ALTERA®

PROGRAMMABLE LOGIC SOLUTIONS

Time-to-Market

Success

High Performance

High Capacity

Seamless Integration

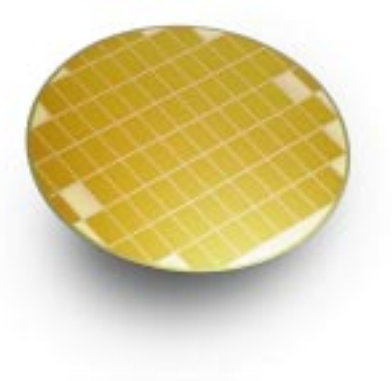
Altera Delivers Programmable Logic Solutions

Companies that can deliver new or improved products faster than their competitors will gain market share and enhance profitability throughout the life cycle of their products. Simply put, the company that gets to market first is usually the company that wins.

At Altera, we're in business to help you get there first. Our programmable logic devices (PLDs) shorten development cycles, enabling you to launch a product while your competitors are still finalizing their design. Today's low prices make programmable logic devices ideal gate array alternatives, from prototypes to volume production.

At Altera, our goal is to provide a total solution that gives you a competitive edge.

Programmable logic devices are integrated circuits that can be customized by system designers at their desktops to perform specific, unique logic functions. Altera® programmable logic devices are the fastest and largest in the industry. They offer densities and speeds that are similar to those of mainstream gate arrays, while avoiding the high up-front costs, large production commitment, and risks that are typical of gate arrays. In contrast to gate arrays, programmable logic devices provide a high degree of flexibility—particularly when it comes to last-minute design changes. The combination of speed, flexibility, and reduced risk makes programmable logic an ideal design solution for today's electronic systems.



At Altera, our goal is to provide a total solution that gives you a competitive edge. To accomplish this goal, we offer:

- Multiple product families with a total of over 500 chip/package combinations, so you can always find the density, speed, and package type that meets your specific needs
- A development system that's both easy to use and compatible with other industry-standard EDA tools
- Optimized, system-level functional blocks that help you complete your design faster and more efficiently
- A complete customer support system to make sure you get the help you need when you need it

We are proud of our history of innovation. Altera shipped the world's first CMOS reprogrammable logic device in 1984 and has been a pioneer of this dynamic CMOS PLD industry. A series of industry firsts and continual improvements has enabled Altera to become the world's leading supplier of programmable logic. The benefits of Altera's programmable logic solutions reach across a variety of industries, including telecommunications and data communications, and computers and peripherals. In these and other industries, Altera devices are used in a multitude of applications ranging from networking and switching systems to mass storage, navigation systems, desktop servers, video, robotics, medical imaging, graphics and wireless communications.

We are totally committed to making your design process quick and successful.

To address the widest range of design requirements and applications possible, Altera offers a broad line of product families that use state-of-the-art CMOS SRAM, EEPROM, and EPROM processes.

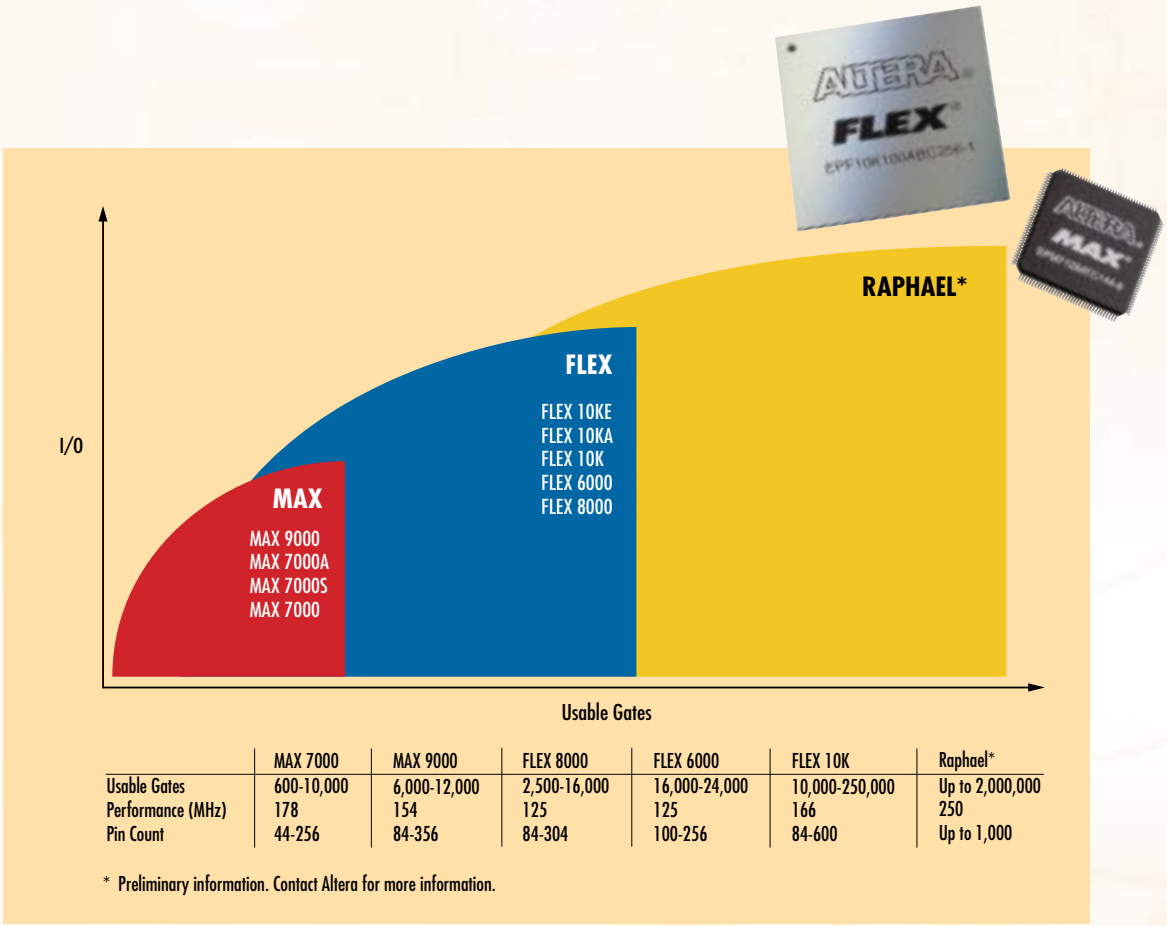
Raphael. Altera recently announced Raphael, a revolutionary new PLD architecture with up to two million gates, more than 15 times the capacity of the largest PLDs on the market today. The Raphael architecture extends the benefits of Altera's three-dimensional interconnect structure to a fourth level, further improving speed and die area by leveraging additional process metal layers. This revolutionary architecture will give engineers far greater design flexibility at density and performance levels that can only be addressed by gate arrays today and will enable the implementation of complex, high-performance system-on-silicon functionality using a single PLD.

FLEX 10K. The Flexible Logic Element MatriX (FLEX®) 10K family is the highest-performance, highest-density gate array replacement today. With devices as large as 250,000 gates, the FLEX 10K family can address the increasing levels of integration needed to accommodate today's complex system-on-a-chip designs.

SRAM-based FLEX 10K devices, offered in 2.5-V, 3.3-V, and 5.0-V supply voltages, have a unique embedded architecture made up of both a logic array and an embedded array. The flexible, programmable embedded array consists of embedded array blocks (EABs) that can implement large blocks of RAM or logic. Various memory configurations and complex logic functions such as arithmetic logic units (ALU), digital signal processing (DSP) algorithms, and microprocessor and microcontroller operations can all be implemented in FLEX 10K devices with the efficiency and speed of embedded gate arrays.

FLEX 6000. Altera's SRAM-based FLEX 6000 family delivers the flexibility and time-to-market of programmable logic at prices that are competitive with gate arrays. Featuring the industry's most efficient architecture—OptiFLEX™—FLEX 6000 devices provide a flexible and cost-effective alternative to gate arrays for high-volume production. Every feature in the OptiFLEX architecture is targeted at producing maximum performance and utilization in the smallest possible die area.

Altera offers a broad line of product families that use state-of-the-art processes.



	MAX 7000	MAX 9000	FLEX 8000	FLEX 6000	FLEX 10K	Raphael*
Usable Gates	600-10,000	6,000-12,000	2,500-16,000	16,000-24,000	10,000-250,000	Up to 2,000,000
Performance (MHz)	178	154	125	125	166	250
Pin Count	44-256	84-356	84-304	100-256	84-600	Up to 1,000

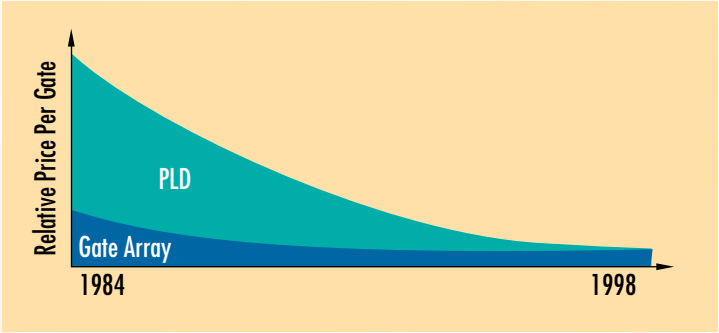
* Preliminary information. Contact Altera for more information.

FLEX 8000. The SRAM-based FLEX 8000 device family offers densities ranging from 2,500 to 16,000 gates. FLEX 8000 uses the Altera patented FastTrack Interconnect™, a continuous routing structure that allows for fast, predictable interconnect delays. FLEX 8000 devices have a 5.0-V supply voltage and can interface with 3.3-V devices through the MultiVolt I/O feature.

MAX 9000. The Multiple Array MatriX (MAX®) 9000 family is the densest EPLD family in the industry with up to 560 macrocells. The EEPROM-based MAX 9000 devices are PCI-compliant and offer non-volatile 5.0-V in-system programmability (ISP). ISP functionality allows devices to be programmed after they are soldered onto the printed circuit board (PCB), thereby minimizing the possibility of lead damage or electrostatic discharge (ESD) exposure. Altera's ISP reduces cost, shortens the development time, and provides a wider range of programming options than standard device programming methods.

MAX 7000. The MAX 7000 device family is the fastest high-density programmable logic family in the industry. The MAX 7000 device family—which includes MAX 7000E, MAX 7000S, and MAX 7000A devices—is fabricated on an advanced CMOS EEPROM process, providing a high-density, high-speed, I/O-intensive programmable logic solution. MAX 7000S devices provide several enhanced features, including support for the JTAG boundary-scan test (BST) circuitry and ISP. MAX 7000A devices support 3.3-V ISP through the JTAG interface with advanced pin-locking capability.

Dramatic cost reductions and process migrations allow Altera to offer devices at prices comparable to gate arrays.



Meeting Market Needs

Altera strives to meet the emerging demands of the marketplace. To help customers remain at the forefront of technical developments, Altera offers the most extensive selection of peripheral component interconnect (PCI) local-bus-compliant devices, ideal for high-speed and high-bandwidth computing and networking applications.

Altera's FLEX DSP solution provides the performance and flexibility required for DSP applications. Because DSP algorithms optimally map to Altera device architectures, there is no tradeoff between flexibility and performance, making Altera PLDs a logical alternative to DSP processors and ASICs. PCI, DSP, as well as a wide range of end-market applications, are well supported by a comprehensive offering of intellectual property.

Programmable Logic Is Cost Effective

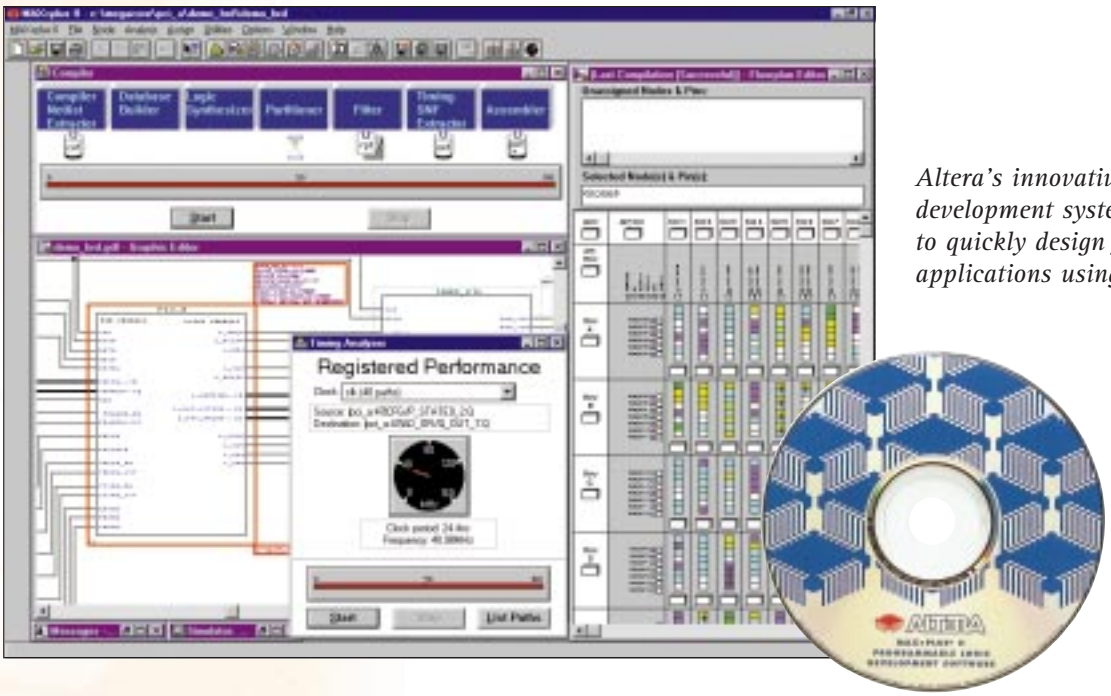
Gate Array Alternative

Due to PLD cost decreases through high-volume manufacturing and the use of aggressive process technologies, Altera offers devices that are similar in integration, density, performance, and cost to that of a gate array solution. These factors, combined with the time-to-market and flexibility of a programmable logic solution, continue to drive the increasing use of high-density PLDs in the development and production of electronic systems.

Simple Logic Integration

Integrating several smaller PLDs into a larger one can reduce cost, board space, and overall power consumption, while increasing reliability. For example, the EPM7128A can integrate over ten simple PLDs and achieve a reduction in price, power consumption, and board space requirements. Also, because the board will contain fewer devices, there will be fewer interconnections between chips, thus resulting in greater system board performance and reliability.

Cost Effective



Altera's innovative MAX+PLUS II development system enables engineers to quickly design for specific applications using Altera devices.

Advanced Development Tools

To enable you to quickly design with Altera devices for specific applications, we offer advanced engineering software that maximizes ease-of-use. Altera's state-of-the-art MAX+PLUS® II development system is a fully integrated software product that easily adapts to the designer's needs. It consists of a variety of modular applications centered around a logic compiler. Applications and features can be added incrementally to tailor the design environment as your requirements grow.

Optimized Building Blocks Help Speed Your Design Cycle

Altera provides complex system-level functions that are optimized for the Altera device architectures. Altera's MegaCore functions are developed, pre-tested, and licensed by Altera, providing customers with a wide range of functions from a PCI Master/Target interface to fast Fourier transform (FFT) functions and more.

Megafunctions are also offered through the Altera Megafunction Partners Program (AMPP℠), an alliance between Altera and developers of optimized synthesizable megafunctions. The AMPP alliance encourages megafunction development and adds significant breadth to Altera's intellectual property offering.

Your Choice of Design Environment and Platform

Through MAX+PLUS II, Altera pioneered an open design system that fits into your design environment. It can exchange netlists in EDIF, VHDL, or Verilog HDL formats, providing a convenient interface to industry-standard EDA tools. The Altera Commitment to Cooperative Engineering Solutions (ACCESS℠) program consists of EDA vendors that have developed design entry, synthesis, and analysis software products that support all of Altera's programmable logic families. Through this program, Altera offers a seamless path to industry-standard EDA tools common in many of today's design environments.

MAX+PLUS II can be used alone or together with industry-standard EDA tools. It runs under

Microsoft Windows on PCs and on UNIX platforms from Sun, HP, and IBM. Regardless of your preferred platform, MAX+PLUS II provides a rich, graphical user interface, complemented by instantly accessible on-line documentation. The variety of dialog boxes and menus, combined with comprehensive on-line help, simplifies the design process.

Architecture-Independent Design

The MAX+PLUS II Compiler supports all Altera device families, offering the industry's only truly architecture-independent programmable logic design environment. This innovative design methodology allows you to create logic designs independent of the device architecture with hardware description languages (HDLs) such as VHDL and Verilog. After you have entered a design, you can target it to any Altera device to determine the best fit. This architecture-independent design flow also allows the same design to be easily targeted towards a gate array.

Advanced Packaging Technology

Altera programmable logic devices are available in a wide variety of packages and pin counts for surface-mount or through-hole applications. In order to provide maximum logic integration in the smallest board area, Altera has pioneered the use of 1.0-mm thin quad flat pack (TQFP) and space-saving ball-grid array (BGA) packages for programmable logic.

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Flexibility

Support

Technical Support

Altera Applications Engineers provide instant technical assistance to customers.

Altera offers the industry's most complete multi-tiered support system to meet customer needs. This system includes extensive on-line help built into the MAX+PLUS II development system; a technical support hotline where customers can receive direct technical support for devices and tools; an online database of technical solutions accessed through the Altera world-wide web site; a 24-hour file transfer protocol (FTP) site for instant Internet access to product information; and an electronic mail (e-mail) response for sending technical questions to Altera's technical support team. Altera's world-wide web site also provides the latest information on Altera devices and software development tools, as well as technical literature and information on special programs.

Altera offers a Failure Analysis Service, which is designed to perform detailed analysis on suspected failing devices. In addition, Field Applications Engineers are available worldwide to help enter and evaluate designs at customer locations. For customers who desire hands-on training, we provide a variety of on- or off-site programs that teach innovative and efficient design techniques.

Altera offers the industry's most complete multi-tiered support system to meet customer needs.

Quality and Reliability

Every Altera product undergoes a series of extensive qualification and characterization tests. Each programming element is tested numerous times during manufacturing, helping to ensure 100% programming yield and eliminating the uncertainty of testing one-time programmable processes such as antifuse. In addition, Altera maintains modern quality assurance systems that have been widely audited and conform to ISO 9001 requirements.

I.S. EN ISO 9001

Developing Future Generations

Altera continues to pave the way to the future by focusing on research and development, key industry partnerships, and educational programs.

We commit a significant portion of our revenue to R&D. For example, Altera has pioneered research in reconfigurable hardware products using our SRAM-based FLEX device families. Reconfigurable hardware is a new application area that holds exciting possibilities for new product development by enabling hardware to be changed as easily as software for maximum system flexibility and speed.

Altera's University Program provides major universities around the world with a design package that includes a board with Altera devices, a student version of the MAX+PLUS II development software, and technical literature. In addition, Altera rewards students for their work in CPLD design through a unique certification program. These commitments ensure that tomorrow's designers will be well equipped to use leading-edge programmable logic devices to meet their design challenges. Visit Altera's world-wide web site for more information about the Altera University Program.

The Altera Advantage

When you choose Altera for your programmable logic needs, you get much more than speed and density. You get design cycles that measure in hours instead of days or weeks. You get comprehensive technical support, easy-to-use design software, and technology leadership. And you get the time-to-market edge you need to be successful. This is real value. This is the Altera Advantage. For more information, contact your local Altera sales representative.

Reliability

Altera maintains modern quality assurance systems that have been widely audited and conform to ISO 9001 requirements.

Timeline

Date	Significant Events
1983	Altera is founded
1984	EP300—world's first EPLD A+PLUS—Altera's first PC-based development system
1985	EP1200—world's first high-density PLD
1988	Altera stock goes public MAX 5000 architecture introduced
1989	AHDL (Altera Hardware Description Language) introduced
1990	Altera purchases 17% of Cypress Texas wafer fabrication facility Altera's first UNIX-based PLD development system
1991	MAX+PLUS II—industry's first Microsoft Windows-based development system MAX 7000 architecture introduced
1992	EPM7032—Altera's first EEPROM PLD ACCESS program—industry alliance with EDA and programmer manufacturers FLEX 8000 architecture introduced
1993	EPM7032V—world's first 3.3-V complex PLD Altera ships 15,000th PLD development system MAX 7000E architecture introduced
1994	Altera purchases Intel's programmable logic business Altera wins prestigious President's Export Achievement Award MAX 9000 architecture introduced
1995	MAX 7000S architecture introduced FLEX 10K architecture introduced Altera completes first stock split Altera ships 20,000th PLD development system AMPP—industry's first alliance of intellectual property providers
1996	Altera ships EPF10K100—world's first 100,000-gate embedded PLD Altera partners with TSMC to build domestic manufacturing plant (WaferTech) MegaCore functions introduced as part of MAX+PLUS II FLEX 10KA architecture introduced
1997	Altera completes second stock split FLEX 6000 architecture introduced Altera moves into new corporate headquarters MAX 7000A architecture introduced Altera announces Raphael—2 million gate device family Altera Consultants Alliance Program (ACAP) introduced
1998	FLEX 10KE architecture introduced Altera ships EPF10K250—world's largest PLD (250,000 gates) Altera ships EPM7128A—world's fastest 3.3-V complex PLD

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