E73-2G4M Series Product Specification Sheet

nRF54L05/10/15 BLE6.0 SOC SMD Wireless Module



成都亿佰特电子科技有限公司
Chengdu Ebyte Electronic Technology Co.,Ltd.

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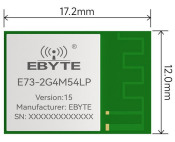
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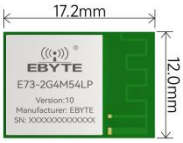
Chapter 1 Overview

1.1 Introduction

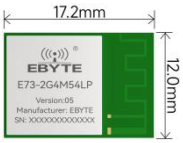
The E73-2G4M series modules are multi-protocol wireless communication modules based on the Nordic nRF54L05/nRF54L10/nRF54L15 SoC. They feature long communication distance, low power consumption, strong anti-interference capabilities, abundant interface resources, powerful processing capabilities, and small size. The E73-2G4M Series wireless communication module requires secondary development by the user and can be widely used in the Internet of Things (IoT) industry.



E73-2G4M54LP(15)



E73-2G4M54LP(10)



E73-2G4M54LP(05)



E73-2G4M54LX(15)



E73-2G4M54LX(10)



E73-2G4M54LX(05)

1.2 Features and Functions

- Global unlicensed ISM 2.4GHz band;
- Supported protocols: BLE 6.0, Bluetooth Mesh , Zigbee , Thread , Matter , Amazon Sidewalk , and proprietary 2.4 GHz protocol;
- It features a built-in high-performance Arm Cortex-M33 processor, along with a rich set of peripherals and a RISC-V coprocessor;
- Maximum transmit power of 8dBm;
- Dormant current as low as 0.7uA;
- The external crystal oscillators use high-precision industrial-grade crystal oscillators of 32.768KHz and 32MHz to ensure stable operation of the module;
- Industrial-grade standard design, supporting long-term use at temperatures ranging from -40 to 85 ℃;
- Users can perform secondary development, and the small-volume modules are easy to integrate.

1.3 Application scenarios

- Access control system;
- Automotive electronics applications;
- Smart remote control;
- Location services;
- Healthcare;

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- Wireless alarm security system;
- Smart home and industrial sensors, etc.

Chapter 2 Specifications

2.1 Product Selection Comparison

Product Model	Chip solutions	Carrier frequency ① GHz	Transmit power ② dBm	Communication distance ③ m	Product size ④ mm	Antenna type ⑤
E73-2G4M54LP(15)	nRF54L15-QFAA	2.4	8	130	12.0*17.2	PCB
E73-2G4M54LX(15)	nRF54L15-QFAA	2.4	8	200	12.0*12.0	IPEX 3rd Generation
E73-2G4M54LP(10)	nRF54L10-QFAA	2.4	7	110	12.0*17.2	PCB
E73-2G4M54LX(10)	nRF54L10-QFAA	2.4	7	180	12.0*12.0	IPEX 3rd Generation
E73-2G4M54LP(05)	nRF54L05-QFAA	2.4	7	110	12.0*17.2	PCB
E73-2G4M54LX(05)	nRF54L05-QFAA	2.4	7	180	12.0*12.0	IPEX 3rd Generation

Note:

① Communication channel: User programming settings are supported within the channel range;

② Transmit power: 8dBm/7dBm, adjustable in multiple levels , see nRF54Lxx chip datasheet for details ;

③ Communication distance: Clear and open terrain, antenna height 2 meters, BLE, airspeed 1Mbps (for reference only, actual measurement recommended);

④ Product dimensions: tolerance ±0.2mm;

⑤ Antenna type: equivalent impedance approximately 50Ω .

2.2 Basic Parameters

Conditions: Tc = 25℃, VDD = 3.3V

Parameter	Description					
Model	E73-2G4M54LP(15)	E73-2G4M54LX(15)	E73-2G4M54LP(10)	E73-2G4M54LX(10)	E73-2G4M54LP(05)	E73-2G4M54LX(05)
Chip Model	nRF54L15		nRF54L10		nRF54L05	
kernel	Arm Cortex-M33 + RISC-V Coprocessor					
RAM	256 KB		192KB		96KB	
NVM	1524 KB		1012KB		500KB	
High-speed crystal oscillator frequency	32MHz, built-in passive crystal oscillator					
low-speed	32.768kHz, built-in passive crystal oscillator					

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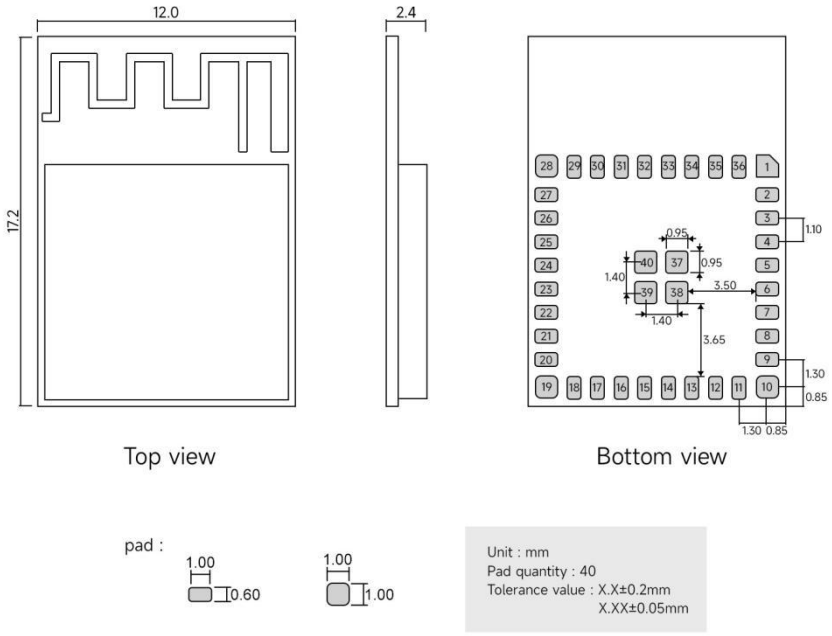
Parameter	Description					
crystal oscillator frequency						
Packaging	LGA					
interface	UART, SPI, I²C, GPIO, ADC, and PWM require user-defined configuration.					
weight	0.8g±0.1g	0.6g±0.1g	0.8g±0.1g	0.6g±0.1g	0.8g±0.1g	0.6g±0.1g
Working Environment						
Operating temperature	-40℃~+85℃, industrial grade standard					
Operating humidity	10~95%RH, no condensation					
Storage temperature	-40℃～+125℃					
RF Parameters						
Transmit power	8dBm power adjustable in multiple levels		7dBm power adjustable in multiple levels		7dBm power adjustable in multiple levels	
Operating frequency band	2.4GHz					
Receiver sensitivity	- 104 dBm @ Long Range 125 K bps					
	-96 dBm @Bluetooth LE 1 Mbps					
Electrical Parameters						
Power supply voltage	The voltage range is 1.8V to 3.6V, with 3.3V being recommended. Voltages exceeding 3.6V may burn out the module.					
Communication level	3.3V (see nRF54Lxx chip datasheet for details)					
Emission current	≈4.8mA, instantaneous power consumption					
Received current	≈3.4mA,BLE @1Mbps					
Dormant current	≈0.7uA, System OFF					

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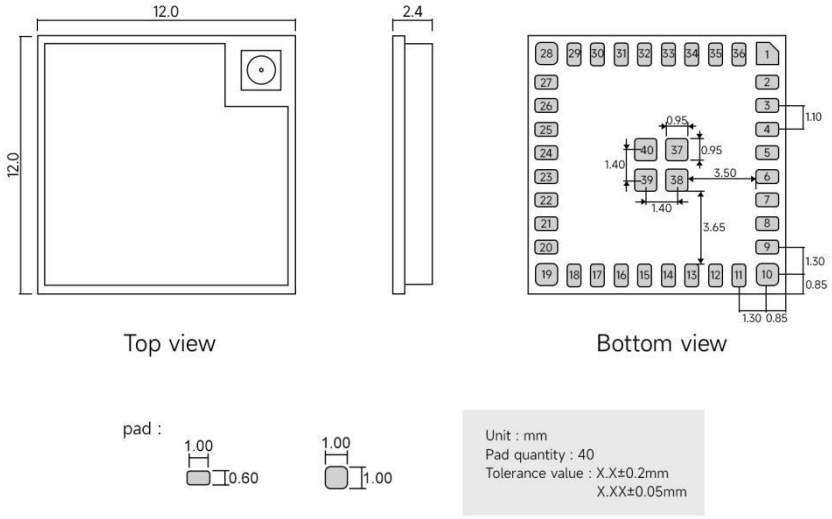
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Chapter 3 Mechanical Dimensions and Pin Definitions

3.1 Mechanical Dimensions and Pin Definitions



E73-2G4M54LP(15)/E73-2G4M54LP(10)/E73-2G4M54LP(05)



E73-2G4M54LP(15)/E73-2G4M54LX(10)/E73-2G4M54LX(05)

Pin number	Pin Name	Pin direction	Pin Applications
1	P1.09	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)

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Pin number	Pin Name	Pin direction	Pin Applications
2	P1.10	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
3	P1.11	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
4	P1.12	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
5	P1.13	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
6	P1.14	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
7	P1.04	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
8	P1.02	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
9	VDD	Input	Power supply interface, DC 1.8~3.6V
10	GND	-	Ground wire, connected to power reference ground
11	CLK	Input/Output	Program debugging/download port SWCLK
12	SWD	Input/Output	SWDIO (Program Debug/Download Port)
13	P1.03	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
14	P1.06	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
15	P1.05	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
16	P1.07	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
17	P1.08	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
18	P2.00	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
19	nRESET	Input	Reset pin, low level reset
20	P2.01	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
twenty one	P2.02	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
twenty two	P2.03	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
twenty three	P2.06	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
twenty four	P2.08	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)

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Pin number	Pin Name	Pin direction	Pin Applications
25	P2.10	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
26	P0.01	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
27	P2.04	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
28	P2.05	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
29	P0.00	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
30, 31	GND	-	Ground wire, connected to power reference ground
32	P0.02	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
33	P0.04	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
34	P0.03	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
35	P2.09	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
36	P2.07	Input/Output	Configurable general-purpose I/O ports (see nRF54Lxx manual for details)
37~40	GND	-	Ground wire, connected to power reference ground

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Chapter 4 Basic Operations

4.1 Hardware Design

- It is recommended to use a DC regulated power supply to power this module, with the power supply ripple coefficient as small as possible, and the module must be reliably grounded;
- Please ensure the correct connection of the power supply positive and negative terminals. Reversing the connection may cause permanent damage to the module.
- Please check the power supply and ensure it is within the recommended voltage range. Exceeding the maximum value will cause permanent damage to the module.
- Please check the power supply stability; the voltage should not fluctuate significantly or frequently.
- When designing power supply circuits for modules, it is often recommended to retain a margin of more than 30% to ensure long-term stable operation of the entire unit.
- The module should be kept as far away as possible from power supplies, transformers, high-frequency traces, and other parts with high electromagnetic interference.
- High-frequency digital traces, high-frequency analog traces, and power traces must avoid the area under the module. If it is absolutely necessary to run under the module, assuming the module is soldered on the Top Layer, lay ground copper on the Top Layer of the module contact area (all copper and well grounded), and run the traces close to the digital part of the module on the Bottom Layer.
- Assuming the module is soldered or placed in the Top Layer, it is also wrong to arbitrarily route traces in the Bottom Layer or other layers, as this will affect the module's stray emissions and reception sensitivity to varying degrees.
- If there are devices around the module that cause significant electromagnetic interference, it will greatly affect the module's performance. Depending on the intensity of the interference, it is recommended to keep them away from the module. If possible, appropriate isolation and shielding can be implemented.
- If there are traces around the module that cause significant electromagnetic interference (high-frequency digital, high-frequency analog, power supply traces), it will greatly affect the module's performance. Depending on the intensity of the interference, it is recommended to keep them away from the module. If possible, appropriate isolation and shielding can be implemented.
- Antennas should never be installed inside a metal casing, as this will greatly reduce the transmission distance.
- It is recommended to add a 200Ω protection resistor to the RXD/TXD of the external MCU.

4.2 Software Development

- This module has an integrated RF chip, nRF54Lxx, and users can operate it in strict accordance with the nRF54Lxx chip datasheet.
- For more details, please refer to the SDK program provided by Nordic.

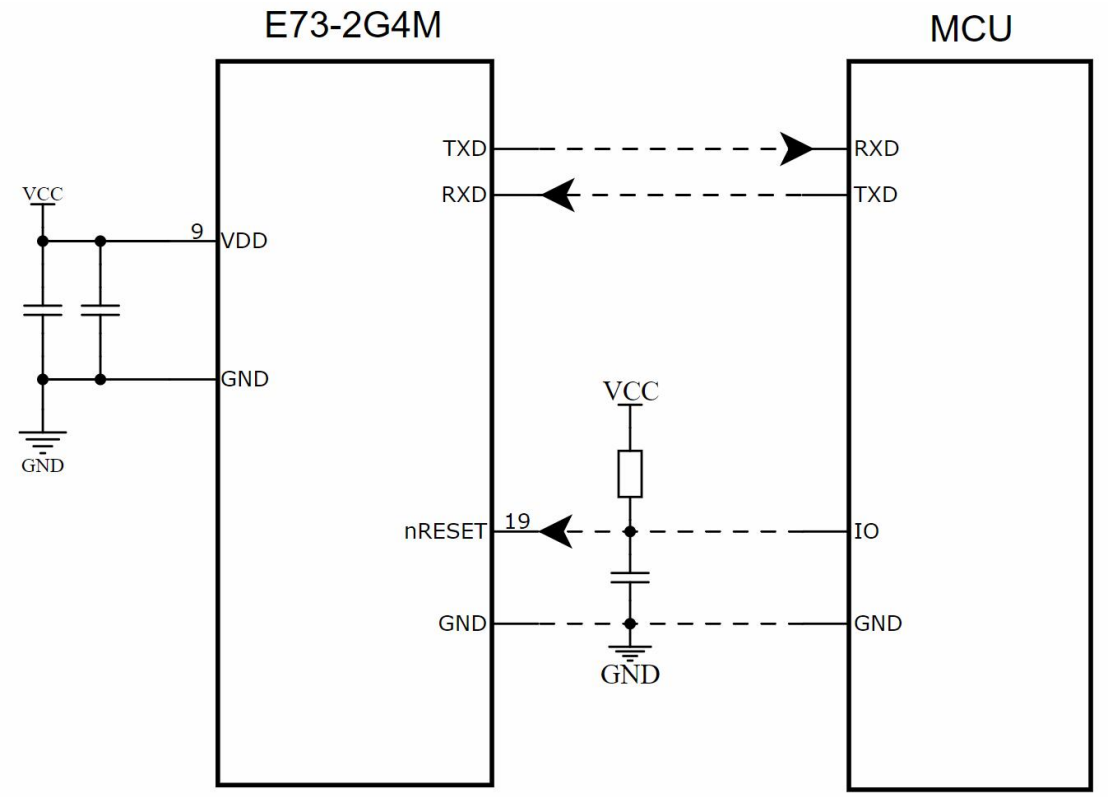
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- For development environment setup, please refer to Developing Your First nRF Connect SDK (NCS)/Zephyr Application ;
- For more details, please refer to the sample program provided by Ebyte.

Chapter 5 Recommended Circuits

5.1 Recommended Circuit Diagram



Note: The TXD and RXD pins of this module are customized by the customer according to the chip manual.

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Chapter 6 Frequently Asked Questions

6.1 Transmission distance is not ideal

- When there are obstacles in line-of-sight communication, the communication distance will be reduced accordingly;
- Temperature, humidity, and co-channel interference can all lead to increased packet loss rates in communications.
- The ground absorbs and reflects radio waves, and the test results are poor when the ground is close to the ground.
- Seawater has a strong ability to absorb radio waves, so tests conducted at the seaside are ineffective.
- If there are metal objects near the antenna, or if it is placed inside a metal casing, the signal attenuation will be very severe.
- Power register settings are incorrect; air speed is set too high (the higher the air speed, the shorter the distance).
- At room temperature, the power supply voltage is lower than the recommended value; the lower the voltage, the lower the power output.
- The antenna may be poorly matched with the module or have quality issues.

6.2 The module is easily damaged.

- Please check the power supply and ensure it is within the recommended voltage range. Exceeding the maximum value will cause permanent damage to the module.
- Please check the power supply stability; the voltage should not fluctuate significantly or frequently.
- Please ensure anti-static operation during installation and use, as high-frequency devices are sensitive to electrostatic discharge.
- Please ensure that the humidity is not too high during installation and use, as some components are humidity-sensitive.
- Unless there are special requirements, it is not recommended to use it at excessively high or low temperatures.

6.3 The error rate is too high.

- If there is interference from a co-channel signal nearby, move away from the source of interference or change the frequency or channel to avoid the interference.
- Check for interference on the UART line; the UART cable should not be too long.
- An inadequate power supply can also cause garbled characters, so it is essential to ensure the reliability of the power supply.
- Poor quality or excessive length of extension lines or feeders can also lead to a high bit error rate.

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Chapter 7 Welding Operation Instructions

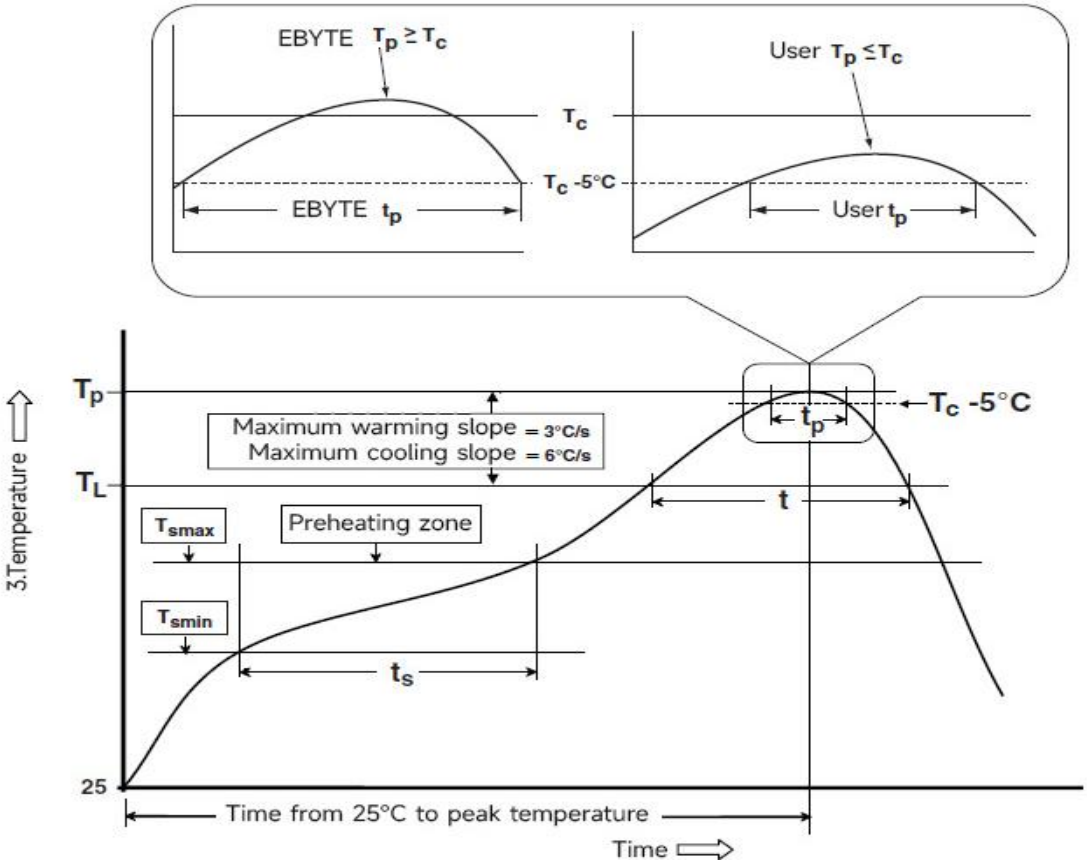
7.1 Reflow soldering temperature

Reflow soldering profile characteristics		Lead-based assembly	Lead-free assembly
Preheating/Insulation	Minimum temperature (Tsmin)	100℃	150℃
	Maximum temperature (Tsmax)	150℃	200℃
	Time (Tsmin~Tsmin)	60-120 seconds	60-120 seconds
Temperature rise slope (TL~Tp)		3℃/second, maximum value	3℃/second, maximum value
Liquid phase temperature (TL)		183℃	217℃
Duration above TL		60~90 seconds	60~90 seconds
Package peak temperature Tp		Users must not exceed the temperature specified on the product's "humidity sensitivity" label.	Users must not exceed the temperature specified on the product's "humidity sensitivity" label.
The time (Tp) within 5°C of the specified grading temperature (Tc) is shown in the figure below.		20 seconds	30 seconds
Cooling slope (Tp~TL)		6℃/second, maximum value	6℃/second, maximum value
Time from room temperature to peak temperature		6 minutes, the longest	8 minutes, the longest
* The peak temperature (Tp) tolerance of the temperature profile is defined as the user's upper limit.			

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7.2 Reflow Soldering Profile



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Revision History

Version	Revision Date	Revision Notes	maintainer
V1.0	2025-11-12	Initial version	Bin
V1.1	2026-8-19	● Newly added: E73-2G4M54LP(10), E73-2G4M54LX(10), E73-2G4M54LP(05), E73-2G4M54LX(05) ● Product model change: The model E73-2G4M08S1F has been changed to E73-2G4M54LP(15); The model E73-2G4M08S1FX has been changed to E73-2G4M54LX(15)	Bin
V1.2	2026-9-07	Content revision	Bin

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Technical support: service@cdebyte.com
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Web: https://www.cdebyte.com
Address: B5 Mould Park, 199# Xiqu Ave, High-tech District, Sichuan, China

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