HyperX™ Midnight Software Defined SoC Family

Description

The HyperX™ Midnight Software-Defined System-on-a-Chip (hxSoC) Family is the highest performance and lowest power programmable system of chips of the 4th generation HyperX Architecture.

The HyperX Midnight family of chips are made in North America. They are built on GlobalFoundries proven 12LP process. The Midnight family is available in several frequency variations and IO configurations. All versions are available in a radiation-tolerant or terrestrial variant.

Midnight Family Versions

Frequency	Multi-Protocol IO	Rad-Tol (R) / Terrestrial (T)
1.25 GHz	8	R or T
1.25 GHz	16	R or T
1.25 GHz	32	R or T
1.25 GHz	48	R or T
1.25 GHz	64	R or T
1.60 GHz	8	R or T
1.60 GHz	16	R or T
1.60 GHz	32	R or T
1.60 GHz	48	R or T

The HyperX Midnight Chips are built on the latest 4th generation HyperX Architecture that includes a fabric of Processing Elements (PEs) and Data Memory Routers (DMRs) supporting autonomous Communication Networks. These resources are used to perform ultra-high-performance pipelining and massively parallel computational processing of Software Defined Functions (SDFs) (*e.g.*, algorithms, state machines, logic) for high-volume streaming data applications such as software-defined radio, software-defined networking, and other wideband applications.

The HyperX Technology within includes integrated security, power management and an event-driven computational architecture that delivers industry-leading performance and power efficiency.

The devices also include a Quad-core RISC-V General-Purpose-Processor (GPP) for industry-standard software stacks, device control, and other real/non-real-time operations.

The Multi-Protocol IO options available provide a variety of interfaces and connectivity. In addition, the device includes glue-less chip-to-chip capabilities that enable scalability for the most challenging applications.

HyperX Midnight family is designed to operate efficiently in both terrestrial environments as well as the extreme environments of space. It provides the ability to replace fixed and programmable integrated circuit functions with SDFs developed completely in industry-standard ANSI C. The C-based SDF designs provide greater flexibility, reduce complexity, and enable up to 75% faster development times.

Target Markets

The HyperX Midnight family is designed for solutions that require high levels of integration, real-time performance, power efficiency, upgradability, and with the added benefits of radiation tolerance. It supports power sensitive system designs with real-time adaptive workloads at less than 3W and at the same time being able to tackle the most demanding computations at less than 60W, all under software control.

Potential applications include:

- Enterprise Networking
- Satellite communications and networking
- Analysis and refinement of data-in-motion
- Autonomous decisioning at the edge
- Novel signal detection; AI data analysis
- Multi- and Hyperspectral data capture and analysis
- Synthetic Aperture Radar
- 5G to Satellite
- MIMO
- CyberSecurity / CyberNetworking
- Post Quantum Cryptography

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PRODUCT BRIEF

Key Features

Ease of Design
- Fully Software-Defined SoC
- ANSI C programming model

Ultra-High Performance @ 1.6 GHz
- >2,662,400 MIPS
- >2,662 GMACS (16-bit data)
- >665 GFLOPS

Extreme Real-Time Processing Capabilities
- HyperX Technology-based fabric
- 416 PEs/16KB Instruction SRAM (SECDED ECC)
- 459 DMRs/32KB Data SRAM (SECDED ECC)
- Variable Width Instruction Word (VWIW)
- ≤1.25 GHz and ≤1.60 GHz frequency operation

General Purpose Processing and Interfaces
- Quad-core RISC V General Purpose Processor
- Gigabit Ethernet
- Universal sync/async rec/trans (USART)

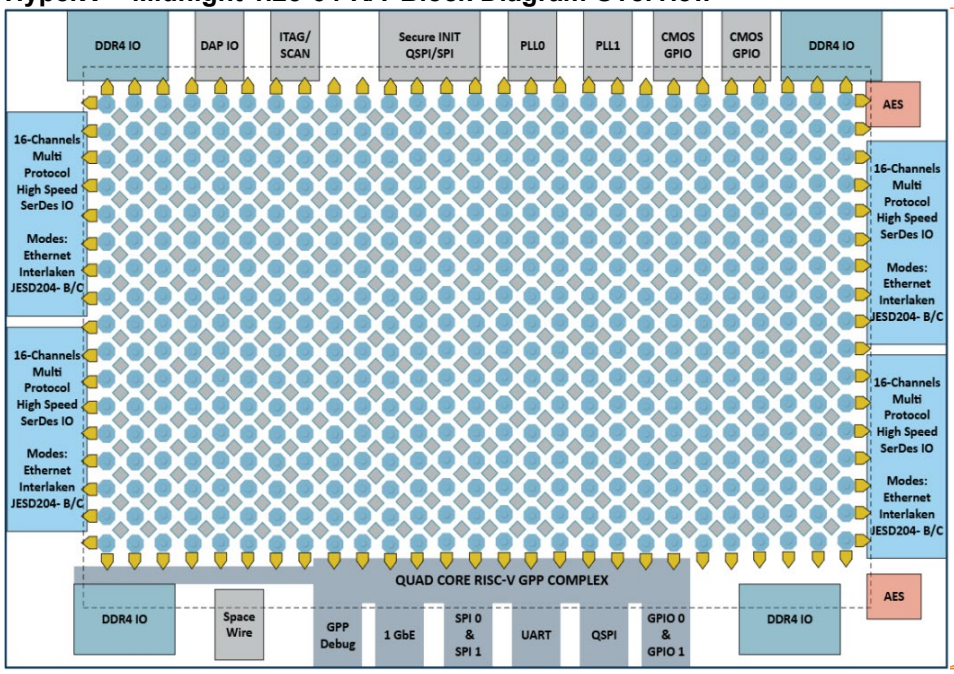
Flexible On-chip Memory and Communication
- Physically flat address space
- >14 MB data memory
- >6 MB instruction memory

Dynamic I/O Architecture
- Multi-Protocol IO
  - Up-to 64 SerDes lanes
  - Performance configurable
    - 1.25 GHz: up to 10 Gbps
    - 1.60 GHz: up to 25 Gbps
  - Supports Ethernet, Interlaken, JESD204B/C
- SpaceWire
- 4 DDR4 32-bit ports with ECC
- 2 LVCMOS 16-bit GPIO channels
- 3 SPI and 2 QSPI Ports

System Support
- AES with GCM (Galois/Counter Mode), ECB (Electronic Codebook), and CBC (Cipher Block Chaining)
- Real-Time Clock (RTC)
- Watch Dog Timer (WDT)
- Dual On-board PLL/Clock Generators
- Process and Voltage (PV) sensors
- Electronic Fuse (Efuse)

Package Footprint
- 42.5 x 42.5 mm FCBGA

HyperX™ Midnight 1.25-64-R/T Block Diagram Overview



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