

Spartan-3 Generation FPGAs – The Ultimate Low-Cost Applications Platform

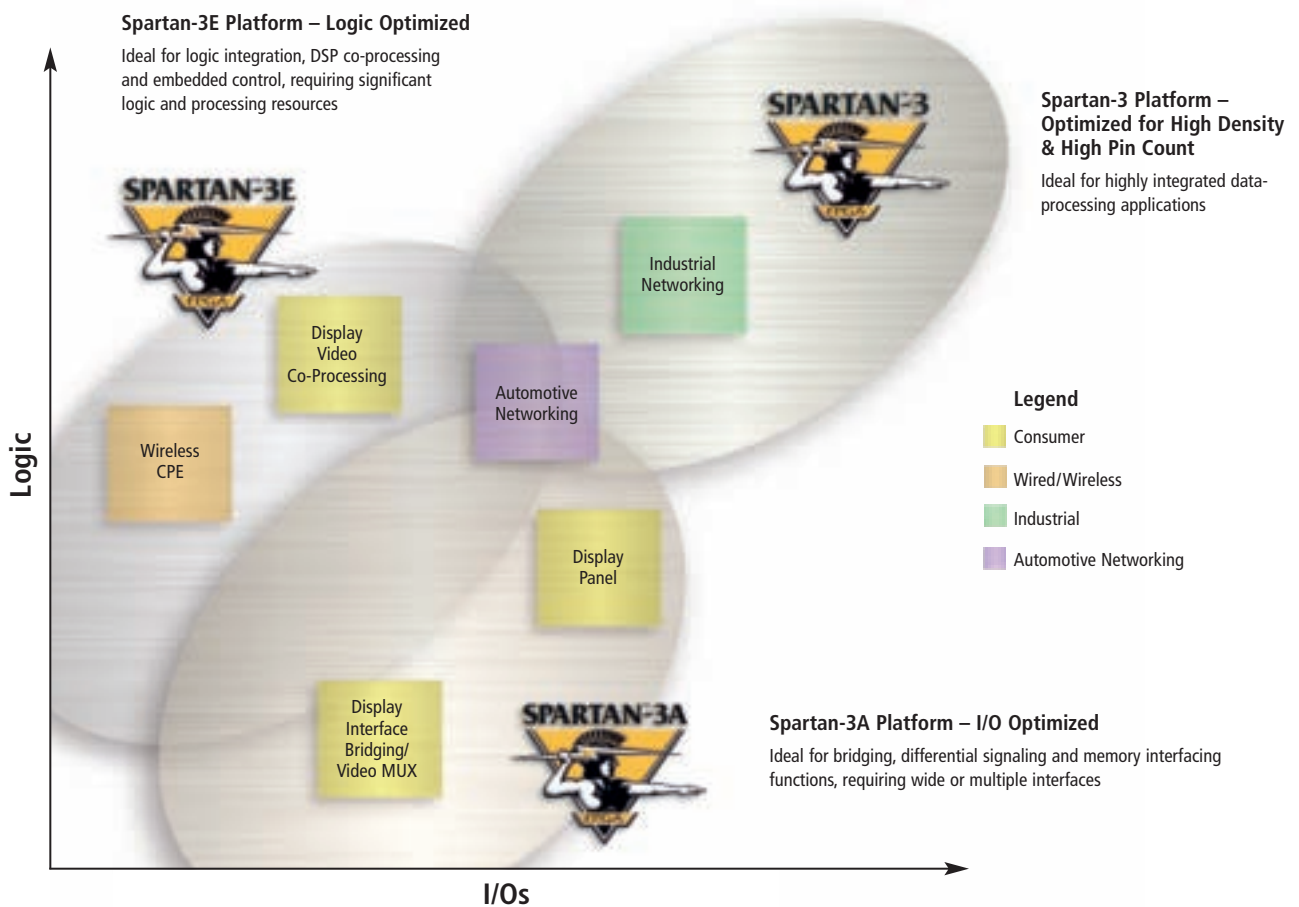


FPGAs FOR VOLUME APPLICATIONS

One Generation – Multiple Domain-Optimized Platforms





With the introduction of the new Spartan™-3A platform, the Spartan-3 Generation of FPGAs now offers a choice of three platforms, each delivering a unique cost-optimized balance of programmable logic, connectivity, and dedicated hard IP for your low-cost applications. The new Spartan-3A FPGAs are optimized for applications emphasizing I/O count and capabilities, and complement the existing Spartan-3E and Spartan-3 platforms.

Spartan-3 Generation FPGAs utilize the industry's most cost-effective and production-proven process technology – with over 25 million devices already shipped to thousands of customers worldwide.



Flexibility and Low Cost – The Ultimate Choice for Volume Applications

Systems designers worldwide are leveraging the unique advantages of Spartan-3 Generation FPGAs across a wide range of end applications, adapting their products to rapidly changing interface and data standards, differentiating functionality with minimum design time, and reducing risk as they ramp to higher production volumes.

| Examples | Application Challenges | Spartan-3 Generation Advantages |
|---|--|--|
| Flat Panel Displays  | <ul style="list-style-type: none"> Panel board and video/tuner board cost Constantly evolving I/O requirements Shorter product life cycles with higher amortized cost risk for new ASICs Constantly evolving, subjective image quality requirements Differentiating vs. competing hardware | <ul style="list-style-type: none"> 3 domain-optimized platforms for lowest-cost fit to each application SelectIO™ Technology with on-chip differential termination and widest I/O standards compliance, including LVDS, RSDS, mini-LVDS, PPDS and TMDS Pre- or post-processing video enhancement, LVDS TxRx (FPDLink), and peripheral interface bridging solutions TCON (timing control) and video co-processing flexibility Flexible peripheral interfacing and video switching Reference designs for precise gamma correction, image dithering, color temperature correction and other video-enhancement functions |
| Set-Top Boxes  | <ul style="list-style-type: none"> Evolving interface standards for memory, disks, and other components Managing inventory with multiple product feature sets Differentiating video processing capability at lower power and cost Accelerating and updating algorithms for conditional access/security | <ul style="list-style-type: none"> SelectIO Technology with support for up to 26 different I/O standards Multi-boot reconfigurability and density migration within a single package XtremeDSP™ Technology with industry-leading price/performance for digital video decoding Fast, compact IP cores for authentication and content encryption |
| Wireless Access  | <ul style="list-style-type: none"> Low-level MAC-layer co-processing in Customer Premises Equipment Forward Error Correction and DSP co-processing efficiency Peripheral bridging and interfacing | <ul style="list-style-type: none"> IP cores for MAC, FEC, encryption, digital up/down conversion and security XtremeDSP Technology with flexible high performance SelectIO Technology with on-chip termination and wide I/O standards support |
| Industrial Ethernet and Motion Control  | <ul style="list-style-type: none"> Bridging multiple connectivity protocols Customizing PWM and control algorithms Accelerating motion control algorithms | <ul style="list-style-type: none"> IP cores for EtherCAT, SerCOS III, CAN, Ethernet, PCI and PCI Express Flexible Xilinx Embedded Processing Technology Hardware acceleration with Fast Simplex Link and XtremeDSP Technology |
| Automotive  | <ul style="list-style-type: none"> Full compliance to industry production process and quality standards Interconnecting different automotive/multimedia standards | <ul style="list-style-type: none"> Extended Automotive temperature ranges, both Industrial and Q-Grade; full PPAP support and AEC-Q100 qualification for Spartan-3 and Spartan-3E platforms IP cores for bridging CAN, LIN and MOST as well as USB 2.0 and Ethernet XtremeDSP Technology with industry-leading price/performance/power and IP for filtering, edge detection, and codes Select IO Technology with on-chip termination for LVDS, RSDS and other standards |



THE ULTIMATE LOW-COST APPLICATIONS PLATFORM

The Lowest-Cost Programmable Logic Platform

Integrate system functions more efficiently

- Sophisticated clock management offers increased flexibility and control for high-performance systems
- Embedded 18 Kbit dual-port RAM blocks provide efficient processor code and data storage
- Embedded 18 x 18 multipliers deliver high-performance DSP
- Distributed RAM and shift registers for smallest design footprint

Flexible Power Management*

Reduce system power consumption

- Suspend mode reduces total FPGA power more than 40%
- Hibernate mode reduces quiescent power up to 98%



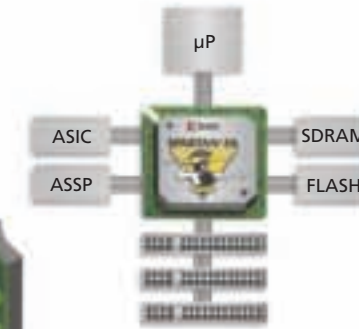
Robust Anti-Cloning Security*

Prevent design cloning and unauthorized overbuilding

- Every device has a unique Device DNA serial number for user-defined authentication
- Ultimate flexibility with user-defined authorization for both hardware and critical software IP



*New in Spartan-3A



The Leading Connectivity Platform

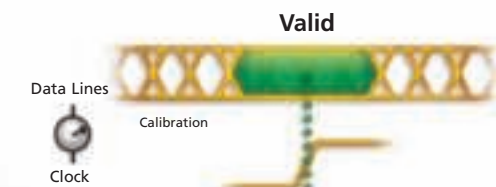
Implement multiple bridging, differential signaling and memory interfaces with SelectIO™ Technology

- Supports most popular and emerging single-ended and differential signaling standards including TMDS, PPDS, SSTL3 Class I & II *
- Pre-engineered interface IP solutions including PCI, PCI Express, USB, Firewire, CAN, SPI, I2C, and more
- Full hot-swap compliance and 3.3V support *

The Most Extensive Package Options

Select plastic to ceramic, smallest (8x8 mm² CP132) to largest (FG1156)

- Exceptional density migration options for a given package
- Pb-free availability for all packages



The Best Design Margins with Low-Cost Source Synchronous Interfacing Technology*

Ensure reliable data-clock synchronization

- Dynamic Input Delay technology with real-time flexibility
- Simplifies DDR and DDR2 memory interface design

The Most Comprehensive Configuration Capabilities

Reduce system cost, boot with different functions, and upgrade reliably

- Broadest flash memory support for lowest-cost configuration, including Platform Flash and commodity serial (SPI) and parallel flash memories
- Multi-Boot capability for multiple system configurations from the same hardware

| Platform | Cost-Optimization | Ideal Applications | Logic Cells | I/Os | Security | Power Management | SelectIO™ Technology | DSP Resources | Configuration |
|------------|----------------------------------|--|----------------|------------|--------------------------|---|--|---|--|
| Spartan-3A | I/O count & capabilities | Wide or multiple interfaces – bridging, differential signaling, memory interfaces | 1584 to 25,344 | 108 to 502 | Internal with Device DNA | Suspend – more than 40% reduction Hibernate – up to 98% reduction XPower Analyzer tools | Supports 26 differential and single-ended I/O standards Enhanced differential signaling with on-chip input termination TMDS, PPDS, RSDS, LVDS, DDR, DDR2 and SSTL3 class I & II Full 3.3V and hot-swap compliance | Pipelined, embedded 18 x 18 multipliers 18 Kbit dual-port RAM Distributed RAM and shift registers | Platform Flash with full support Parallel flash with Multi-Boot plus watchdog SPI flash JTAG and full ISE™ tool support |
| Spartan-3E | Logic density | Lowest-cost logic density – logic integration, DSP co-processing, embedded control | 2160 to 33,192 | 66 to 376 | External with SHA PROM | XPower Estimator and XPower Analyzer tools | Supports 18 differential and single-ended I/O standards Up to 16mA drive DDR memory interfaces | Pipelined, embedded 18 x 18 multipliers 18 Kbit dual-port RAM Distributed RAM and shift registers | Platform Flash with full support Parallel flash with Multi-Boot SPI flash; JTAG and full ISE tool support |
| Spartan-3 | High logic density and I/O count | High logic and I/O densities – highly integrated data-processing | Up to 74,880 | Up to 784 | External with SHA PROM | XPower Analyzer and Web Power tools | Supports 24 differential and single-ended I/O standards Up to 24mA drive DDR and DDR2 memory interfaces | Embedded 18 x 18 multipliers 18 Kbit dual-port RAM Distributed RAM and shift registers | Platform Flash, with easy in-system reprogrammability, compression, JTAG and full ISE tool support |

FAST, FLEXIBLE SYSTEM

Implement Customizable Lowest-Cost Networking and System Interfaces

Optimized silicon and application-specific IP cores make it easy to support all popular low-cost interface standards.

PCI Express

- Fully-compliant to PCIe-Base Specification v1.1 specifications
- PCI Express Starter Kit, including development board
- PCI Express PIPE Endpoint LogiCORE™ IP
- Reference Design with third-party PHY
- Bundled solution pricing



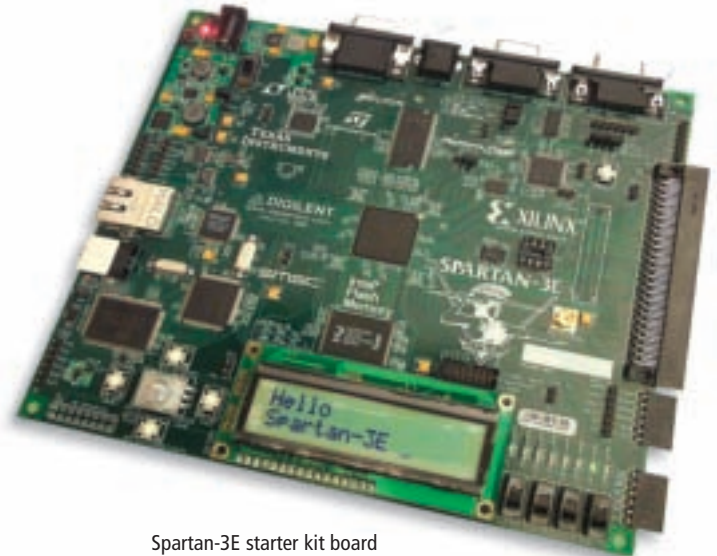
Spartan-3 PCI Express kit

PCI 33 and 66MHz, fully PCI 3.0-compliant

- PCI32 and PCI64 LogiCORE IP cores
- Customizable back-end functionality

Ethernet

- Designed to the IEEE 802.3-2002 specification for 1000 Mbps, 100 Mbps, and 10 Mbps modes
- Customizable LogiCORE Tri-Mode Ethernet MAC
- Integrates with the Ethernet 1000BASE-X PCS/PMA or SGMII LogiCORE for implementation of Ethernet Link and Physical layers



Spartan-3E starter kit board
with 10/100 Ethernet PHY

SPI-4.2, functionally compliant with OIF and SATURN® specifications

- SPI4.2(PL4) Lite LogiCORE™ delivers Sink and Source cores selected and configured through Xilinx CORE Generator™

CAN, designed to ISO 11898-1, CAN2.0A and CAN2.0B specifications

- User-configurable CAN LogiCORE IP
- Stand-alone mode or connected to Xilinx MicroBlaze™ processor

INTEGRATION

Integrate Soft Embedded Processors

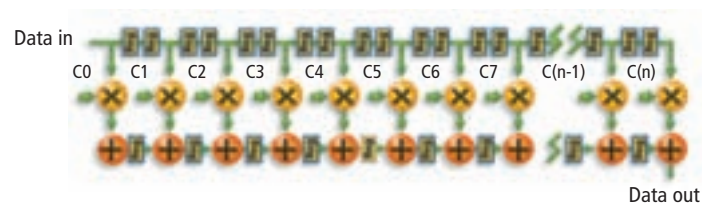
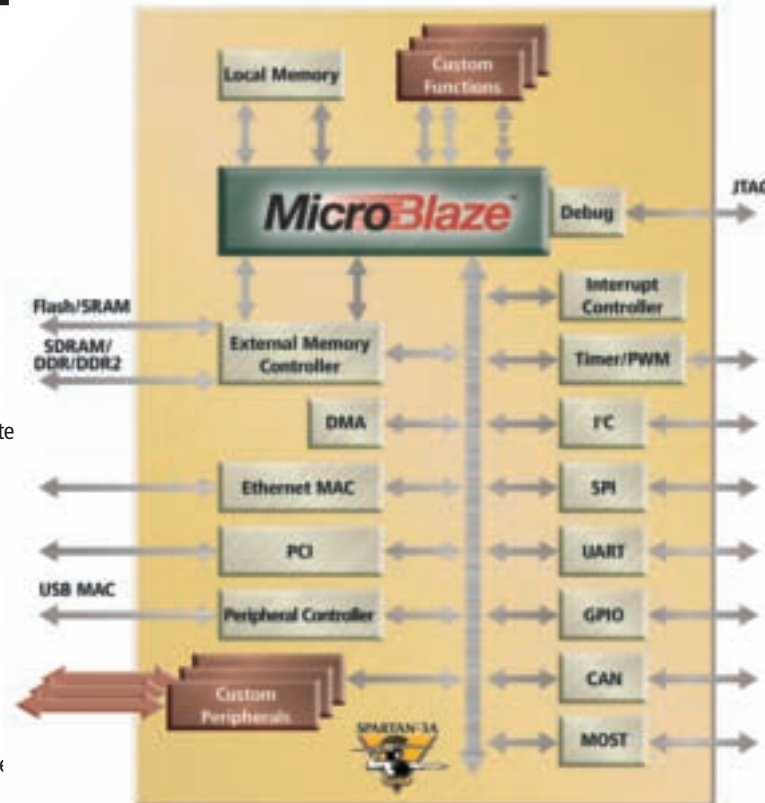
Xilinx offers flexible programmable processing solutions and a unified development tool suite

- Customizable 32-bit MicroBlaze soft processor with a full set of peripherals and reference designs
- No risk of processor or code obsolescence
- Flexibility to perform rapid design updates and changes
- Embedded Development Kit and award-winning Platform Studio tool suite
- Small-footprint PicoBlaze™ 8-bit processing solution for assembly-programmed applications

Accelerate DSP Algorithms Efficiently

Spartan-3 Generation FPGAs offer the best DSP price/power/performance for cost-conscious applications. Optimized silicon advantages including embedded multipliers, block RAM, distributed RAM and SRL16 shift registers, AccelDSP™ and System Generator for DSP tools, plus pre-verified IP cores make Spartan-3 Generation solutions ideal for:

- Video: H.264 decoding, compression, color space conversion, warping, rotation, scaling, and edge detection
- Multi-channel Audio: noise reduction, modulation and demodulation, encoding and decoding
- Communications: sample-rate conversion, filtering, down- and up-conversion, modulation and demodulation, forward error correction, encryption, compression, signal conditioning (filtering and stabilization), and decimation



Build Memory Interfaces Quickly and Reliably

Dynamic Input Delay Technology and the Memory Interface Generator tool make it easy to build reliable interfaces to the latest low-cost memories, including DDR2 and DDR

| Memory Device | Electrical Interface | Clock Rate | Data Rate |
|---------------|----------------------|------------|-----------|
| DDR2 SDRAM | SSTL 1.8V | 166 MHz | 333 Mbps |
| DDR SDRAM | SSTL 2.5V | 166 MHz | 333 Mbps |

Finish Your Design Ahead of Schedule

- Achieve FPGA performance goals quickly with ISE™ Fmax technology and PlanAhead™ design analysis tools
- Reduce debug cycle time with the real-time verification capabilities of ChipScope™ Pro tools
- Accelerate product development with online resources, training courses, and premium support services
- Get Xilinx Productivity Advantage (XPA) bundles of software, education, support services, and IP cores
- Augment your development team with a worldwide network of Xilinx Design Service (XDS) and partner experts

| | Spartan-3 Optimized for High Density and High I/O Designs | | | | | | | | Spartan-3E Logic optimized | | | | | Spartan-3A I/O optimized | | | | |
|-----------------------|--|---------|---------|----------|----------|----------|----------|----------|-------------------------------|----------|----------|-----------|-----------|-----------------------------|----------|----------|----------|-----------|
| Part Number | XC3S50 | XC3S200 | XC3S400 | XC3S1000 | XC3S1500 | XC3S2000 | XC3S4000 | XC3S5000 | XC3S100E | XC3S250E | XC3S500E | XC3S1200E | XC3S1600E | XC3S50A | XC3S200A | XC3S400A | XC3S700A | XC3S1400A |
| System Gates | 50K | 200K | 400K | 1000K | 1500K | 2000K | 4000K | 5000K | 100K | 250K | 500K | 1,200K | 1,600K | 50K | 200K | 400K | 700K | 1400K |
| Logic Cells | 1,728 | 4,320 | 8,064 | 17,280 | 29,952 | 46,080 | 62,208 | 74,880 | 2,160 | 5,508 | 10,476 | 19,512 | 33,192 | 1,584 | 4,032 | 8,064 | 13,248 | 25,344 |
| Dedicated Multipliers | 4 | 12 | 16 | 24 | 32 | 40 | 96 | 104 | 4 | 12 | 20 | 28 | 36 | 3 | 16 | 20 | 20 | 32 |
| Block RAM Blocks | 4 | 12 | 16 | 24 | 32 | 40 | 96 | 104 | 4 | 12 | 20 | 28 | 36 | 3 | 16 | 20 | 20 | 32 |
| Block RAM Bits | 72K | 216K | 288K | 432K | 576K | 720K | 1,728K | 1,872K | 72K | 216K | 360K | 504K | 648K | 54K | 288K | 360K | 360K | 576K |
| Distributed RAM Bits | 12K | 30K | 56K | 120K | 208K | 320K | 432K | 520K | 15K | 38K | 73K | 136K | 231K | 11K | 28K | 56K | 92K | 176K |
| DCMs | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | 8 | 8 | 2 | 4 | 4 | 8 | 8 |
| Max Single Ended I/O | 124 | 173 | 264 | 391 | 487 | 565 | 712 | 784 | 108 | 172 | 232 | 304 | 376 | 144 | 248 | 311 | 372 | 502 |
| Max Diff. I/O Pairs | 56 | 76 | 116 | 175 | 221 | 270 | 312 | 344 | 40 | 68 | 92 | 124 | 156 | 52 | 112 | 142 | 165 | 227 |
| VQ100 16 x 16 mm | 63 | 63 | | | | | | | 66 | 66 | | | | | | | | |
| CP132 8 x 8 mm | 89 | | | | | | | | 83 | 92 | 92 | | | | | | | |
| TQ144 22 x 22 mm | 97 | 97 | 97 | | | | | | 108 | 108 | | | | 108 | | | | |
| PQ208 30.6 x 30.6 mm | 124 | 141 | 141 | | | | | | | 158 | 158 | | | | | | | |
| FT256 17 x 17 mm | | 173 | 173 | 173 | | | | | | 172 | 190 | 190 | | 144 | 195 | 195 | | |
| FG320 19 x 19 mm | | | 221 | 221 | 221 | | | | | | 232 | 250 | 250 | | 248 | 251 | | |
| FG400 21 x 21 mm | | | | | | | | | | | | 304 | 304 | | | 311 | 311 | |
| FG456 23 x 23 mm | | | 264 | 333 | 333 | 333 | | | | | | | | | | | | |
| FG484 23 x 23 mm | | | | | | | | | | | | | 376 | | | | 372 | 375 |
| FG676 27 x 27 mm | | | | 391 | 487 | 489 | 489 | | | | | | | | | | | 502 |
| FG900 31 x 31 mm | | | | | | 565 | 633 | 633 | | | | | | | | | | |
| FG1156 35 x 35 mm | | | | | | | 712 | 784 | | | | | | | | | | |

Note: 1. System Gates include 20-30% of CLBs used as RAMs.

2. Numbers in table across device packages indicate maximum number of user I/Os.

TAKE THE NEXT STEP

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