

Virtex UltraScale+ HBM FPGA

- > Highest memory capacity and bandwidth at lower power/bit
- > Adaptable logic for emerging algorithms and protocols
- > Fastest time-to-market for applications requiring tightly coupled compute and memory

OVERVIEW

Many of today's applications demand more memory bandwidth and lower power than commodity memories, like DDR4, can deliver. Virtex® UltraScale+™ HBM FPGAs allow users to integrate power efficient compute capabilities with the highest memory capacity and bandwidth/watt in one device. Users can design their systems with low latency and high throughput while reducing power, costs, hardware size, and complexity.

Virtex UltraScale+ HBM FPGAs integrate up to 16GB of high-bandwidth memory (HBM Gen2) at 460GB/s bandwidth and extremely low power, ~7pJ/bit. An integrated HBM controller and switch reduce logic size by 250K LUTs and minimize R&D time. HBM user ports are industry-standard AXI interfaces capable of accessing any HBM pseudo-channel from any user port, unique among competing FPGAs.

Adaptable compute logic with tightly coupled memory enable system designs to adapt with the market to deliver the latest, most valuable applications even as they change over time. Integrated high-speed connectivity provides off-the-shelf interfaces for smaller, simpler designs and shorter design cycles.

HIGHLIGHTS

Tightly Coupled Compute and Massive Memory Bandwidth

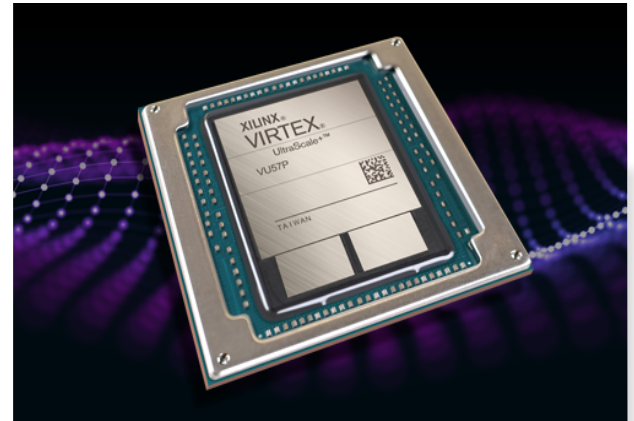
- > 16GB HBM DRAM @ 460GB/s: 20X more bandwidth than DDR4 DIMMs
- > Up to 2.9M system logic cells for emerging algorithms and protocols
- > Up to 28 TOPs (INT8) of DSP compute performance

Breakthrough System Integration for Simplified Design

- > Integrated HBM DRAM and SRAM eliminates discrete memories
- > PCIe® Gen4 for host control and data interfaces
- > 100G Ethernet MAC with KR4-FEC and 150G Interlaken for high-speed connectivity
- > Up to 3.1Tb/s SerDes bandwidth for high throughput systems
- > Integrated 58Gb/s PAM4 and 32.75Gb/s NRZ SerDes for fast data movement

Low Power Consumption for Easier Cooling

- > 4X lower power per bit vs. discrete memory solution
- > Lidless packages for more efficient cooling
- > Voltage scaling options for performance and power



TARGET APPLICATIONS

Data Center

- > Compute Acceleration
- > Data Pre-processing and Buffering
- > Database Acceleration and Analytics
- > AI and High Performance Computing

Network Acceleration

- > Network Security Acceleration
- > Loading Balancing
- > Search Applications

Test and Measurement

- > Network Protocol Testing
- > Packet Capturing

FEATURE	DESCRIPTION
16nm low power FinFET+ process technology from TSMC	<ul style="list-style-type: none"> > Industry-leading process from the #1 service foundry TSMC > The same scalable architecture and tools from 20nm UltraScale™ FPGAs
Integrated HBM (Gen2)	<ul style="list-style-type: none"> > Up to 16GB in-package HBM DRAM with 460GB/s bandwidth > 4/8/16GB HBM DRAM for optimal memory capacity options > Assembled using proven, 3rd generation 3D IC technology (SSI)
Massive memory interface bandwidth	<ul style="list-style-type: none"> > DDR4 support of up to 2,666Mb/s > Support for server-class DIMMs > Up to 30% power-saving low operating voltage mode
Integrated blocks for PCI Express with Cache Coherent Interconnect for Accelerators (CCIX) ports	<ul style="list-style-type: none"> > Complete end-to-end solution for multi-100G ports > Gen3 x16 and Gen4 x8 for 128Gb/s bandwidth > Expanded virtualization for data center applications > Acceleration for cache coherent compute using CCIX ports
Enhanced DSP slices for diverse applications	<ul style="list-style-type: none"> > Up to 28 TOPs (INT8) of DSP compute bandwidth > Double-precision floating point using 30% fewer resources > Complex fixed-point arithmetic in half the resources
UltraRAM for deep memory buffering	<ul style="list-style-type: none"> > Up to 270Mb for SRAM device integration for reduced BOM cost > 8X capacity-per-block vs. traditional embedded memory > Deep-sleep power modes for power saving
Massive serial bandwidth and dramatic latency reduction	<ul style="list-style-type: none"> > 32.75G/bs NRZ transceivers for backplane, chip-to-chip, and chip-to-optics connectivity > 58Gb/s PAM4 transceivers for latest optic standards and fastest transmission rates > High-density I/O for smaller area and greater power efficiency per pin
Integrated 100G Ethernet MAC and 150G Interlaken cores	<ul style="list-style-type: none"> > 60K–100K system logic cell savings per port > Built-in KR4-FEC (Ethernet MAC) for error correction > 150Gb/s of off-the-shelf Interlaken connectivity for scalable chip-to-chip connectivity
Enhanced routing, fabric CLB, and ASIC-like clocking	<ul style="list-style-type: none"> > Lower skew, faster performing clock networks > Up to one speed-grade advantage vs. comparable solutions > Efficient CLB use and placement for reduced interconnect delay
High-speed memory cascading	<ul style="list-style-type: none"> > Eliminates FPGA routing usage when building deep memories for faster timing closure > Reduces routing congestion > Lowers dynamic power consumption
Advanced security	<ul style="list-style-type: none"> > AES-GCM decryption, RSA-2048 authentication > DPA countermeasures and permanent tamper penalty > Improved SEU resilience

TAKE THE NEXT STEP

For more information about Xilinx Virtex UltraScale+ HBM FPGAs, go to www.xilinx.com/virtex-ultrascale-plus-hbm.

Virtex UltraScale+ HBM FPGAs are supported by comprehensive developments tools, reference designs, an IP catalog, and evaluation platforms. Visit the [Virtex UltraScale+ FPGA VCU128 evaluation kit](#) page to get started.

Corporate Headquarters
 Xilinx, Inc.
 2100 Logic Drive
 San Jose, CA 95124
 USA
 Tel: 408-559-7778
 www.xilinx.com

Xilinx Europe
 Xilinx Europe
 Bianconi Avenue
 Citywest Business Campus
 Saggart, County Dublin
 Ireland
 Tel: +353-1-464-0311
 www.xilinx.com

Japan
 Xilinx K.K.
 Art Village Osaki Central Tower 4F
 1-2-2 Osaki, Shinagawa-ku
 Tokyo 141-0032 Japan
 Tel: +81-3-6744-7777
 japan.xilinx.com

Asia Pacific Pte. Ltd.
 Xilinx, Asia Pacific
 5 Changi Business Park
 Singapore 486040
 Tel: +65-6407-3000
 www.xilinx.com

India
 Xilinx India Technology Services Pvt. Ltd.
 Block A, B, C, 8th & 13th floors,
 Meenakshi Tech Park, Survey No. 39
 Gachibowli(V), Seri Lingampally (M),
 Hyderabad -500 084
 Tel: +91-40-6721-4747
 www.xilinx.com

