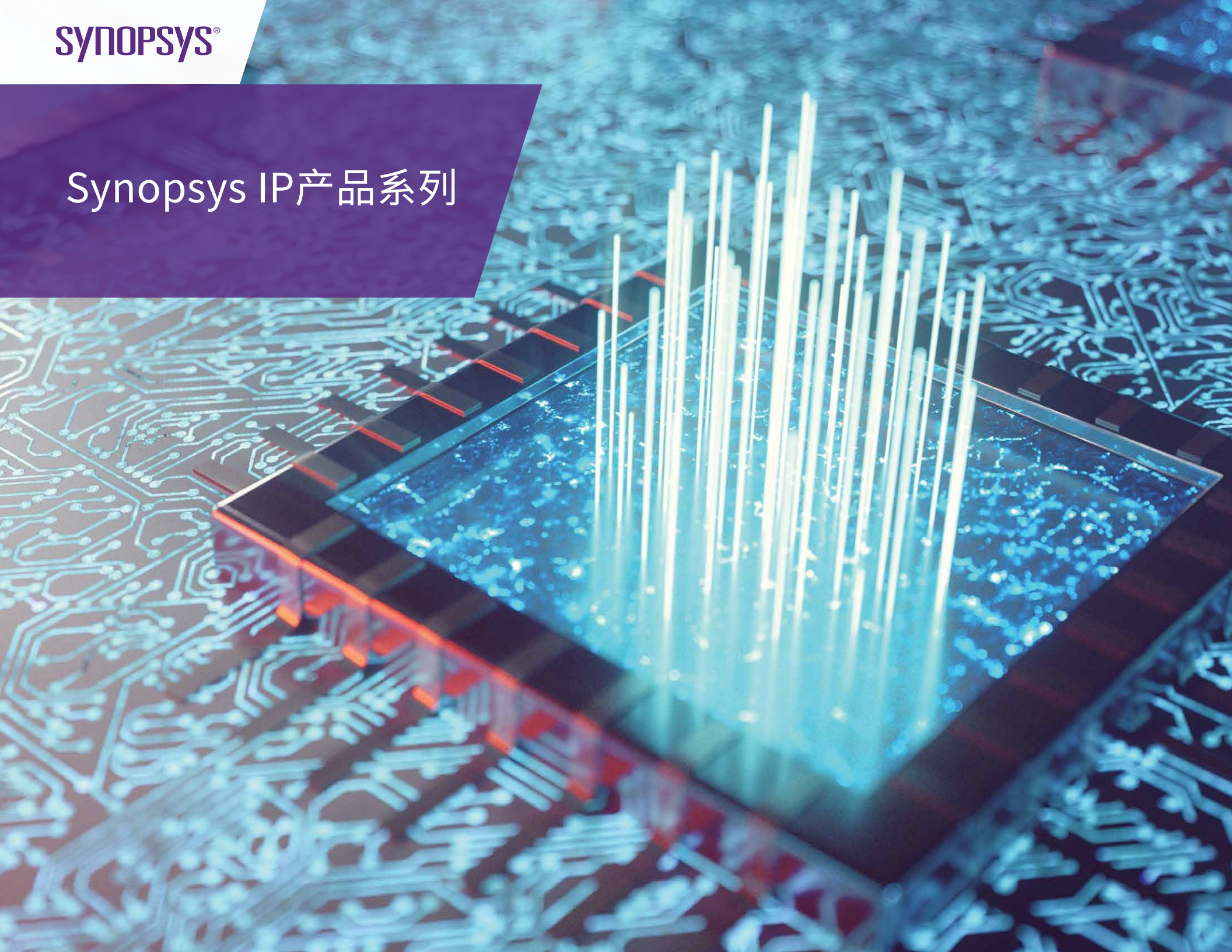


# Synopsys IP产品系列



广泛的IP组合

新思科技是一家领先的高质量、硅验证半导体 IP 解决方案供应商，专为 SoC 设计提供服务。新思科技的广泛 IP 产品组合包括逻辑库、嵌入式存储器、接口 IP、安全 IP、嵌入式处理器和子系统。为了加速 IP 集成、软件开发和硅片启动，新思科技的 IP Accelerated 计划提供架构设计专业知识、预验证和可定制的 IP 子系统、硬化以及信号/功率完整性分析。Synopsys 在 IP 质量上的大量投资、全面的技术支持和强大的 IP 开发方法使设计人员能够降低集成风险并加快上市时间。

| 接口IP     |      |      |     |     |     |     |     |     |      |     |         |     |     |      |
|----------|------|------|-----|-----|-----|-----|-----|-----|------|-----|---------|-----|-----|------|
| 晶片对晶片    | 工艺技术 |      |     |     |     |     |     | 控制器 | 支持协议 |     |         |     |     | 验证IP |
|          | 16nm | 12nm | 7nm | 6nm | 5nm | 4nm | 3nm |     | 流媒体  | CXS | CHI-C2C | AXI | CXL |      |
| UCle     |      |      |     |     | ✓   | ✓   | ✓   | ✓   | ✓    | ✓   | ✓       | ✓   | ✓   | ✓    |
| AIB      | ✓    |      |     |     |     |     |     |     |      |     |         |     |     |      |
| 112G XSR |      | ✓    | ✓   | ✓   | ✓   |     |     | ✓   |      | ✓   |         |     |     |      |

| PCI Express | 工艺技术                  |      |      |      |                |        |     |       |       |     | 控制器            | 配置                  | IDE<br>安全模块 | HS 访问<br>和测试 | 验证IP | 车用级 |
|-------------|-----------------------|------|------|------|----------------|--------|-----|-------|-------|-----|----------------|---------------------|-------------|--------------|------|-----|
|             | 40/45/<br>55/<br>65nm | 28nm | 22nm | 20nm | 12/14/<br>16nm | 8/10nm | 7nm | 5/6nm | 3/4nm | 2nm |                |                     |             |              |      |     |
| PCIe 7.0    |                       |      |      |      |                |        |     | ✓     | ✓     |     | 端点、根端口、双模式     | x2, x4, x8          | ✓           | ✓            | ✓    |     |
| PCIe 6.x    |                       |      |      |      |                |        |     | ✓     | ✓     | ✓   | 端点、根端口、双模式     | x2, x4, x8, x16     | ✓           | ✓            | ✓    |     |
| PCIe 5.0    |                       |      |      |      | ✓              | ✓      | ✓   | ✓     | ✓     |     | 端点、根端口、双模式、交换机 | x1, x2, x4, x8, x16 | ✓           | ✓            | ✓    | ✓   |
| PCIe 4.0    |                       | ✓    |      |      | ✓              | ✓      | ✓   | ✓     | ✓     | ✓   | 端点、根端口、双模式、交换机 | x1, x2, x4, x8, x16 | ✓           | ✓            | ✓    | ✓   |
| PCIe 3.1    | ✓                     | ✓    | ✓    |      | ✓              | ✓      | ✓   | ✓     |       |     | 端点、根端口、双模式、交换机 | x1, x2, x4, x8, x16 | ✓           | ✓            | ✓    | ✓   |
| PCIe 2.1    | ✓                     | ✓    | ✓    | ✓    | ✓              |        | ✓   |       |       |     | 端点、根端口、双模式、交换机 | x1, x2, x4, x8, x16 |             | ✓            | ✓    | ✓   |

| 接口IP                                                                                                |      |         |     |     |     |     |     |        |      |     |
|-----------------------------------------------------------------------------------------------------|------|---------|-----|-----|-----|-----|-----|--------|------|-----|
| 以太网                                                                                                 | 工艺技术 |         |     |     |     | PCS | 控制器 | MACSec | 验证IP | 车用级 |
|                                                                                                     | 28nm | 14/16nm | 7nm | 5nm | 3nm |     |     |        |      |     |
| 224G 以太网 (200G/400G/800G/1.6T, 极速以太网)                                                               |      |         |     |     | ✓   | ✓   | ✓   |        |      |     |
| 112G 以太网 (100G/200G/400G/800G, 极速以太网)                                                               |      |         | ✓   | ✓   | ✓   | ✓   | ✓   | 100G   | ✓    |     |
| 56G Ethernet (100G/200G/400G)                                                                       |      | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | 100G   | ✓    |     |
| RXAUI/Double XAUI (6.25 G)                                                                          | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| 1000BASE-KX, 节能以太网、10GBASE-KR, 10GBASE-KX4                                                          | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| 40GBASE-KR4, 40GBASE-CR4, XLAUI                                                                     | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| 100GBASE-CR10, CAUI                                                                                 | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| 100GBase-DR4/CR4, CAUI4                                                                             |      |         |     |     |     | ✓   | ✓   | ✓      | ✓    |     |
| 100GBase-KR2/1                                                                                      |      | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| SGMII                                                                                               | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    | ✓   |
| QSGMII                                                                                              | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| XFI, SFI (SFF-8431)                                                                                 | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| GMII/MII, RGMII, RTBI, TBI, SMII, RMII, RevMII, XGMII, XLGMII                                       |      |         |     |     |     | ✓   | ✓   | ✓      | ✓    |     |
| IEEE TSN/AVB Standards: IEEE 802.1AS, 802.1AS-Rev, 802.1Qav, 802.1Qat, 802.1Qbv, 802.1Qbu & 802.3br |      |         |     |     |     |     | ✓   | ✓      | ✓    | ✓   |
| 25G/50G以太网联盟与IEEE规范                                                                                 |      | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    | 25G |
| 2.5G/5.0G USXGMII                                                                                   |      | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |     |
| 更多企业协议                                                                                              |      |         |     |     |     |     |     |        |      |     |
| OIF, CEI-6G/11G                                                                                     | ✓    | ✓       | ✓   | ✓   |     |     |     |        |      |     |
| CPRI, OBSI, JESD204 A/B                                                                             | ✓    | ✓       | ✓   | ✓   |     |     |     |        | ✓    |     |
| SRIO                                                                                                | ✓    | ✓       | ✓   | ✓   |     |     |     |        |      |     |

| 接口IP  |      |     |     |     |     |        |      |
|-------|------|-----|-----|-----|-----|--------|------|
| HBM   | 工艺技术 |     |     |     | 控制器 | 平台架构支持 | 验证IP |
|       | 7nm  | 6nm | 5nm | 3nm |     |        |      |
| HBM4  |      |     |     |     | ✓   |        | ✓    |
| HBM3E | ✓    | ✓   | ✓   | ✓   | ✓   | ✓      | ✓    |
| HBM2E | ✓    | ✓   | ✓   |     |     |        | ✓    |

| DDR                 | 工艺技术    |      |      |         |      |      |     |     |     | 控制器             | 内联内存加密<br>(IME)<br>安全模块 | 支持Platform<br>Architect | 验证IP | 车用级 |
|---------------------|---------|------|------|---------|------|------|-----|-----|-----|-----------------|-------------------------|-------------------------|------|-----|
|                     | 40/45nm | 28nm | 22nm | 14/16nm | 12nm | 10nm | 7nm | 5nm | 3nm |                 |                         |                         |      |     |
| LPDDR6              |         |      |      |         |      |      |     |     | ✓   |                 |                         |                         | ✓    |     |
| LPDDR5X             |         |      |      | ✓       | ✓    |      | ✓   | ✓   | ✓   | 内存控制器           | ✓                       | ✓                       | ✓    | ✓   |
| LPDDR5              |         |      |      | ✓       | ✓    |      | ✓   | ✓   | ✓   | 内存控制器           | ✓                       | ✓                       | ✓    | ✓   |
| LPDDR4              |         | ✓    | ✓    | ✓       | ✓    | ✓    | ✓   | ✓   |     | 协议控制器、内存<br>控制器 | ✓                       | ✓                       | ✓    | ✓   |
| LPDDR4X             |         |      |      | ✓       | ✓    |      | ✓   | ✓   | ✓   | 协议控制器、内存<br>控制器 | ✓                       | ✓                       | ✓    | ✓   |
| LPDDR3              |         | ✓    | ✓    | ✓       | ✓    | ✓    |     |     |     | 协议控制器、内存<br>控制器 |                         | ✓                       | ✓    |     |
| LPDDR2              |         | ✓    |      |         |      |      |     |     |     | 协议控制器、内存<br>控制器 |                         | ✓                       | ✓    |     |
| DDR5 Gen2<br>MRDIMM |         |      |      |         |      |      |     |     | ✓   | 内存控制器           |                         | ✓                       | ✓    |     |
| DDR5                |         |      |      | ✓       | ✓    | ✓    | ✓   | ✓   | ✓   | 内存控制器           | ✓                       | ✓                       | ✓    |     |
| DDR4                |         | ✓    | ✓    | ✓       | ✓    | ✓    | ✓   | ✓   |     | 协议控制器、内存<br>控制器 |                         | ✓                       | ✓    |     |
| DDR3                | ✓       | ✓    | ✓    | ✓       | ✓    | ✓    |     |     |     | 协议控制器、内存<br>控制器 |                         | ✓                       | ✓    |     |
| DDR2                | ✓       |      |      |         |      |      |     |     |     | 协议控制器、内存<br>控制器 |                         | ✓                       | ✓    |     |

| CXL     | 工艺技术    |      |     |     |     | 控制器                | 配置                  | IDE安全模块 | 验证IP |
|---------|---------|------|-----|-----|-----|--------------------|---------------------|---------|------|
|         | 14/16nm | 10nm | 7nm | 6nm | 5nm |                    |                     |         |      |
| CXL 3.x |         |      |     |     | ✓   | 设备、主机、双模式 全部带CXS接口 | x4, x8, x16         | ✓       | ✓    |
| CXL 2.0 | ✓       | ✓    | ✓   | ✓   | ✓   | 设备、主机、双模式, 交换端口    | x1, x2, x4, x8, x16 | ✓       | ✓    |

| 接口IP   |     |           |                |            |      |
|--------|-----|-----------|----------------|------------|------|
| UALink | 3nm | Bandwidth | 控制器            | 配置         | 验证IP |
| UALink | ✓   | 200Gbps   | UPLI Interface | x1, x2, x4 | ✓    |

| CCIX     | 工艺技术    |      |     |     |     | 控制器            | 验证IP |
|----------|---------|------|-----|-----|-----|----------------|------|
|          | 14/16nm | 12nm | 7nm | 6nm | 5nm |                |      |
| CCIX 1.1 | ✓       | ✓    | ✓   | ✓   | ✓   | 端点、根端口、双模式、交换机 | ✓    |

| USB                            | 工艺技术    |               |      |         |      |         |     |     |     |     |     |     |     | 控制器/特性                              | HS 访问和测试 | 验证IP |
|--------------------------------|---------|---------------|------|---------|------|---------|-----|-----|-----|-----|-----|-----|-----|-------------------------------------|----------|------|
|                                | 55/65nm | 22/28/40/45nm | 20nm | 14/16nm | 12nm | 10/11nm | 8nm | 7nm | 6nm | 5nm | 4nm | 3nm | 2nm |                                     |          |      |
| USB4                           |         |               |      |         | ✓    |         |     | ✓   | ✓   | ✓   |     | ✓   |     | 设备路由器，主机路由器                         | ✓        | ✓    |
| USB-C 3.2 / DisplayPort 1.4 TX |         |               |      |         | ✓    |         |     | ✓   |     | ✓   | ✓   | ✓   |     | 主机，双重角色，DisplayPort TX，HDCP ESM、DSC | ✓        | ✓    |
| USB 3.2                        |         |               |      |         |      |         |     | ✓   | ✓   | ✓   | ✓   |     |     | 主机、设备、双重角色                          | ✓        | ✓    |
| USB-C 3.1 / DisplayPort 1.4    |         | ✓             |      | ✓       | ✓    | ✓       |     | ✓   | ✓   | ✓   | ✓   |     |     | 主机，双重角色，DisplayPort TX，HDCP ESM、DSC | ✓        | ✓    |
| USB-C 3.1                      |         |               |      | ✓       | ✓    |         | ✓   | ✓   | ✓   | ✓   |     |     |     | 主机、设备、双重角色                          | ✓        | ✓    |
| USB 3.1                        |         | ✓             |      | ✓       | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     | 主机、设备、双重角色                          | ✓        | ✓    |
| USB-C 3.0                      | ✓       | ✓             |      | ✓       | ✓    |         |     |     |     |     |     |     |     | 主机、设备、双重角色                          | ✓        | ✓    |
| USB 3.0                        | ✓       | ✓             | ✓    | ✓       | ✓    | ✓       |     |     |     |     |     |     |     | 主机、设备、双重角色                          | ✓        | ✓    |
| USB 2.0/USB-C 2.0              | ✓       | ✓             | ✓    | ✓       | ✓    | ✓       | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     | 主机、设备、双重角色                          | ✓        | ✓    |
| eUSB2                          |         |               |      |         |      |         |     |     |     | ✓   | ✓   | ✓   | ✓   | 主机、设备、双重角色                          | ✓        | ✓    |

## 接口IP

| MIPI      | 工艺技术    |      |      |      |          |      |     |     |     |         | 控制器                         | 验证IP | 车用级 |
|-----------|---------|------|------|------|----------|------|-----|-----|-----|---------|-----------------------------|------|-----|
|           | 40/45nm | 28nm | 22nm | 20nm | 14/16/nm | 12nm | 8nm | 7nm | 6nm | 3/4/5nm |                             |      |     |
| C/D-PHY   |         |      |      |      | ✓        | ✓    |     | ✓   | ✓   | ✓       | CSI-2, DSI/DSI-2            | ✓    | ✓   |
| D-PHY     | ✓       | ✓    | ✓    | ✓    | ✓        | ✓    | ✓   | ✓   | ✓   |         | CSI-2, DSI/DSI-2            | ✓    | ✓   |
| M-PHY     |         |      |      |      | ✓        | ✓    | ✓   | ✓   | ✓   | ✓       | UFS, UniPro                 | ✓    | ✓   |
| CSI-2     |         |      |      |      |          |      |     |     |     |         | 设备、主机                       | ✓    | ✓   |
| DSI       |         |      |      |      |          |      |     |     |     |         | 设备、主机                       | ✓    | ✓   |
| DSC       |         |      |      |      |          |      |     |     |     |         | Encoder, Decoder            | ✓    | ✓   |
| DSI + DSC |         |      |      |      |          |      |     |     |     |         | DSI/DSI-2 + DSC Encoder     | ✓    |     |
| UniPro    |         |      |      |      |          |      |     |     |     |         | v1.6, v1.8, v2.0            | ✓    |     |
| I3C       |         |      |      |      |          |      |     |     |     |         | 多角色控制器, Target-Lite<br>自主目标 | ✓    | ✓   |

| 移动存储   | 工艺技术 |         |      |     |     |     |     |     |     | 控制器 | 验证IP | 内联加密 | 车用级 |
|--------|------|---------|------|-----|-----|-----|-----|-----|-----|-----|------|------|-----|
|        | 28nm | 14/16nm | 12nm | 8nm | 7nm | 6nm | 5nm | 4nm | 3nm |     |      |      |     |
| UFS    |      |         |      |     |     |     |     |     |     | ✓   | ✓    | ✓    | ✓   |
| UniPro |      |         |      |     |     |     |     |     |     | ✓   | ✓    |      |     |
| M-PHY  |      | ✓       | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    |      | ✓   |
| eMMC   | ✓    | ✓       | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    |     |
| SD     | ✓    | ✓       | ✓    |     | ✓   | ✓   | ✓   |     |     | ✓   | ✓    |      |     |
| SDIO   | ✓    | ✓       | ✓    |     | ✓   | ✓   | ✓   |     |     | ✓   | ✓    |      |     |

| HDMI / DisplayPort | 工艺技术    |      |      |         |      |     |     |     |     |     |      | 控制器 | HDCP 2.3<br>安全模块 | 验证IP | 自动门 |
|--------------------|---------|------|------|---------|------|-----|-----|-----|-----|-----|------|-----|------------------|------|-----|
|                    | 40/45nm | 28nm | 22nm | 14/16nm | 12nm | 8nm | 7nm | 6nm | 5nm | 4nm | 3 nm |     |                  |      |     |
| HDMI 2.1           |         |      |      | ✓       | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓   | ✓                | ✓    |     |
| HDMI 2.0           | ✓       | ✓    | ✓    | ✓       | ✓    | ✓   |     |     |     |     |      | ✓   | ✓                | ✓    |     |
| HDMI 1.4           | ✓       |      |      |         |      |     |     |     |     |     |      | ✓   |                  | ✓    |     |
| DisplayPort 2.1    |         |      |      |         |      |     |     |     |     |     | ✓    | ✓   | ✓                | ✓    | ✓   |
| DisplayPort 1.4    |         |      |      | ✓       | ✓    |     | ✓   |     | ✓   | ✓   |      | ✓   | ✓                | ✓    | ✓   |

| 接口IP          |                 |            |
|---------------|-----------------|------------|
| 数据路径IP        | 可综合IP (Verilog) | 仿真模型 (C++) |
| 组合浮点          | ✓               | ✓          |
| 流水线浮点         | ✓               | ✓          |
| 多格式 (SIMD) 浮点 | ✓               | ✓          |
| 定点初等函数        | ✓               | ✓          |
| 浮点初等函数        | ✓               | ✓          |
| 流水线浮点初等函数     | ✓               | ✓          |

| AMBA                                                       | 可综合IP | 验证IP | Auto Grade |
|------------------------------------------------------------|-------|------|------------|
| AMBA APB 3/4、AHB 2/5、AXI 3/4、ACE-Lite 互连结构、网桥、互连矩阵和基础设施 IP | ✓     | ✓    |            |
| AHB控制器                                                     | ✓     | ✓    |            |
| AXI DMA 控制器                                                | ✓     | ✓    | ✓          |
| 同步串行接口控制器 (SPI、xSPI)                                       | ✓     | ✓    | ✓          |
| I2C/SMBus控制器                                               | ✓     | ✓    |            |
| I2S/TDM 控制器                                                | ✓     | ✓    |            |
| UART 控制器                                                   | ✓     | ✓    |            |
| AVSBus Controller                                          | ✓     | ✓    |            |
| AMBA外围设备 (I <sup>2</sup> C、I <sup>2</sup> S、UART, SSI)     | ✓     | ✓    |            |
| 定时器、中断控制器、GPIOs、总线互连组件                                     | ✓     | ✓    |            |

# 基础IP

| 嵌入式存储器                                | 工艺技术 |      |              |      |       |              |       |      |      |        |      |     |      |     |
|---------------------------------------|------|------|--------------|------|-------|--------------|-------|------|------|--------|------|-----|------|-----|
|                                       | 65nm | 55nm | 40/<br>45nm* | 28nm | 22nm* | 14/<br>16nm* | 12nm* | 10nm | 8nm* | 7/6nm* | 5nm* | 4nm | 3nm* | 2nm |
| 超高密度单端口 SRAM (UHD SP SRAM)            |      |      |              |      | ✓     | ✓            | ✓     |      |      | ✓      | ✓    | ✓   | ✓    | ✓   |
| 超高密度双端口 SRAM (UHD 2P SRAM) / P2P SRAM |      |      |              | ✓    | ✓     | ✓            |       |      | ✓    | ✓      | ✓    | ✓   | ✓    |     |
| 超高密度双端口寄存器文件 (UHD 2P RF) / P2P RF     | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     | ✓    | ✓    | ✓      | ✓    | ✓   | ✓    | ✓   |
| 超高密度单端口寄存器文件 (UHD 1P RF)              |      |      |              |      | ✓     |              | ✓     |      |      | ✓      | ✓    | ✓   | ✓    | ✓   |
| 超高速单端口 SRAM (UHS SP SRAM)             |      |      |              |      |       |              |       |      | ✓    |        |      | ✓   |      |     |
| 超高速双端口寄存器文件 (UHS 2P RF)               |      |      |              |      |       |              |       |      |      |        |      | ✓   |      |     |
| 高速单端口 SRAM (HS SP SRAM)               | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     | ✓    | ✓    | ✓      | ✓    | ✓   | ✓    |     |
| 高速 ROM (HS ROM)                       |      |      |              |      |       |              |       |      |      |        | ✓    |     | ✓    |     |
| 高速伪 4P/QP SRAM (HS P4P/QP SRAM)       |      |      |              | ✓    |       | ✓            |       |      |      | ✓      |      |     |      |     |
| 高速伪 2P SRAM (HS P2P SRAM)             |      |      |              |      | ✓     |              |       |      |      |        |      |     | ✓    |     |
| 高速双端口 SRAM (HS DP SRAM)               | ✓    | ✓    | ✓            | ✓    |       | ✓            | ✓     | ✓    | ✓    |        |      | ✓   |      |     |
| 高速异步两端口寄存器文件                          |      |      | ✓            | ✓    |       | ✓            |       |      |      |        |      |     |      |     |
| 高速两端口寄存器文件 (HS 2P RF)                 |      |      |              |      | ✓     |              |       | ✓    | ✓    |        | ✓    |     | ✓    | ✓   |
| 高速单端口寄存器文件 (HS 1P RF) (高速缓存)          | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     | ✓    | ✓    | ✓      | ✓    | ✓   | ✓    | ✓   |
| 高性能核心 (HPC) 设计套件                      |      |      | ✓            | ✓    | ✓     | ✓            | ✓     |      | ✓    | ✓      | ✓    | ✓   | ✓    |     |
| 高密度单端口 SRAM (HD SP SRAM)              | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     |      | ✓    | ✓      | ✓    | ✓   | ✓    | ✓   |
| 高密度 ROM (HD ROM)                      | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     | ✓    | ✓    | ✓      | ✓    | ✓   |      | ✓   |
| 高密度双端口 SRAM (HD DP SRAM)              | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     |      |      | ✓      | ✓    |     | ✓    |     |
| 高密度三端口寄存器文件 (HD 3P RF)                |      |      |              |      |       |              |       |      |      |        | ✓    |     |      |     |
| 基于高密度 2P、3P 异步锁存器的编译器                 |      |      |              | ✓    |       | ✓            |       |      |      | ✓      |      |     |      |     |
| 高密度两端口寄存器文件 (HD 2P RF)                | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     |      |      | ✓      | ✓    | ✓   |      |     |
| 高密度单端口寄存器文件 (HD 1P RF)                | ✓    | ✓    | ✓            | ✓    | ✓     | ✓            | ✓     |      | ✓    | ✓      | ✓    | ✓   | ✓    |     |
| 极高密度两端口寄存器文件 (EHD 2P RF)              |      |      |              |      |       |              |       |      |      |        | ✓    | ✓   |      |     |
| 极高密度单端口寄存器文件 (EHD 1P RF)              |      |      |              |      |       |              |       |      |      |        | ✓    | ✓   |      |     |
| 超低功耗双端口射频 (ULP 2P RF)                 |      |      |              |      |       |              |       |      |      |        |      |     | ✓    |     |
| 三态内容寻址存储器 (TCAM)                      | ✓    |      | ✓            | ✓    |       | ✓            |       | ✓    | ✓    | ✓      | ✓    | ✓   | ✓    |     |
| 多端口存储器                                |      |      |              |      |       |              |       |      |      | ✓      |      |     |      |     |
| eMRAM                                 |      |      |              |      | ✓     | ✓            |       |      |      |        |      |     |      |     |

\* 有适用于消费类和汽车类的方案

## 基础IP

| 逻辑库           | 工艺技术 |      |         |      |      |          |       |      |      |     |      |     |      |     |
|---------------|------|------|---------|------|------|----------|-------|------|------|-----|------|-----|------|-----|
|               | 65nm | 55nm | 40/45nm | 28nm | 22nm | 14/16nm* | 12nm* | 8nm* | 7nm* | 6nm | 5nm* | 4nm | 3nm* | 2nm |
| 超性能库          |      |      |         |      |      |          |       |      |      |     |      |     | ✓    |     |
| 超高性能 POK      |      |      |         |      |      |          |       |      |      |     |      |     | ✓    |     |
| 高速库           | ✓    | ✓    | ✓       | ✓    | ✓    | ✓        | ✓     | ✓    | ✓    |     | ✓    | ✓   | ✓    | ✓   |
| 高速POK         | ✓    | ✓    | ✓       | ✓    | ✓    | ✓        |       | ✓    | ✓    |     | ✓    | ✓   | ✓    | ✓   |
| 高密度库          | ✓    | ✓    | ✓       | ✓    | ✓    | ✓        | ✓     | ✓    | ✓    | ✓   | ✓    | ✓   | ✓    | ✓   |
| 高密度POK        | ✓    | ✓    | ✓       | ✓    | ✓    | ✓        | ✓     | ✓    | ✓    | ✓   | ✓    | ✓   | ✓    | ✓   |
| UHD库          | ✓    | ✓    | ✓       | ✓    | ✓    | ✓        |       | ✓    |      |     |      | ✓   | ✓    |     |
| UHD POK       | ✓    | ✓    | ✓       | ✓    | ✓    | ✓        |       | ✓    |      |     |      | ✓   | ✓    |     |
| 极高密度 (EHD) 库  |      |      |         |      |      |          | ✓     |      |      |     |      |     |      |     |
| 极高密度(EHD) POK |      |      |         |      |      |          | ✓     |      |      |     |      |     |      |     |
| 超低泄漏 (厚氧化层)   |      |      | ✓       |      | ✓    | ✓        | ✓     |      |      |     |      |     |      |     |
| 高性能内核设计工具包    |      |      | ✓       | ✓    | ✓    | ✓        | ✓     | ✓    | ✓    | ✓   | ✓    | ✓   | ✓    | ✓   |

\* 有适用于消费类和汽车类的方案

| 非易失性存储器               | 工艺技术          |       |       |             |             |      |      |      |      |      |               | 非易失性存储器                                            | 耐用性 (写入次数)     |
|-----------------------|---------------|-------|-------|-------------|-------------|------|------|------|------|------|---------------|----------------------------------------------------|----------------|
|                       | 150/<br>180nm | 110nm | 130nm | 80/<br>90nm | 55/<br>65nm | 40nm | 28nm | 22nm | 16nm | 12nm | 4/5/<br>6/7nm |                                                    |                |
| 一次性可编程 (OTP)          | ✓             | ✓     | ✓     | ✓           | ✓           | ✓    | ✓    | ✓    | ✓    | ✓    | ✓             | 16 bit to 1 Mbit                                   | 单次每单元          |
| 多次可编程 (MTP) 中等密度      | 180nm         |       |       |             |             |      |      |      |      |      |               | 16 bit to 512 Kbit                                 | 1,000次         |
| 多次可编程 (MTP) EEPROM    | 180nm         |       | ✓     |             | ✓           | ✓    |      |      |      |      |               | 128 bit to 8 Kbit                                  | 1,000,000次     |
| 多次可编程 (MTP) ULP       | ✓             |       |       |             |             |      |      |      |      |      |               | 64 bit to 4 Kbit                                   | 100,000次       |
| 少次可编程Trim             | ✓             | ✓     | ✓     | ✓           |             |      |      |      |      |      |               | 64 bit to 4 Kbit                                   | 1,000次         |
| 汽车级OTP                |               |       | ✓     |             |             |      |      | ✓    |      |      |               | Up to 1 Mbit                                       | 1 per instance |
| 符合汽车 AEC-Q100 标准的 OTP | ✓             |       |       |             | ✓           | ✓    | ✓    |      | ✓    |      | ✓             | Up to 1 Mbit                                       | 1 per instance |
| 符合汽车 AEC-Q100 标准的 MTP | ✓             |       | ✓     |             |             |      |      |      |      |      |               | 128 bit to 8 Kbit (Up to 256Kb for Medium Density) | Up to 10,000   |

| 基础IP       |      |         |      |     |       |     |     |     |     |
|------------|------|---------|------|-----|-------|-----|-----|-----|-----|
| I/O产品      | 工艺技术 |         |      |     |       |     |     |     |     |
|            | 22nm | 14/16nm | 12nm | 8nm | 6/7nm | 5nm | 4nm | 3nm | 2nm |
| 通用I/O      | ✓    | ✓       | ✓    |     | ✓     | ✓   | ✓   | ✓   | ✓   |
| I3C/I2C IO |      |         |      |     | ✓     | ✓   | ✓   | ✓   |     |
| 低电压差分信号IO  |      |         | ✓    |     | ✓     | ✓   | ✓   | ✓   |     |
| SDeMMC     | ✓    |         |      | ✓   |       | ✓   | ✓   | ✓   |     |
| 3DIO       |      |         |      |     |       | ✓   |     | ✓   |     |
| 高速测试IO     |      |         |      |     |       |     |     | ✓   |     |

| 芯片生命周期管理 (SLM) IP                                                                                 | 工艺技术   |      |         |      |         |     |         |     |        |     |
|---------------------------------------------------------------------------------------------------|--------|------|---------|------|---------|-----|---------|-----|--------|-----|
|                                                                                                   | 28nm   | 16nm | 14nm    | 12nm | 7nm     | 6nm | 5nm     | 4nm | 3nm    | 2nm |
| 片内 PVT 监视器 IP                                                                                     |        |      |         |      |         |     |         |     |        |     |
| 过程检测器                                                                                             | ✓      | ✓    |         | ✓    | ✓*      | ✓   | ✓*      | ✓   | ✓      | ✓   |
| 电压监控器                                                                                             | ✓      | ✓    |         | ✓    | ✓*      | ✓   | ✓*      | ✓   | ✓      | ✓   |
| 温度感应器                                                                                             | ✓      | ✓    | ✓       | ✓    | ✓*      | ✓   | ✓*      | ✓   | ✓      | ✓   |
| 數位分散式熱感測器                                                                                         |        |      |         |      |         |     |         |     | ✓      | ✓   |
| 分布式热传感器                                                                                           |        |      |         |      |         | ✓   | ✓*      | ✓   | ✓      | ✓   |
| 热敏二极管                                                                                             |        | ✓    |         | ✓    | ✓       | ✓   | ✓*      | ✓   | ✓      | ✓   |
| 灾难性行程传感器                                                                                          |        |      |         |      |         | ✓   | ✓       | ✓   | ✓      | ✓   |
| 毛刺检测器                                                                                             |        |      |         |      |         |     |         |     |        | ✓   |
| 数字毛刺检测器                                                                                           |        |      |         |      |         |     |         |     | ✓      | ✓   |
| Power on Reset/Brown out Reset                                                                    |        |      |         |      |         |     |         |     |        | ✓   |
| Other IP                                                                                          |        |      |         |      | Soft IP |     |         |     |        |     |
| PVT控制器; 路径余量监视器; 时钟与延迟监视器;                                                                        |        |      |         |      | ✓*      |     |         |     |        |     |
| Controller Software Driver; UCle Monitor, Test & Repair; Lane Test & Repair; Adv. Clock Generator |        |      |         |      | ✓       |     |         |     |        |     |
| IP 测试自动化                                                                                          | 嵌入式存储器 |      | 非易失性存储器 |      | 特殊内存    |     | DRAM 内存 |     | 接口IP测试 |     |
| 多个IP核的分层测试                                                                                        |        |      |         |      |         |     |         |     | ✓*     |     |
| 内存测试、修复和诊断                                                                                        | ✓*     |      | ✓       |      | ✓*      |     | ✓       |     |        |     |

\* 汽车级

| 安全IP                                            |       |          |      |      |
|-------------------------------------------------|-------|----------|------|------|
| 安全                                              | 可合成IP | Software | 安全合规 | 验证IP |
| 加密IP                                            | ✓     | ✓        | ✓    |      |
| 物理不可克隆功能 (PUF)                                  | ✓     | ✓        | ✓    |      |
| 安全协议加速器                                         | ✓     | ✓        | ✓    |      |
| 带有硬件信任根的平台模块                                    | ✓     | ✓        | ✓    |      |
| HDMI/DisplayPort/USB Type C 数据内容保护IP (HDCP 2.3) | ✓     | ✓        |      | ✓    |
| PCIe和CXL完整性和数据加密IP (IDE)                        | ✓     | ✓        | ✓    | ✓    |
| DDR/LPDDR 内联内存加密 IP (IME)                       | ✓     | ✓        |      | ✓    |
| 以太网媒体访问控制安全 (MACsec)                            | ✓     | ✓        | ✓    | ✓    |

## 加速高性能SoC的开发

新思科技的ARC®处理器IP是一系列CPU、DSP和NPU，SoC设计师可以针对各种市场细分领域的各种用途（从深度嵌入到高性能主机应用）进行优化。该组合包括基于开放标准RISC-V ISA的32位和64位ARC-V™处理器IP。

ARC处理器提供了高度的可配置性，使设计师可以定制每个处理器实例以满足其特定的性能、功耗和面积要求。ARC处理器也是可扩展的，允许设计师实现用自定义指令或所有权，这可以显著提高性能和降低能源消耗。

新思科技ARC处理器得到了商业和开源工具，操作系统和中间件的广泛生态系统支持。这包括来自新思科技的全套软件开发工具，ARC Access Program成员的领先行业供应商的产品，以及通过embARC.org提供的广泛的免费和开源软件。

| 处理器IP                               |                      |                  |                    |              |     |           |         |               |                         |               |               |                           |                             |
|-------------------------------------|----------------------|------------------|--------------------|--------------|-----|-----------|---------|---------------|-------------------------|---------------|---------------|---------------------------|-----------------------------|
| ARC-V (RISC-V)<br>64-bit Processors | Multicore<br>Support | L1 缓存<br>(I 和 D) | L2 缓存 (统<br>一, 每核) | L3缓存<br>(共享) | MMU | 硬件虚<br>拟化 | 浮点      | 矢量扩展 (RVV)    | RISC-V RVA23<br>配置文件合规性 | 标量与向量<br>加密扩展 | N-Trace<br>支持 | 符合安全<br>标准<br>(ISO 26262) | 符合网络安<br>全标准<br>(ISO 21434) |
| RPX-100/100V                        |                      | Up to 64K        | Up to 1M           | Up to 16M    | ✓   | ✓         | H, S, D | ✓ (100V only) | Opt                     | Opt           | Opt           |                           | ✓                           |
| RPX-105/105V                        | Up to 16             | Up to 64K        | Up to 1M           | Up to 16M    | ✓   | ✓         | H, S, D | ✓ (105V only) | Opt                     | Opt           | Opt           |                           | ✓                           |
| RPX-110-FS/110V-FS                  |                      | Up to 64K        | Up to 1M           | Up to 16M    | ✓   | ✓         | H, S, D | ✓ (110V only) | Opt                     | Opt           | Opt           | ✓                         | ✓                           |
| RPX-115-FS/115V-FS                  | Up to 16             | Up to 64K        | Up to 1M           | Up to 16M    | ✓   | ✓         | H, S, D | ✓ (115V only) | Opt                     | Opt           | Opt           | ✓                         | ✓                           |

| ARC-V (RISC-V)<br>32-bit Processors | Multicore<br>Support | CCM (I & D) | L1 缓存<br>(I & D)      | L2 缓存<br>(共享) | MMU | 硬件虚<br>拟化 | 浮点            | 矢量扩展 (RVV)    | 标量与<br>向量加<br>密扩展 | DSP 扩展        | N-Trace<br>支持 | 符合安全<br>标准<br>(ISO 26262) | 符合网络安<br>全标准<br>(ISO 21434) |
|-------------------------------------|----------------------|-------------|-----------------------|---------------|-----|-----------|---------------|---------------|-------------------|---------------|---------------|---------------------------|-----------------------------|
| RHX-100/100V                        |                      | Up to 16M   | Up to 64K             | Up to 16M     | Opt | ✓         | H, S, D       | ✓ (100V only) | Opt               |               | Opt           |                           | ✓                           |
| RHX-105/105V                        | Up to 16             | Up to 16M   | Up to 64K             | Up to 16M     | Opt | ✓         | H, S, D       | ✓ (105V only) | Opt               |               | Opt           |                           | ✓                           |
| RHX-110-FS/110V-FS                  |                      | Up to 16M   | Up to 64K             | Up to 16M     | Opt | ✓         | H, S, D       | ✓ (110V only) | Opt               |               | Opt           | ✓                         | ✓                           |
| RHX-115-FS/115V-FS                  | Up to 16             | Up to 16M   | Up to 64K             | Up to 16M     | Opt | ✓         | H, S, D       | ✓ (115V only) | Opt               |               | Opt           | ✓                         | ✓                           |
| RMX-100                             |                      | Up to 2M    | Up to 64K<br>(I only) |               |     |           | Opt (S, D)    |               |                   | ✓ (uDSP only) | Opt           |                           | ✓                           |
| RMX-500/500D                        |                      | Up to 2M    | Up to 64K             |               |     |           | Opt (H, S, D) | ✓ (500D only) | Opt               | ✓ (500D only) | Opt           |                           | ✓                           |
| RMX-110-FS                          |                      | Up to 2M    | Up to 64K<br>(I only) |               |     |           | Opt (S, D)    |               |                   | ✓ (uDSP only) | Opt           | ✓                         | ✓                           |
| RMX-510-FS                          |                      | Up to 2M    | Up to 64K             |               |     |           | Opt (H, S, D) | ✓             | Opt               | ✓             | Opt           | ✓                         | ✓                           |

# 处理器IP

| ARC (Classic)<br>64-bit Processors | 多核支持          | CCM (I & D) | L1 Cache (I & D) | L2 Cache  | MPU | MMU | 浮点 (SIMD) | 跟踪  |
|------------------------------------|---------------|-------------|------------------|-----------|-----|-----|-----------|-----|
| HS66, HS66MP                       | Up to 12 (MP) | Up to 16M   | Up to 64K        | Up to 64M | Opt | Opt | Opt       | Opt |
| HS68, HS68MP                       | Up to 12 (MP) | Up to 16M   | Up to 64K        | Up to 64M | Opt | ✓   | Opt       | Opt |

| ARC (Classic)<br>32-bit Processors | 多核支持     | CCM (I & D) | L1 Cache<br>(I & D) | L2 Cache  | MPU | MMU | DSP           | 浮点  | 符合安<br>全标准 (ISO 26262) | 侧通道<br>保护 |
|------------------------------------|----------|-------------|---------------------|-----------|-----|-----|---------------|-----|------------------------|-----------|
| HS58, HS58MP                       | Up to 12 | Up to 16M   | Up to 64K           | Up to 64M | Opt | ✓   |               | Opt |                        |           |
| HS57D, HS57DMP                     | Up to 12 | Up to 16M   | Up to 64K           | Up to 64M | Opt | Opt | ✓             | Opt |                        |           |
| HS56, HS56MP                       | Up to 12 | Up to 16M   | Up to 64K           | Up to 64M | Opt | Opt |               | Opt |                        |           |
| HS48FS, HS48FSx4                   | Up to 4  | Up to 16M   | Up to 64K           | Up to 8M  | Opt | ✓   |               | Opt | ✓                      |           |
| HS47DFS, HS47DFSx4                 | Up to 4  | Up to 16M   | Up to 64K           |           | Opt | Opt | ✓             | Opt | ✓                      |           |
| HS46FS, HS46FSx4                   | Up to 4  | Up to 16M   | Up to 64K           |           | Opt | Opt |               | Opt | ✓                      |           |
| HS47D, HS47Dx2, HS47Dx4            | Up to 4  | Up to 16M   | Up to 64K           |           | Opt | Opt | ✓             | Opt |                        |           |
| HS45D, HS45Dx2, HS45Dx4            | Up to 4  | Up to 16M   |                     |           | Opt |     | ✓             | Opt |                        |           |
| HS48, HS48x2, HS48x4               | Up to 4  | Up to 16M   | Up to 64K           | Up to 8M  |     | ✓   |               | Opt |                        |           |
| HS46, HS46x2, HS46x4               | Up to 4  | Up to 16M   | Up to 64K           |           | Opt | Opt |               | Opt |                        |           |
| HS44, HS44x2, HS44x4               | Up to 4  | Up to 16M   |                     |           | Opt |     |               | Opt |                        |           |
| HS38, HS38x2, HS38x4               | Up to 4  | Up to 16M   | Up to 64K           | Up to 8M  |     | ✓   |               | Opt |                        |           |
| HS36, HS36x2, HS36x4               | Up to 4  | Up to 16M   | Up to 64K           |           | Opt | Opt |               | Opt |                        |           |
| HS34, HS34x2, HS34x4               | Up to 4  | Up to 16M   |                     |           | Opt |     |               | Opt |                        |           |
| EM11D/9D                           |          | Up to 2M    | Up to 64K (11D)     |           | Opt |     | ✓             | Opt |                        |           |
| EM7D/5D                            |          | Up to 2M    | Up to 64K (7D)      |           | Opt |     | ✓             | Opt |                        |           |
| EM6/4                              |          | Up to 2M    | Up to 64K (6)       |           | Opt |     |               | Opt |                        |           |
| EM22FS                             |          | Up to 2M    | Up to 64K           |           | Opt |     | ✓             | Opt | ✓                      |           |
| SEM110/120D                        |          | Up to 2M    |                     |           | Opt |     | ✓ (120D only) | Opt |                        | ✓         |
| SEM130FS                           |          | Up to 2M    |                     |           | Opt |     | ✓             | Opt | ✓                      | ✓         |

| IP子系统       |                         |       |                                                                           |                                |
|-------------|-------------------------|-------|---------------------------------------------------------------------------|--------------------------------|
| ARC处理器IP子系统 | 支持的ARC处理器               | 硬件加速器 | 集成外围设备                                                                    | 包含的软件                          |
| 物联网通信IP子系统  | EM11D                   | ✓     | SPI, UART(s), GPIO, Digital Front End (DFE), PMU, USIM, MIPI RFFE and RTC | DSP库, 基础通信库, 设备驱动              |
| 数据融合IP子系统   | EM5D, EM7D, EM9D, EM11D | ✓     | SPI, I2C, I2S, UART, PDM, ADC I/F, APB I/F, GPIO                          | DSP库、音频处理库、外围I/O驱动程序 (裸机)、参考设计 |
| 传感器与控制IP子系统 | EM4, EM6                | ✓     | SPI, I2C, PWM, UART, ADC I/F, DAC I/F, APB I/F, GPIO                      | DSP库、电机控制库、外围I/O驱动程序 (裸机)、参考设计 |

| 处理器IP           |         |             |          |        |              |                    |
|-----------------|---------|-------------|----------|--------|--------------|--------------------|
| ARC VPX DSP 处理器 | 多核配置    | 向量执行单元/VLIW | 矢量长度     | 向量浮点单元 | 矢量数学加速器 (可选) | 符合安全标准 (ISO 26262) |
| VPX2/VPX2FS     | 1, 2    | 3           | 128-bit  | Opt    | ✓            | ✓ (FS only)        |
| VPX3/VPX3FS     | 1, 2    | 3           | 256-bit  | Opt    | ✓            | ✓ (FS only)        |
| VPX5/VPX5FS     | 1, 2, 4 | 3           | 512-bit  | Opt    | ✓            | ✓ (FS only)        |
| VPX6/VPX6FS     | 1, 2, 4 | 3           | 1024-bit | Opt    | ✓            | ✓ (FS only)        |

| ARC NPX 神经处理器       | MACs   | L2 共享内存 | 张量加速器 | 张量浮点单元 | 数据压缩 (OCP MX) 支持 | 内存管理单元 (MMU) | 虚拟化支持 | 符合安全标准 (ISO 26262) |
|---------------------|--------|---------|-------|--------|------------------|--------------|-------|--------------------|
| NPX6-1K/NPX6-1KFS   | 1,024  |         | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-4K/NPX6-4KFS   | 4,096  | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-8K/NPX6-8KFS   | 8,192  | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-12K/NPX6-12KFS | 12,288 | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-16K/NPX6-16KFS | 16,384 | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-24K/NPX6-24KFS | 24,576 | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-32K/NPX6-32KFS | 32,768 | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-48K/NPX6-48KFS | 49,152 | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-64K/NPX6-64KFS | 65,536 | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |
| NPX6-96K/NPX6-96KFS | 98,304 | 0-64 MB | ✓     | Opt    | Opt              | ✓            | ✓     | ✓ (FS only)        |

| 嵌入式视觉处理器    | 视觉 CPU MAC | DNN/CNN 加速器 MAC (非 FuSa 选项) | 标量核心数量 | 矢量 DSP 数量 | 矢量 DSP 位宽 | L1 缓存一致性 | 标量浮点单元 | 向量浮点单元 | 符合安全标准 (ISO 26262)) |
|-------------|------------|-----------------------------|--------|-----------|-----------|----------|--------|--------|---------------------|
| EV71/EV71FS | 64         | 880, 1760, or 3520          | 1      | 1         | 512       |          | ✓      | 可选     | ✓ (FS only)         |
| EV72/EV72FS | 128        | 880, 1760, or 3520          | 2      | 2         | 512       | ✓        | ✓      | 可选     | ✓ (FS only)         |
| EV74/EV74FS | 256        | 880, 1760, or 3520          | 4      | 4         | 512       | ✓        | ✓      | 可选     | ✓ (FS only)         |

# IP加速计划

通过IP加速计划,新思科技借助SoC架构设计支持、IP子系统、信号完整性/电源完整性分析和IP加固、IP原型套件以及全面的硅培养支持,扩展了经过硅验证的全面 Synopsys IP产品组合,从而加速您的产品 开发周期。

IP子系统支持多种用于IP集成的协议和可交付内容,包括配置脚本、测试环境、测试脚本、代码检查、CDC检查、RDC检查、综合脚本和实施脚本。子系统还包括AMBA或本地总线、时钟管理、复位、DMA、中断、存储器、电源管理、调试和测试逻辑。

硬化和SIPI提供了用于集成到SOC中的GDSII,包括片上去耦电容、电源和接地引脚、PHY和SDRAM端接策略、SoC封装设计、PCB堆叠和走线宽度/间距、所需数据速率下的性能、读/写/寻址以及命令/控制时序预算。

凭借您的愿景和我们的专业知识,我们可以针对您的SOC调试IP,使您的团队专注于实现产品差异化。

| IP Subsystems |                                                                                         |       |                                   |                                                        |
|---------------|-----------------------------------------------------------------------------------------|-------|-----------------------------------|--------------------------------------------------------|
| 接口IP子系统支      | 支持的接口                                                                                   | 多协议支持 | 集成逻辑                              | 包含的脚本                                                  |
| IP协议特定子系统     | USB, PCIe, DDR, HBM, UCle,以太网, MIPI, AMBA, Security, MACsec, PCIe switch, CXL2.0 switch | ✓     | AMBA或本地总线、时钟管理、重设、DMA、中断、存储器、功耗管理 | ‘配置脚本, 测试环境, 测试脚本, linting检查, CDC检查, RDC检查, 合成脚本, 实施脚本 |

| 接口IP子系统        | Combo子系统                                               | 汽车级    | UVM | Spyglass | SRAM/MBIST | UPF | DFT |
|----------------|--------------------------------------------------------|--------|-----|----------|------------|-----|-----|
| PCIe/CXL       | PCIe-CXL-IDE, PCIe-以太网, PCIe-USB, PCIe-SATA, PCIe-CCIX | ASIL B | ✓   | ✓        | ✓          | ✓   | ✓   |
| DDR3/4/5       | DDR4/5, LPDDR4/4X/5/5X                                 |        |     |          |            |     |     |
| HBM4/3/2       | cHBM                                                   |        |     |          |            |     |     |
| UCle-A, UCle-S | cHBM                                                   |        |     |          |            |     |     |
| 以太网            | 以太网-PCIe<br>以太网-USB                                    |        |     |          |            |     |     |
| USB            | USB-DP<br>USB-DP-HDMI<br>USB-PCIe<br>USB-以太网           |        |     |          |            |     |     |
| MIPI           | CSI, DSI, UFS                                          |        |     |          |            |     |     |

| 可配置的IP子系统 | Combo子系统 | 汽车级    | UVM | Spyglass | SRAM/MBIST | UPF | DFT |
|-----------|----------|--------|-----|----------|------------|-----|-----|
| 以太网交换机    | ✓        | ASIL B | ✓   | ✓        | ✓          | ✓   | ✓   |
| PCIe交换机   |          |        |     |          |            |     |     |
| MACsec    |          |        |     |          |            |     |     |

| IP硬化         |       |          |     |      |    |     |       |      |          |         |     |
|--------------|-------|----------|-----|------|----|-----|-------|------|----------|---------|-----|
| 支持的IP        | 多协议支持 | 合成为GDSII | 平面图 | 扫描插入 | 电网 | 斜平衡 | RDL路由 | 凸块分配 | IR/EM-分析 | DRC/LVS | GLS |
| DDR/LPDDR    | ✓     | ✓        | ✓   | ✓    | ✓  | ✓   | ✓     | ✓    | ✓        | ✓       | ✓   |
| HBM2E / HBM3 |       |          |     |      |    |     |       |      |          |         |     |
| UCIe, PCIe   |       |          |     |      |    |     |       |      |          |         |     |

| 信号/电源完整性分析   |       |       |        |               |        |        |       |                    |                |      |
|--------------|-------|-------|--------|---------------|--------|--------|-------|--------------------|----------------|------|
| 支持的IP        | 多协议支持 | 平面图审查 | 前后布局分析 | 去耦单元尺寸/<br>放置 | 功率阻抗仿真 | 目视质量分析 | 端到端分析 | 时间预算分析<br>Analysis | 信号质量PVT<br>角分析 | 完整报告 |
| DDR/LPDDR    | ✓     | ✓     | ✓      | ✓             | ✓      | ✓      | ✓     | ✓                  | ✓              | ✓    |
| HBM2E / HBM3 |       |       |        |               |        |        |       |                    |                |      |
| UCIe         |       |       |        |               |        |        |       |                    |                |      |
| HBI          |       |       |        |               |        |        |       |                    |                |      |
| PCIe         |       |       |        |               |        |        |       |                    |                |      |
| MIPI         |       |       |        |               |        |        |       |                    |                |      |
| 以太网          |       |       |        |               |        |        |       |                    |                |      |

For more information on Synopsys IP, visit [synopsys.com/ip](https://www.synopsys.com/ip).