SPARTAN 7

The Challenge: Driving Down Size and Cost while Increasing Performance and Monitoring

- System requirements necessitate higher performance for any-to-any connectivity and sensor fusion
- Systems are required to meet smaller power budgets with less power support circuitry
- Form factor is continuing to shrink in order to meet more challenging mechanical requirements
- The onset of ubiquitous network connectivity demands increased security and monitoring

The Solution: Spartan-7 FPGAs

- Industry-leading performance-per-watt at the lowest cost; half the power of previous devices with 30% more performance
- 200DMIPs of processing power, plus drag n' drop peripherals with MicroBlaze soft processor
- Cost efficient connectivity solution for both legacy and cutting-edge interfaces
- RoHS 6/6 compliant packaging options as small as 8mm
- Comprehensive device security and environmental monitoring
- Scalable across the industries broadest All Programmable Cost-Optimized Portfolio
- Q temperature grade (–40°C to +125°C) on all commercial devices

XILINX
ALL PROGRAMMABLE™

I/O OPTIMIZATION WITH THE HIGHEST PERFORMANCE-PER-WATT

Unmatched Performance and Power Efficiency at the Lowest Cost

If your power or performance requirements are just as challenging as your cost, look to Spartan®-7 FPGAs. Manufactured with TSMC's 28nm HPL process, this family brings together the extensive capabilities of the Xilinx 7 series FPGA architecture with small form factor and RoHS-compliant packaging for the most optimized connectivity solution in the 7 series portfolio. The efficient 7 series CLB architecture, enhanced DSP, and block RAM enable a roughly 50% power reduction vs. previous Spartan families, while at the same time deliver a 30% performance improvement. The MicroBlaze™ 32-bit RISC processor delivers 200DMIPs of processing power on a Spartan-7 device. Spartan-7 devices enable key connectivity and processing applications in industrial, automotive, infotainment, consumer, and communications markets, among others.

Industry-leading Tool and IP Support with the Vivado Design Suite

Get a jump-start generating correct-by-construction block-level design by leveraging the vast catalog of over 200 available 7 series IP solutions in the Vivado® Design Suite IP Integrator. For fast deployment of the MicroBlaze processor, presets are available for Microcontroller, Real-Time Processor, and Application Processor use cases. Start with a preset, then further customize specific processor features to meet the specific needs of your application. Then expand your MicroBlaze processor system using drag n' drop IP from a catalog of driver-enabled peripherals such as PWMs, UARTs, serial interfaces, etc. Achieve timing closure faster and attain up to 20% higher utilization using the Vivado Design Suite's expert place and route technology. Verify your design with less hassle using the mixed-language simulator with no code line limits, at no extra cost. The MicroBlaze processor, drag n' drop peripherals, Vivado(R) HLx Design Suite WebPACK™edition, and Eclipse-based Software Development Kit are all available at no cost from Xilinx, allowing you to use the fastest and lowest-cost design tools for these devices.

Part of the Broadest All Programmable Cost-Optimized Portfolio

The Spartan-7 family complements Artix®-7 FPGAs and Zynq®-7000 All Programmable SoCs to introduce a new, lower-cost entry point into the Xilinx 7 series portfolio, delivering the best value for its target applications.

Key Capabilities Overview

Half the Power with Increased Performance

- Half the total power of the previous Spartan family
- Sub-watt performance ranging from 6K – 102K logic cells
- Lowest-power industrial speed grade offering (-1LI)
- 30% faster logic performance than the previous generation Spartan family
- A smart mix of logic resources with capacity of up to 102K logic cells for high-performance systems
- Enhanced DSP block provides up to 176GMACs at 551MHz
- 200DMIPs MicroBlaze processor in Microcontroller, Real Time Processor, or Application Processor configuration
- Wide temperature grade offering allows –40°C to +125°C on commercial devices

Any-to-Any Connectivity

- Support for major single-ended and differential I/O standards
- Connect faster with 1.25Gb/s differential I/O, and up to 240Gb/s max aggregate bandwidth
- 800Mb/s DDR3 line rates and 25.6Gb/s peak bandwidth per memory controller
- Connect at lower cost and with ultimate flexibility using the optimized, soft memory controller
- Simplify high-bandwidth interfaces with multi-voltage, multi-standard high-performance SelectIO™ interface banks with 3.3V capability

Lowest Cost

- 28nm HPL process from TSMC with cost-optimized packaging and dedicated IP blocks like the XADC integrated dual analog-to-digital converters, and voltage/thermal monitoring to help reduce overall BOM cost

Innovative Packaging

- At 8mm, industry's smallest form factor package for a 28nm FPGA
- Lowest cost packaging with simple breakout
- RoHS 6/6 Compliant

Security and Monitoring

- Device DNA serial number and eFUSE identifier
- AES256 CBC Mode bitstream decryption & SHA-256 bitstream symmetric authentication
- Tamper monitoring and responses
- Integrated supply voltage and thermal monitoring

Industry's Best Tool Flow

- Faster timing closure and up to 20% higher utilization using the Vivado Design Suites' expert place and route technology
- Bare metal, freeRTOS, and Linux support for MicroBlaze processor with drag n' drop peripherals
- 200+ available IP solutions in Vivado IP Integrator for correct-by-construction block-level design
- Easier verification with Vivado's mixed-language simulator at no extra cost and with no code line limits
- Spartan-7 production devices supported by the free Vivado HL WebPACK Edition. Download at www.xilinx.com/vivado

FEATURES OVERVIEW

28nm TSMC HPL Process Technology Delivering best-in-class performance-per-watt	• Scalable 7 series CLB architecture • Flexible LUTs are configurable as logic, distributed RAM, or shift registers • From 6K – 102K logic cells for system-level integration
Low Cost by Design Cost-optimized, 7 series-based architecture	• Multiple efficient integrated blocks for BOM cost reduction, including XADC dual 12-bit analog-to-digital converters with supply voltage and thermal monitoring • Optimized selection of I/O standards
Embedded Processing Faster embedded processing with MicroBlaze soft processor	• 200+ DMIPs MicroBlaze processor in Microcontroller, Real Time Processor, or Application Processor configuration
Integrated Memory Block Capacity up to 4.2Mb Block RAM with tremendous flexibility	• Efficient and high-performance block RAM with byte write enables and optional FIFO configuration • 36K blocks can be split into two independent 18K block RAMs
Soft Memory Controller Efficient soft memory controller for the ultimate flexibility	• DDR3/DDR2/LPDDR2 support • Data rates up to 800Mb/s (25.6Gb/s peak bandwidth) • Ultimate pinout flexibility • Software wizard to guide through the entire process
SelectIO Interface Technology Multi-voltage, multi-standard SelectIO interface banks	• Up to 1.25Gb/s LVDS data rate, with up to 240Gb/s aggregate bandwidth • 3.3V to 1.2V I/O standards and protocols • HSTL and SSTL memory interfaces • Adjustable slew rates for added signal integrity
Efficient DSP48E1 Slices Drive high-performance arithmetic and signal processing	• Each slice contains a fast 18x25 wide multiplier with 48-bit accumulator and 25-bit pre-add • Capable of up to 176GMACs at 551MHz • Pipelining, balancing, cascading, SIMD support, integrated pattern detect, and ALU
Extensive Design Security Reduce system cost, increase reliability, and safeguard your design	• Device DNA serial number and eFUSE identifier • AES256 decryption and SHA-256 authentication for bitstream • Tamper monitoring and response
Small, RoHS 6/6 Compliant Packaging Flexible and cost-optimized for challenging mechanical requirements	• 8mm – 27mm package footprints at 0.5mm – 1mm pitch • Extensive footprint-compatible package migration