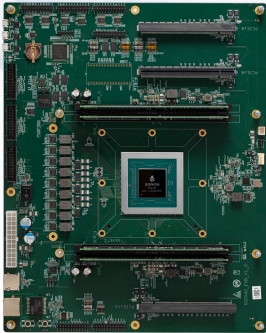# SG2042 RISC-V Processor Specifications 🔥 SOPHON

The SOPHON SG2042 is a server-grade processor featuring high performance, low power consumption and high throughput. It integrates 64 RV64GCV instruction set processor cores. The SG2042 employs advanced platform technologies that enable users to work, connect, analyze, and create in unprecedented ways.

The pioneering compute architecture of the SG2042 and RISC-V represents a turning point in professional high-end computing demands, providing a new option for building powerful computing ecosystems. Its operating temperature range is -40°C to 105°C, with a maximum power consumption of 120W. It can be used for industry-grade large enterprise hosts, high-performance server systems, large internet data centers, AI computing servers and other product types with high requirements. Configured with up to 32 PCIe 4.0 channels, it can flexibly configure various hardware accelerators.

The software SDK, toolchain and system environment of the SG2042 are mature and stable. It also supports various mainstream operating systems, such as Ubuntu, Debian, Fedora, Archlinux, openEuler, etc.

Application Processor Subsystem

- 64-core RISC-V processor supporting RV64IMAFDC
- 2.0GHz base frequency
- 4 cores per cluster, 16 clusters total
- Supports RISC-V Vector
- 64KB L1 instruction & data cache per core
- 1MB L2 cache per cluster
- 64MB system-level L3 cache
- Single processor compute: 1 TFLOPS@FP64
- Boot options: SPI Flash/SD Card

Storage Interface

- Supports DDR4
- Supports UDIMM/SODIMM/RDIMM
- Supports ECC
- Max speed: 3200MT/s
- Single channel width: 64bit/72bit (8bit ECC)
- Supports single channel, dual Rank
- 4 independent DDR channels
- Max supported capacity: 256GB

PCIe

- 2 PCIe Gen4 controllers (supports CCIX)
- Each controller supports Gen4 x16 channel, max speed of 16GT/s per channel
- Supports EP/RC modes
- RC mode supports 128G peripheral space

Ethernet

- 1 Ethernet interface
- Supports speeds of 10/100/1000Mbps
- Supports RGMII
- Supports IEEE 802.3u MAC

eMMC/SDIO Controller

- 1 eMMC 4.5/5.1 interface, 4-bit data width
- 1 SDIO 3.0 interface, 4-bit data width
- Supports eMMC 5.1 flash media
- Supports 4-bit data interface for SD cards, WiFi, Bluetooth
- Supports interrupts for SD cards and SDIO devices
- Total bus width 4-bit

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SPI Flash Controller

- 2 SPI interfaces, each supporting 2 processor selects
- Max capacity per processor: 512MB
- Supports synchronous serial full duplex transfer
- Supports SPI modes 0, 1, 2, 3
- Frame length configurable from 2 to 16 bits
- Simultaneously supports transmit/receive endianness
- Supports read/write operations for dual/quad IO
- Supports direct memory mapped read operations
- Supports boot from SPI flash

I2C

- 4 I2C interfaces
- Two-wire serial I2C interfaces
- Three speed modes supported:
- Standard mode (≤ 100 Kb/s)
- Fast mode (≤ 400 Kb/s)
- High speed mode (≤ 3.4 Mb/s)
- Supports I2C master device mode/slave device mode
- 7 to 10 bits addressing range
- Supports block transfer mode
- Clock stretching supported at all bus speeds

UART

- 4 UART interfaces
- Supports FIFO mode register
- Fractional baud rate generator; supports wide range of variable baud rates from 2400Hz to 230.4KHz
- Supports DMA mode

Other IO

- 4 PWM interfaces
- 4 fan speed detection interfaces
- 32 general purpose IOs
- 1 I2C debug interface

Electrical Characteristics and Packaging

- Digital core voltage: 0.80V +/- 10%
- I/O voltage: 3.3/1.8V +/-5%
- Max power consumption: 120W
- Operating temperature: -40°C to 105°C
- FCBGA packaging, 1mm ball pitch
- Package dimensions: 57mm X 57mm

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