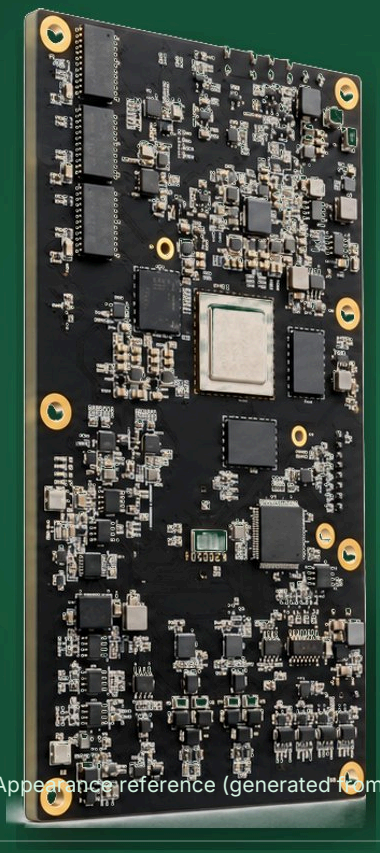
EQIO

ERB-MC-001

PRODUCT MANUAL

RK3588M Real-Time Motion-Control Board

Rockchip RK3588M 8-core processor



Appearance reference (generated from product photos); shipped units may differ.

Measurement and control, made easy.

Easy · Quick · Input · Output

EQIO.COM

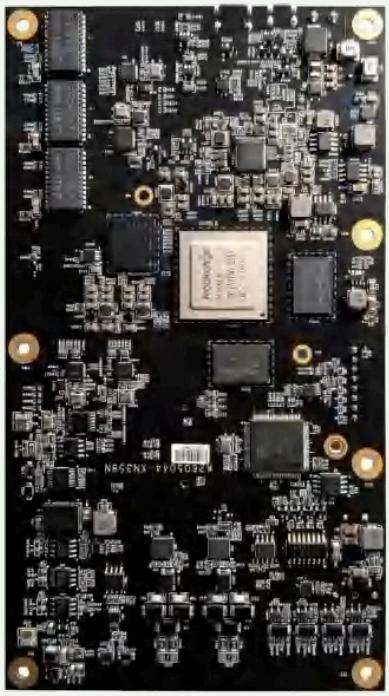
01 OVERVIEW

RK3588M Real-Time Motion-Control Board

Robot perception and motion control · Robot motion control · Real-time control integrates · Equipment health management · EtherCAT · Rockchip

ERB-MC-001 uses RK3588M and independent MCU, configured with 16GB LPDDR4X and 256GB eMMC, supports real-time Linux environment and FreeRTOS management unit, provides EtherCAT, isolated RS-485 and independent can control power output.

3-ch EtherCAT, 4-ch isolated RS-485 and Gigabit Ethernet connect actuation unit and on grade equipment, 8-ch independent can control isolated power external equipment power. Main processor and management unit respectively handles compute and status management, suited to robot motion control and industrial actuation system integration.



Product appearance reference; shipped units may differ.

Key features

- RK3588M and independent MCU
- 16GB LPDDR4X、256GB eMMC
- 3-ch EtherCAT, 4-ch isolated RS-485
- 8-ch independent can control 5V isolated power
- Real-time Linux and FreeRTOS environment

02 FUNCTIONS

Functions and engineering value

Compute and management role split

Board RK3588M handles motion related compute, independent MCU processing status and management signal, configured with 16GB memory and 256GB storage. Software environment includes real-time kernel supports, but real-time performance still requires combined with task scheduling, driver and actual load verification, not can directly write into fixed control cycle guarantee.

Motion network and isolated communications

3-ch EtherCAT, 4-ch isolated RS-485 and 1-ch Gigabit Ethernet respectively carries motion equipment, peripheral control and on grade communications, Type-C and isolated USB2.0 used for auxiliary connect. Bus main from role, driver protocol and synchronous method not by I/O quantity determines, should per control solution item by item confirm.

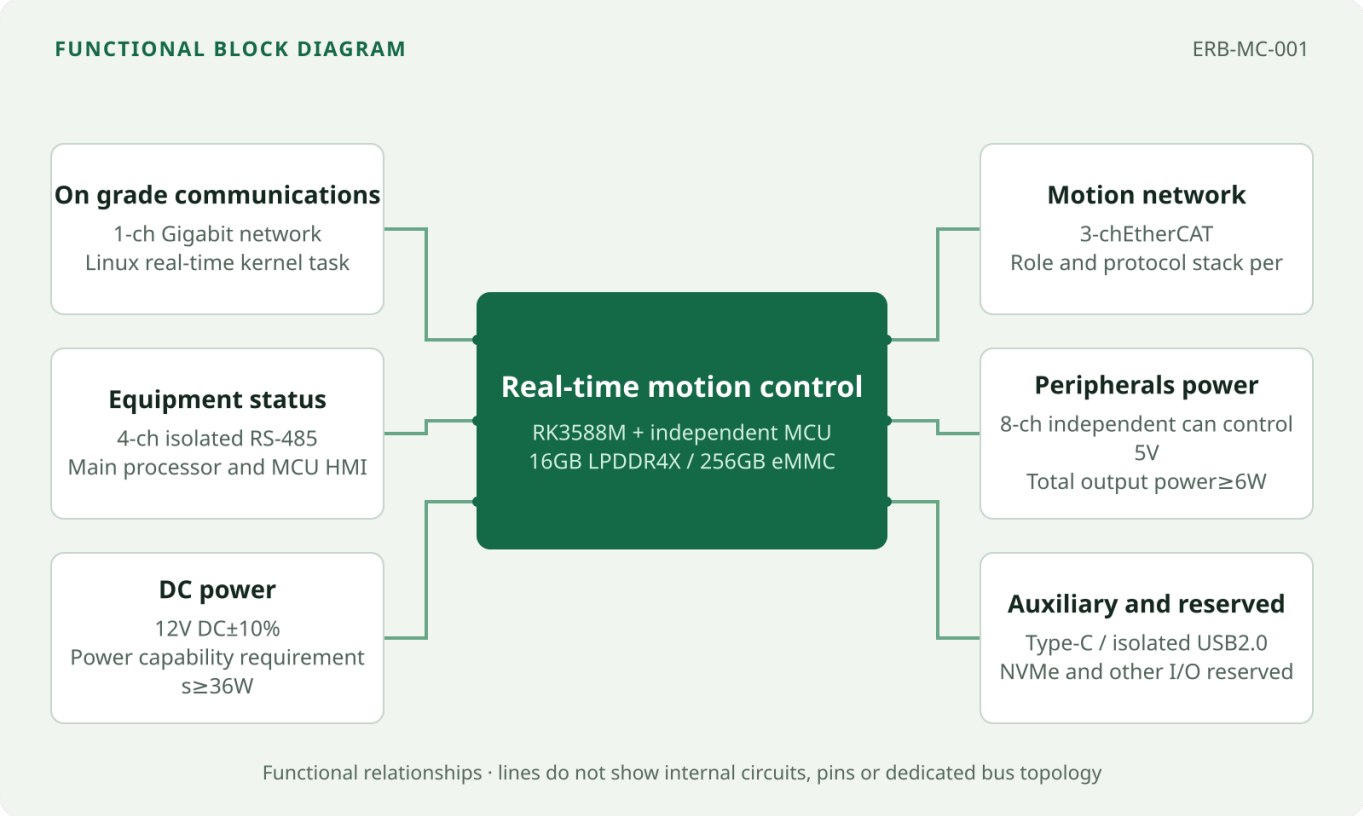
Can control isolated power

Board provides 8-ch independent can control 5V isolated power output, facilitates per peripherals group organize power, website total output power requirements at least 6W. Management unit and main processor still via UART, GPIO and reset signal HMI, can around equipment status design power enable and fault processing procedure.

The functional notes explain the product’s role from published configuration. Optional functions, software and peripherals follow the project definition. Chip capability is not the same as implemented I/O.

03 ARCHITECTURE

Functional blocks and system connections



Function relationship illustration, based on website I/O and configured with compiled; not indicates actual on-board circuit, independent bandwidth or not published chip interconnect implements.

Platform and I/O

Compute side RK3588M 8-core platform, website clock 2.0GHz and mark 6TOPS NPU, management side uses independent MCU and real-time operating system. NPU peak not can indicates motion control cycle, not published MCU model and on-board bridge method not should infer, external I/O per already brought out and reserved respectively listed.

> **Reading the diagram**
>
> Solid lines show published functional relationships, not on-board buses, bridge chips or connector pins. Optional controllers, radios, storage and software follow the configuration and interface files.

04 SPECIFICATIONS

Technical specifications

Compiled from published product data. Batch, I/O and environmental ratings follow the order confirmation.

Core system

Main processor	RK3588M, 8-core (Cortex-A76x4+A55x4), clock 2.0GHz, NPU6TOPS
Capacity	16GB LPDDR4X+256GB eMMC
RTC	RK3588M mount RTC RTC
BMC	Clock≥72MHz, Flash≥128KB, SRAM≥32KB, add-on FLASH≥128Mb
Power I/O	Input: 12V DC±10%, power≥36W; output: 5V DC±5%, 8-ch total power≥6W, isolated voltage≥1.5kV

Environmental conditions

Operating temperature	-20°C~55°C (temperature-rise limit 95°C, 85°Calarm threshold),storage temperature: -40°C~+70°C

I/O and expansion

External I/O	12V power input; 8-ch independent can control 5V isolated power; 4-ch isolated RS-485 (≥0.5Mbps); 1-ch Gigabit network; 3-chEtherCAT; 1-chUSB Type-C; 1-ch isolated USB2.0
Debug interface	MCU debug UART/JTAG I/O, RK3588 debug serial
Main processor and MCU interconnect I/O	1-chUART, 2-chGPIO, RK3588 hardware reset
Reserved I/O	Isolated serial: 1-ch RS-232+ 1-ch RS-422, high-speed I/O: 1-chPCIE3.0 NvMe SSD I/O isolated bus I/O: 1-chI2C+ 1-chSPI+ 1-chCAN, isolated GPIO: 2-chTTL+ 2-chLVTTL

Mechanical specifications and system requirements

Specification	98 × 180 × 16mm (±2mm), weight≤0.11kg (not including pack fitted, allowed deviation±10g), board thickness 1.6mm
System requirements	MCU：FreeRTOS V10.3.1+；RK3588：Ubuntu 22.04、Linux kernel 5.15+ with RT_PREEMPT

05 COMPONENTS

Processor and device specifications

Device figures come from vendor publications and describe the chip or module. The implemented product follows the specification tables. Optional devices are supplied with the selected configuration.

Rockchip RK3588M

Process	8 nm
CPU structure	4 × Cortex-A76 + 4 × Cortex-A55, 8-core
NPU rated	6 TOPS
SoC display engine capability	8K display/video, native seven display display capability
SoC native Type-C controller	2-ch
SoC imaging processing resources	Dual 16M ISP, at least 12-ch camera supports

Sources: Rockchip, Rockchip release RK3588M intelligent vehicle-mounted surround view solution.

06 APPLICATIONS

From product capability to applications

Robot actuation control

Can EtherCAT and isolated RS-485 connect to motion and peripheral node, RK3588M on run task application, from MCU and status management. Target cycle, latency ripple and synchronous accuracy should actual driver and load under verification, not can real-time kernel marking directly etc.same to hard real-time performance guarantee.

Distributed control integrates

Suited to compute, motion communications and peripherals power centralized to the same board, via Gigabit Ethernet and on grade system HMI, and per requires control 8-ch isolated 5V output. Integrates when stated each I/O protocol, load and power group, avoid total output power error assign each channel all can independent provides.

Equipment health and recovery

Can uses independent MCU and main processor interconnect signal organize status inspection, reset and power enable procedure, auxiliary long-term run equipment management. Temperature alarm threshold, fault processing sequence and recovery conditions requires from system program definition, and normal run, link loss and restart etc.scenario under completes verification.

Integration checks

Real-time metrics	Website Ubuntu22.04, kernel 5.15+ and RT_PREEMPT; control cycle and latency required measured, not invent guarantee value.
Isolated power	8-ch independent can control 5V±5%, total power≥6W, isolated voltage≥1.5kV; not is each channel all 6W.
Reserved I/O	RS-232/RS-422, PCIe NVMe and part isolated bus reserved, required confirm assembly, driver and can usability.
Power and temperature	12V±10%, power capability requirements≥36W; operation−20–55°C, 85°Calarm and 95°Climit per confirm.

07 CONFIGURATION

Appearance, configuration and selection



Multi-angle reference (generated from product photos); shipped units may differ.

Configuration

Uses 12V input, provides Gigabit Ethernet, Type-C and isolated USB2.0, board dimensions 98 × 180mm.

Selection guide

Order confirmation	Batch, I/O and environmental ratings follow the order confirmation
Published data	Compiled from published product data; EQIO provides selection and system integration
Configuration talk	Share the application, I/O count, environment and software so a configuration can be proposed

Request a quotation and selection support

Email lyping@eqio.com Phone +86 182 8191 2988
Web eqio.com

EQIO

Easy · Quick · Input · Output

BRAND

Measurement and control, made easy.



EQIO product family · concept rendering

Brand story

EQIO builds measurement and control products and systems. The name stands for Easy Quick Input Output: Easy is a clear structure that is quick to learn, Quick is a direct path to efficient delivery, and Input / Output is every link between the device under test and the control system.
The soft single-cycle wave inside the Q links the brand to signals, acquisition and I/O. “Measurement and control, made easy” is our promise for every selection, integration and delivery.

What we do

Products

Data acquisition, test instruments, control and I/O, modular platforms, software, cables

Systems

Configured to the measurand, channels, accuracy and software, from design to commissioning

Support

Selection advice, training, maintenance and calibration

How we deliver

01
Requirements

02
Solution design

03
Build & integration

04
Factory test

05
Delivery & training

06
Ongoing support

Email lyping@eqio.com Phone +86 182 8191 2988 Web EQIO.COM