Xilinx Programmable **Solutions** for **Aerospace and Defense** Applications

Providing complete solutions — from "space to base" — for the new era of aerospace and defense applications

Xilinx has a long, uninterrupted history of innovation, providing solutions for the aerospace and defense marketplace for more than 15 years. While other vendors have exited and re-entered this market, Xilinx continues to be a reliable partner, providing a constantly expanding product portfolio. This ongoing commitment has made Xilinx a leading supplier of complete programmable logic solutions to the aerospace and defense marketplace.

Today's high-reliability applications demand the density and flexibility found only in Xilinx reprogrammable FPGAs. With densities up to 6M system gates and high-performance system features such as embedded block RAM, embedded multipliers, Digital Clock Manager, and integrated I/O termination (XCITE), the QPro™ Virtex™-II family leads the industry in high-density, high-performance reconfigurable solutions specifically designed for mission-critical aerospace and defense applications.

Xilinx also offers a variety of package options in both ceramic and plastic, as well as a wide range of product grades including commercial, Mil-Temp QPro devices, Standard Microcircuit Drawings (SMDs), and radiation-tolerant products for space applications. And all our FPGAs are standard off-the-shelf products, enabling rapid technology insertion into existing fielded systems or new systems in design.

Xilinx has manufacturing and engineering capabilities that specifically address the aerospace and defense market. Plus, we combine IP cores with free reference designs, application notes, and design kits to help accelerate design time.

The Xilinx QPro family addresses the issues that are critical to the aerospace and defense market:

- QML/Best commercial practices — commercial manufacturing strengths result in more efficient process flows
- Performance-based solutions — including cost-effective plastic packages
- Supply reliability — controlled mask sets and processes ensure the same quality devices every time, without variation, resulting in extended production life

Experienced Supply Chain Management

Designers need a vendor who understands their dynamics and risks, including longer life cycles and substantial costs associated with mission failure. Reconfigurable devices provide numerous benefits, including lower costs for long life cycle applications. Reprogrammability can make the difference between failure and success.

The Xilinx QPro family of products offers a host of benefits:

- Long history of production
- A single characterized and qualified mask set, so the device you used in product development goes into production
- The ability to develop specific solutions to accommodate aerospace trends

Xilinx offers you confidence, whether you select commercial or military-grade products:

- Comprehensive product change notification process
- 2-year notice for any change in military parts
- Regularly published reliability data with failure analysis reports
- Complete in-house testing capabilities — including high-temperature operating life, thermal shock, temperature cycling, biased moisture life, unbiased pressure pot, preconditioning, solderability, and hermeticity (complete failure-analysis laboratory)

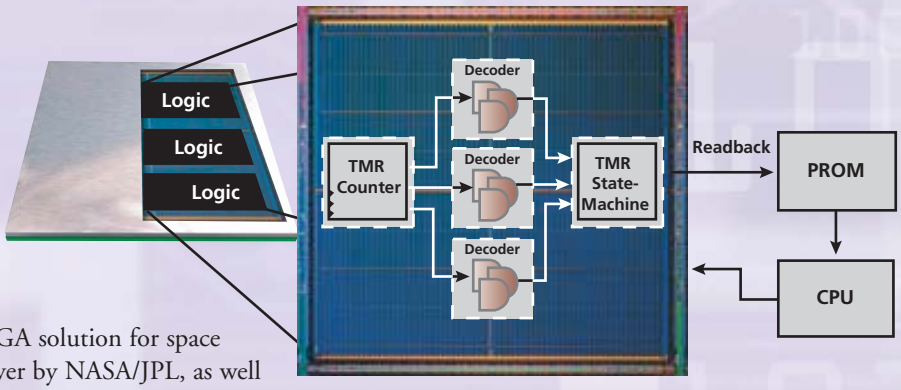
Failure is Not an Option

Xilinx reconfigurable technology provides the highest reliability, from base stations to mission-critical applications. Reconfigurable solutions have a proven reliability that fixed solutions cannot rival through use of:

- Triple mode redundancy for high-reliability applications (i.e. space, avionics, etc.)
- Configuration readback
- 20 years of designs with over 1 billion devices in a wide range of applications, including high reliability

Additionally, Xilinx has developed the TMRTool to simplify designs that require triple modular redundancy (TMR)

- Automates the TMR process for designs utilizing QPro Virtex-II devices
- Automatically implements TMR techniques on a user design
- Allows users to implement custom TMR logic
- Supports all design entry methods and HDLs
- Delivers EDIF-based performance
- Provides Windows™ 2000/XP GUI and Windows/UNIX PERL command-line support



Xilinx offers the industry's only reconfigurable FPGA solution for space applications. Utilized on the Mars Lander and Rover by NASA/JPL, as well as numerous satellites, Xilinx provides the ultimate in design flexibility:

- Seamless support between commercial and QPro devices
- The freedom to prototype with commercial devices, then insert radiation tolerant flight units without costly board re-design or qualification
- Support for total ionizing dose (TID) up to 200k Rads(si) (XQ2VR)
- Guaranteed immunity to latch up
- The flexibility to change designs right up to launch, as well as after deployment
- Xilinx is a member of the Single-Event Effects (SEE) Consortium, which is focused on the evaluation of reconfigurable FPGAs for aerospace applications. Radiation is characterized via the SEE Consortium and test results are available through the consortium.

Product Solutions for Every Application

As FPGA technology has evolved and devices have become larger, more complex, and feature-rich, packaging is presenting unprecedented challenges. Additionally, the pervasive use of plastic packages that are subjected to the harsh environments of aerospace and defense applications is resulting in even greater challenges. Xilinx is addressing this issue with a wide range of product solutions, and continuous investment in the development and testing of advanced package technology.

Xilinx aerospace and defense products use advanced plastic and ceramic packaging to provide high I/O counts in ball-grid array, column-grid array, and other package technologies.

QPro PLUS/Most Select (Rad Tolerant)
- Guaranteed total ionizing dose to 200K Rad(si)
- Latch-up immune to LET > 160 MeV-cm2/mg
- Manufactured on QML-certified line
- Densities from 1M to 6M gates with ceramic and plastic wire-bond/flip-chip grid-array packages
- Guaranteed over the full military temperature range (-55°C to +125°C)

Mil Temp/Select Products (N Grade)
- Manufactured on QML-certified line
- Guaranteed over the full military temperature range (-55°C to +125°C)
- Plastic wire-bond/grid-array packages

Mil Temp, SMDs/More Select (M & SMD Grade)
- SMDs certified to MIL-PRF-38535 (QML)
- Densities from 1M to 6M gates with ceramic and plastic wire-bond/flip-chip grid-array packages
- Guaranteed over the full military temperature range (-55°C to +125°C)
- 300+ MHz internal clock speed (Advance Data)/622+Mbps I/O (Advance Data)

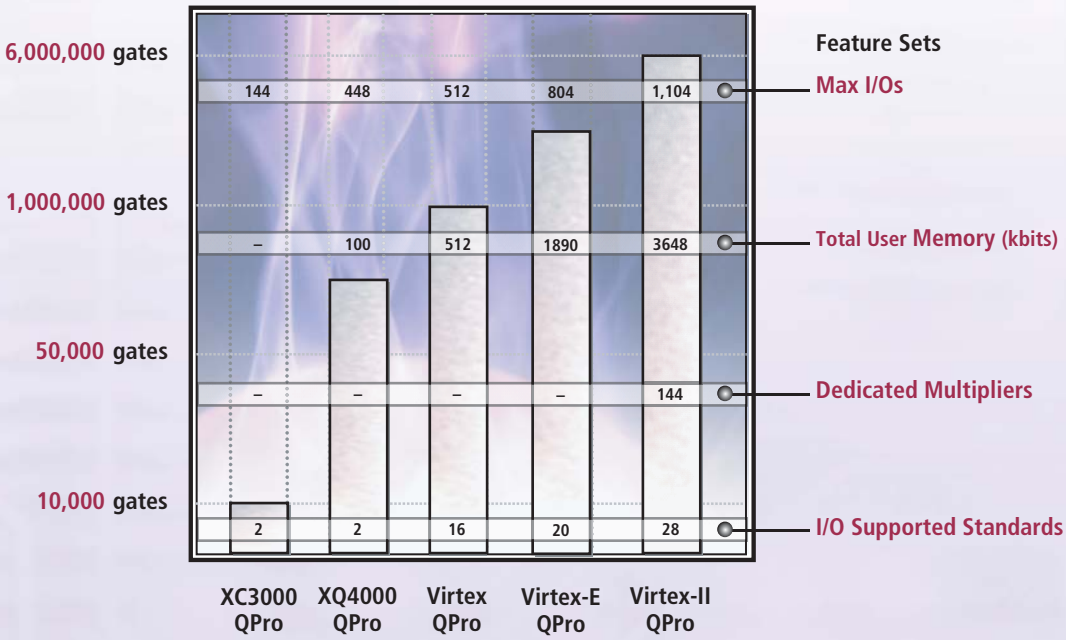
All Xilinx Products (C&I Grade)
- Product family ranges from CoolRunner™ CPLDs to Spartan™ and Virtex FPGAs
- Logic cell densities range from 32 macro cells to 125K logic cells
- Junction Temperature – C Grade = 85°C/ I Grade = 100°C (FPGAs)
- Commercial manufacturing process flow for controlled environments

A Comprehensive Suite of Design Tools

The time from design to production is a critical element in the aerospace and defense market, and system designers require a supplier that can deliver entire solutions. Xilinx QPro families of FPGAs provide a graceful path from prototyping to production using Xilinx standard software tools. A robust line of software IP cores available from Xilinx and our AllianceCORE™ partners can be utilized to solve a host of design challenges.

All Xilinx standard software tools can be used across the entire spectrum of product grades. In addition, the vast IP resources available from Xilinx — such as DSP and embedded processor cores — can be utilized with any product grade.

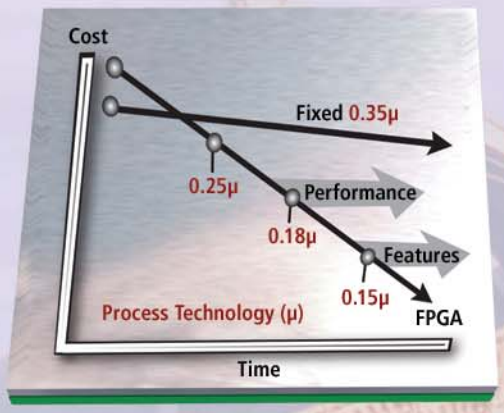
Reprogrammability offered by Xilinx devices delivers:
- The ability to design modular solutions for many different platforms and create basic functions, changes, and upgrades for new missions
- A software upgrade rather than a hardware change, reducing cost and eliminating re-spins and re-qualifications
- The ability to perform remote upgrades, meaning there is no physical contact with the product



Technology Insertion

For long-life cycle products in the aerospace and defense market, there are numerous benefits to selecting FPGAs over a fixed technology strategy. Designs can be ported to next-generation technology with improved performance, lower costs, and new features and capabilities.

Xilinx FPGAs make it easy to take advantage of the latest generation technology. The industry's leading product tool suite, Xilinx ISE 6.2i, seamlessly interfaces with all FPGA product families, so targeting your design to the latest technology takes a few mouse clicks. Adding new features and capabilities is also simpler than ever, with no NRE, there's no penalty for taking advantage of the latest technology offerings.



Xilinx offers a variety of resources such as IP cores, application notes, and design tools from AllianceCORE, LogiCORE™, and Xilinx XPERTs partners program, to accelerate product development and time-to-market.

Image/Video Processing and DSP

- Soft IP: DCT/iDCT, FIR filters, DA FIR, FETs, MACs, MPEG-2 (SD & HD), JPEG, RGB2YCrCb, YCrCb2RGB, RGB2YUV, YUV2RGB, forward error correction (Reed-Solomon, Virterbi, Convultional), arithmetic & memory functions
- Hard IP: XtremeDSP™ – Virtex-II solution delivers over 0.5 TeraMACs/s of DSP performance.
- Applications Notes: Color space conversion, image scaling, scan-line de-interlacing, image enhancement, frame buffers, gamma correction, quanitization, Huffman coding, etc.
- Design Tools: Xilinx ISE Logic Design tools, Xilinx Embedded Development Kit (EDK), and commercial RTOS support for MicroBlaze™ such as Nucleus, uC-OS, Micrium, and ExpressLogic, XtremeDSP Developer's Kit, Xilinx System Generator, etc.

System Connectivity and Integration

- Soft IP: PCI, PCI-X, RapidIO, PCI Express, SPI, UART, I2C, buffers, and FIFOs
- Hard IP: Clock DLLs, SelectIO (LVDS), BlockRAM, DistributedRAM
- Application notes: Interfacing to MIPS, ARM, IBM PowerPC™ processors

Memory & Storage Interface

- Soft IP: SRAM (ZBT/QDR), SDRAM (SDRAM/DDR), Flash memory controllers (CompactFlash, MMC, SD card, MemoryStick, IDE), asynchronous and synchronous FIFOs, frame buffers, shift registers, CAMs
- Hard IP: BlockRAM, Distributed RAM, SRL16
- Application notes: DDR SDRAM, ZBT & QDR SRAM memory controllers

System Control

- Soft Processor IP: MicroBlaze 32-bit MPµ, PicoBlaze™ 8-bit MCµ
- Soft Peripheral IP: OPB Arbiter, watchdog timer, interrupt controller, BRAM
- UART Lite, UART 16450 & 16550, I2C master & slave, SPI master & slave, GPIO, Ethernet 10/100 MAC, Ethernet Lite, ATM Utopia level 2, SRAM, SDRAM, ZBT, DDR, Flash memory controller

Encryption/Decryption

- Soft IP: AES(Rijndael), DES, TDES, SHA, RSA, MD5, Blowfish

Virtex and Virtex-II FPGA Development Boards

In addition there is a wide range of Virtex and Virtex-II development boards to help our customers understand and develop with Xilinx FPGA technology. For more information about Xilinx and partner development boards, visit **www.xilinx.com/xlnx/xebiz/board_search.jsp**

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