handling the motherboard, CPU, or RAM. If unavailable, touch a grounded metal object first to discharge static electricity, and ensure your hands are dry.
- Place the motherboard on an anti-static mat or inside an anti-static bag prior to installation.
- Turn off the power supply unit (PSU) before disconnecting any power cables from the motherboard.
- Verify that your power supply voltage matches your local power standard before switching on the system.
- Ensure all internal cables and power cords are properly and securely connected before powering on the system.
- Prevent mounting screws from scraping or colliding with the motherboard circuits and components to avoid malfunction.
- Check for loose screws or stray metal objects inside the PC case before powering on the computer.
- Place the PC chassis on a stable, flat surface before operating the computer.
- Avoid operating the system in high-temperature environments to prevent hardware overheating and system failure.
- Never power on the system before the installation is complete. Doing so may damage the components or cause personal injury.
- Consult a certified technician if you are unfamiliar with the installation procedure or experience technical issues.

SO-DIMM (Laptop Memory) Installation Guide

The motherboard provides DDR4 SODIMM memory slot.



Pre-Installation Checklist

1. Verify compatibility: Ensure the purchased SO-DIMM memory modules match the specifications and generation (e.g., DDR3L/DDR4/DDR5) supported by this motherboard.

2. Power off the system: Always shut down the computer, unplug the power adapter, before installing or removing memory to prevent hardware damage.

Installation Procedure

1. Handle with care: Hold the SO-DIMM module firmly by its edges. Do not touch the gold contacts (pins) along the bottom to avoid static or oil contamination.

2. Align the notch: Locate the foolproof alignment notch on the SO-DIMM module. Align it precisely with the keyed tab inside the memory slot.

3. Insert at an angle: Insert the gold contacts of the SO-DIMM module into the slot at approximately a 30-degree angle until it is firmly seated.

4. Pivot and lock: Gently push the top edge of the module downward until the metal retaining clips on both sides snap outward and lock it into place with an audible "click." (Note: Press evenly and do not force it if the module is not properly aligned).

Removal Procedure

1. Release the clips: Use two fingers to gently push the metal retaining clips at both ends of the slot outward simultaneously.

2. Extract the module: The SO-DIMM module will automatically tilt up to a 30-degree angle. Gently pull the module straight out of the slot by its edges.

Jumper Setting

Before installing any hardware devices, configure the jumpers according to your system requirements by referring to the manual or the layout table below.

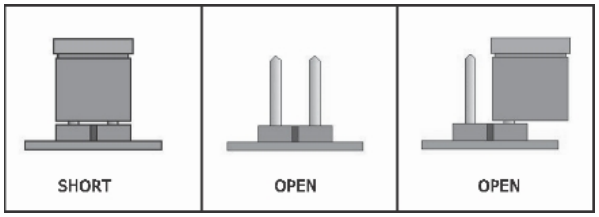
Identifying Pin 1 on Jumpers and Connectors

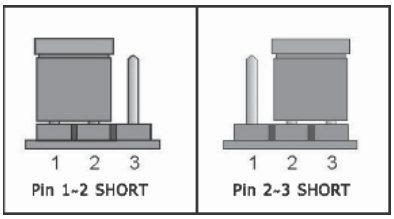
To locate Pin 1 on a jumper or header, check the following indicators:

- Board Markings: Look for a triangle symbol "▲", the number "1", or a thick white line printed on the motherboard next to the connector.
- Solder Pads: Check the back of the motherboard; the square solder pad always represents Pin 1, while round pads represent the remaining pins.
- Caution: Always verify the orientation and locate Pin 1 before plugging any cable into a connector. Misaligning or reversing the pins may cause permanent damage to the motherboard and connected devices.

Configuring Jumper Caps

- **2-Pin Headers**: Placing a jumper cap over both pins **shorts (closes)** the circuit to enable a setting. Removing the cap leaves the circuit **open**, disabling the setting.
- **3-Pin Headers**: Placing a jumper cap over **Pins 1-2** or **Pins 2-3** bridges those specific pins to select different functional modes or configurations.





Clear CMOS Jumper(CLR_CMOS)

Image	Status	Setting
	1-2	Normal (Default)
	2-3	Restore BIOS to default settings

This jumper can clear the motherboard's BIOS settings, restoring them to factory default values. If you need to clear CMOS settings, use a metal object such as a screwdriver to simultaneously touch the two pins for a few seconds.

Important:

Before clearing CMOS settings, be sure to shut down the computer.

After booting, enter BIOS and load Optimized Defaults (Load Optimized Defaults) or manually enter the desired settings.

Restore on AC/Power Loss (AUTO_ON)

Image	Status	Setting
	1-2	Automatic power on
	2-3	Normal (Default)

ME Flashing Selection Jumper (JME)

Image	Status	Setting
	1-2	Disable
	2-3	Enable (Default)

Motherboard Pin Definition

SATA Data

The motherboard provides SATA data socket

Image	PIN	Definition	PIN	Definition
	1	GND	2	SATA_TXP
	3	SATA_TXN	4	GND
	5	SATA_RXN	6	SATA_RXP
	7	GND	-	

SATA PWR

The motherboard provides SATA power socket (1*4-pin, 2.54 mm pitch)

Image	PIN	Definition
	1	+12V
	2	GND
	3	GND
	4	+5V

Notice: For the SATA_PWR header, Pin 1 delivers +12V power output, and Pin 4 delivers +5V power output. Please ensure the drive's power cable is correctly aligned before connecting.

Serial Port (COM)

The motherboard provides 2x DB9 ports; COM1 can be toggled between RS232 and RS485 modes via jumper settings.

Status RS232

Image	PIN	Definition	PIN	Definition
	1	DCD#	2	RXD
	3	TXD	4	DTR#
	5	GND	6	DSR#
	7	RTS#	8	CTS#
	9	RI#		

Status RS485

Image	PIN	Definition	PIN	Definition
	1	DATA-	2	DATA+
	3	N/C	4	N/C
	5	GND	6	N/C
	7	N/C	8	N/C
	9	N/C		

COM1 Status Adjustment Jumper (JP1_COM1/JP2_COM1/JP3_COM1)

JP3_COM1 (2*3-pin, 2.00 mm pitch)

Image	Status	Definition
	1-2	+5V
	3-4	+12V
	5-6	RI (Default)

The motherboard provides Jumper for switching between RS232 and RS485. The default transmission mode is RS232.

JP2_COM1 (2*3-pin, 2.00 mm pitch)

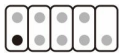
Image	Status	Definition
	1-3, 2-4	RS 232 (Default)
	3-5, 4-6	RS 485

JP1_COM1 (1*3-pin, 2.00 mm pitch)

Image	Status	Setting
	1-2	RS 232 (Default)
	2-3	RS 485

Front Panel Connectors (F_PANEL)

The motherboard provides F_PANEL pins (2*5-pin, 2.54 mm pitch, 10th pin is empty)

Image	PIN	Definition	PIN	Definition
	1	HDD_LED+	2	PWR_LED+
	3	HDD_LED-	4	PWR_LED-
	5	GND	6	PWR_ON
	7	RESET	8	GND
	9	GND		

HDD LED (Pins 1, 3 - Pin 1 is Positive/Anode)

Function: Blinks during hard drive read/write activities to indicate disk operation.

Power LED (Pins 2, 4 - Pin 2 is Positive/Anode)

Function: Remains solid on when the system is powered on, and turns off when the system is powered down.

Reset Button (Pins 5, 7)

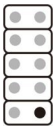
Function: Connects to the chassis reset switch. Pressing this button reboots the system in the event of a system crash or freeze.

Power Button (Pins 6, 8)

Function: Connects to the chassis power switch to power the system on or off.

Programmable Input And Output (J_GPIO)

The motherboard provides GPIO pins (2*5-pin, 2.00 mm pitch)

Image	PIN	Definition	PIN	Definition
	1	GND	2	VCC
	3	GPIO 1	4	GPIO 5
	5	GPIO 2	6	GPIO 6
	7	GPIO 3	8	GPIO 7
	9	GPIO 4	10	GPIO 8

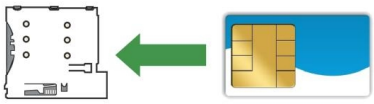
CPU Cooling Fan Power Socket (CPU_FAN)

The motherboard provides Cooling fan power socket (1*4-pin), Located on the back of the motherboard.

Image	PIN	Definition
	1	Ground
	2	+12V
	3	FAN_TAC
	4	FAN_CTL

SIM card slot (SIMB)

The motherboard features a SIM card slot for cellular connectivity, which can be used in combination with an LTE module.



Note: When inserting the SIM card, ensure the gold contacts are facing downward (facing toward the motherboard).

BIOS User Guide

BIOS Description

This motherboard features an AMI BIOS (Basic Input/Output System). Stored on a ROM chip on the motherboard, the BIOS contains essential low-level programs, including the power-on self-test (POST), system boot routines, and basic I/O configurations. It reads and writes system setting data via the CMOS, with the primary function of providing immediate, fundamental hardware control for the computer.

When the computer is powered on, the BIOS is the first program to run, performing the following core functions:

- Executes the Power-On Self-Test (POST): Checks and verifies that all essential hardware components are functioning properly.
- Initializes System Hardware: Tests peripheral devices and loads the operating system during bootup.
- Provides Low-Level Control: Delivers the most fundamental, direct control over the computer hardware.
- Manages Configuration: Allows users to configure and customize system parameters via the BIOS Setup utility.

BIOS data is stored in the CMOS RAM chip on the motherboard and maintained by a 3.3V coin cell battery (CR2032). It contains critical system configuration and the BIOS Setup utility used to adjust system parameters. Under normal operating conditions, modifying the BIOS is unnecessary. However, if CMOS data is lost or corrupted due to unforeseen factors, the BIOS settings must be reconfigured.

Note:

Incorrect BIOS configurations can cause severe hardware damage or motherboard failure. Users unfamiliar with system settings are strongly advised to proceed with caution. Because the motherboard BIOS is continuously updated, the screenshots and descriptions in this manual are for reference only. We cannot guarantee that the information herein will perfectly match your motherboard's actual BIOS version.

BIOS Settings

When the computer powers on or reboots, the following prompt will appear on the POST screen: Press "DEL" to enter BIOS Setup.

If the prompt disappears before you can respond, you may restart the system to try again by using one of the following methods:Press <Ctrl> + <Alt> + <Del> simultaneously.Press the Reset button on the chassis.Power off the system and turn it on again.

Keyboard keys	Functional Description
← / →	Move the Left and Right arrows to select the screen.
↑ / ↓	Move the Up and Down arrows to select the item.
+ / -	Increase/Decrease value or Change selection
<Enter>	Select, Confirm this option or Enter the submenu
<ESC>	Return to Main page, or End the setup process from Main page
<F1>	Show related Help instructions
<F2>	Restore previous settings
<F9>	Load the optimized settings (BIOS defaults)
<F10>	Save the changed settings and reboot

Common fault analysis and solutions

We have compiled some frequently asked questions for your reference. Please check https://bkminipc.com/frequently-asked-questions-and-answers/

Error	Inspection Method
Unable to start after power on	Make sure the power cord is properly connected. Make sure that the power supply you are using meets the power supply requirements of the motherboard. Try to reinsert the Memory Stick. Try to replace the Memory Stick. Try to clear the CMOS of the main board. Please confirm if there is an external expansion card and if it is normal after removing the external card.
Unable to display after power on	Make sure the monitor is turned on. Make sure the monitor and host power cables are properly connected. Make sure the monitor and host cables are properly connected. Check to see if the monitor is in "Sleep" mode. Try changing the monitor interface or replacing the monitor.
BIOS Setup cannot be saved	Check that the CMOS battery is installed Try to replace the CMOS battery (CR2032) Adjust the time and date in BIOS setup
Unable to find a bootable device	Make sure the drive's power and data cables are properly connected. Make sure the operating system is installed on the drive. Make sure the hard drive is not physically damaged.
Blue screen or freeze when logging on to the system	Check if the Memory Stick and External Card are loose. Try removing the newly installed hardware and uninstalling the newly installed driver or software. Try replacing the memory with a different specification.
Slow entry into the operating system	Check if the CPU cooling fan is running normally. Check if the remaining space of the system partition is insufficient. Use software to check for bad sectors on the hard drive.
System restarts automatically	Confirm that the CPU cooling fan is rotating normally. Confirm that the switch/reset button has not been accidentally touched. Confirm that the Memory Stick and external card are loose. Confirm that the power supply has sufficient load capacity, try to replace the power supply Check if the system is infected with viruses.
Unable to detect USB device	Confirm that the USB device requires separate power. Confirm that the USB interface has poor contact. Confirm that the USB controller is enabled in the BIOS setup.

Useful Links

Submit your suggestions and ideas in the community	https://www.reddit.com/r/bkminipc/	
Watch our new product demos	https://www.youtube.com/@BKHD-PCs	
Corporate News and Cooperation	https://www.linkedin.com/company/beikong/	
Get our latest news on Meta	https://www.facebook.com/people/%E5%80%8D%E6%8E%A7/61558406109357/