



# HPM6E00 Series

## High-performance Real-time Ethernet Interconnect Microcontroller

- The First MCUs Support ESC in China
- Officially Authorized by Beckhoff
- Multi-protocol, Multi-functional Gigabit Ethernet
- High Performance Motion Control

HPM6E00 series MCU is a high-performance, high-real-time Ethernet interconnect, dual RISC-V core microcontroller launched by Shanghai HPMicro Semiconductor Technology Co., Ltd. The HPM6E00 series provides up to 4-port Gigabit Ethernet routing modules, supports Time-Sensitive Networking (TSN: Time-Sensitive Networking), and supports EtherCAT Slave Controller (ESC: EtherCAT Slave Controller), as well as 32 channels of high-resolution PWM output.  $\Sigma\Delta$  digital filtering, high-precision motion control system, can realize high-performance servo motor control, robot motion control and other applications based on high real-time, low-latency Ethernet in the field of industrial automation.

### Performance:

- RISC-V dual-core supports double-precision floating-point operations and powerful DSP extensions, with a main frequency of over 600 MHz and performance exceeding 3390 CoreMark™ and 1710 DMIPS.
- 32KB cache (I/D Cache) and dual-core zero-wait instruction and data local memory (ILM / DLM) of up to 512KB each, plus 1024KB general-purpose SRAM, greatly avoid the performance loss caused by low-speed external memory.

### External storage:

- 1 serial bus controller, supports NOR Flash/Hyper Flash, supports NOR Flash online encryption execution, and provides a program space with extremely high scalability and compatibility.
- External expansion memory controller, supports 166MHz 32/16-bit SDRAM, SRAM or external devices compatible with SRAM interface.
- Programmable external parallel bus expansion supports external expansion of various external devices including FPGA.

### Security:

- integrates AES-128/256, SHA-1/256 acceleration engine and hardware key manager. Supports firmware software signature authentication, encrypted startup and encrypted execution to prevent illegal code replacement, tamper or copy.
- Security management based on the chip life cycle and detection of multiple attacks further protect sensitive information.
- Built-in Boot ROM, and the firmware can be downloaded and upgraded safely through USB or UART.

### Real-time Ethernet system:

- Gigabit Ethernet router supports up to 3 external ports and 1 internal port for time-sensitive networking.
- EtherCAT slave controller, supports up to 3 ports.

### Enhanced motion control system:

- 4 8-channel enhanced PWM controllers with PWM modulation accuracy up to 100ps.
- A variety of motion sensor interfaces, including incremental and absolute position sensor interfaces, rotary encoder interfaces and magnetic encoder interfaces.
- Pulse position output interface and absolute value position output interface.
- Motion and position control unit.
- Programmable Logic Unit PLB.

### Rich peripherals:

- Multiple communication interfaces: 1 high-speed USB with built-in PHY, up to 8 CAN/CAN-FD, and rich UART, SPI, I2C and other peripherals.
- $\Sigma\Delta$  digital filtering SDM, including SINC digital filter, can be externally connected to  $\Sigma\Delta$  modulator.
- 4 2MSPS 16-bit high-precision ADCs, the conversion rate can reach 4MSPS when configured with 12-bit precision, up to 32 analog input channels; 8 analog comparators.
- Up to 20 channels of 32-bit timers, 5 watchdogs and RTC.
- 2 8-channel I2S and digital microphones.

## HPM6E00 Series

High-Performance 32-bit Microcontroller Based on RISC-V Core



Product Number	HPM6E80	HPM6E70	HPM6E60	HPM6E50
CPU0	600MHz	600MHz	600MHz	600MHz
CPU1	600MHz	600MHz	/	/
On-Chip Memory	2 MB	2 MB	2 MB	1 MB
TSN Gigabit Switch	3+1 Ports	/	/	/
EtherCAT Slave Stack Controller	3 Ports	3 Ports	3 Ports	2 Ports
Secure Encryption	Real-time code encryption execution, AES/SHA, TRNG, secure boot			
USB	1 high-speed USB, built-in high-speed PHY			
CAN FD	8	8	8	4
UART/SPI/I <sup>2</sup> C	17x/8x/8x			9x/4x/4x
PWM	4x8CH 100ps HR PWM			
Timer	9 groups of GPTMR, each group has 4 32-bit timers			5 groups of GPTMR
Position sensor	4-axis position sensor input and output			2-axis position sensor
ADC	4x16b/2Msps (12b/4Msps) ADC			3x16b/2Msps ADC
ΣΔ digital filtering	2x4CH			1x4CH
Analog	8xACMP			4xACMP
Package	14x14 289BGA P0.8, 12x12 196BGA P0.8			
Temperature Range	-40 ~105° C Ta			

Power	Core	Connectivity
DCDC	RISC-V CPU 0	UART x17   SPI x8
LDOPMC   LDOOTP	32KB L1-I   32KB L1-D	I2C x8   CAN FD x8
LDOBAT   POR/BOR	FPU   DSP   PLIC	USB HS x1
Clock	RISC-V CPU 1	Motion Control System
Frac PLL x3	32KB L1-I   32KB L1-D	PWM 32CH(16 pair)
OSC 24M   IRC 24M	FPU   DSP   PLIC	QE1x4   QEOx4
OSC 32K   IRC 32K	256KB ILM   256KB DLM	PLB   TRGM
System	FFT/IFFT 4096	Motion Management
DMAx2   WDG x5	Ethernet System	Resolver Decoder
Mailbox   RTC	EtherCAT	Serial Encoder Interface x4
JTAG	100Mbps Port x3	Tamawaga BISS-C ENDAT
Onchip Memory	TSN Switch	Analog
AXI SRAM 1024KB	1Gbps Port x4	16b SAR-ADC 2Msps x4
AHB SRAM 32KB   APB SRAM 8KB	ENET 1000/100/10Mbps x1	ΣΔ Filter 4CH x2
ROM 128KB   OTP 4Kb	Timer	ACMP x8   Temp Sensor
External Memory	32bit GPTMR x9	Security
4b/8b Serial NOR/PSRAM x1	Audio	Encrypted XIP
32b SDRAM/16b SRAM	I2S x2/PDM-MIC/DAO	AES/SHA   TRNG
Parallel Interface	Input/Output	Secure Debug
	GPIO/Fast GPIO	Key Management
		Life Cycle Management
		Secure Boot

### Software and Ecology:

HPMicro Semiconductor provides SDK based on BSD license, including low-level drivers, middleware and RTOS, such as lwIP/TinyUSB/FreeRTOS, etc., and also integrates SDK into active open source projects, such as RT-Thread/Zephyr.

### Contact US:

Email - [info@hpmicro.com](mailto:info@hpmicro.com)

Website - <https://www.hpmicro.com>

