

MAX II Product Backgrounder

Introduction

Building on nearly fifteen years of CPLD leadership and innovation, Altera introduces the MAX[®] II family, the industry's lowest-cost CPLDs. At half the cost of competing CPLDs, MAX II devices are based on a new look-up table (LUT)-based architecture that delivers the lowest cost per I/O pin on the market and breaks new ground in CPLD architectures. This instant-on, non-volatile device family targets general-purpose, low-density logic applications, enabling designers to leverage the benefits of industry leading CPLD devices in lieu of small ASICs and ASSPs, which are costlier and less flexible.

Built on a cost-optimized 0.18- μ m flash process with six metal layers, MAX II devices operate at approximately one-tenth the power of the previous-generation of MAX devices. They offer densities ranging from 240 to 2,210 logic elements (LEs) (192 to 1,700 equivalent macrocells) and up to 272 user I/O pins. Table 1 describes some of the highlights of MAX II devices, and Table 2 lists available packages.

MAX II Key Features

MAX II devices include many new features that take advantage of the technology innovations that Altera's legacy is built on. The device family was specifically designed to reduce costs for both new and traditional CPLD applications.

Important MAX II features include:

- **One-tenth the Power Consumption of Prior CPLD Families** —The MAX II devices have the lowest dynamic power in the industry, which results in the lowest operating power consumption. For mission critical designs, MAX II devices beat competing low-power products for battery life. Furthermore, the MAX II family consumes one-tenth the power of the low-cost MAX 3000A family.

- **Quadruple the Density**—The density range in macrocell equivalents is approximately 192 to 1,700 macrocells. This quadruples what Altera offered in previous families, and exceeds any offering from significant competitors today.
- **Twice the Performance**—The MAX II device family performance is on average 2X faster than the MAX 7000AE family as a result of improvements in routing architecture, software algorithms, and process technology.
- **User Flash Memory**—Altera is the first programmable logic supplier to offer user flash memory embedded within a programmable logic device (PLD). The MAX II device family can therefore integrate commonly used serial or parallel EEPROMs that typically range from 50 cents to \$2.00 in volume, further reducing the cost of end systems. The memory capacity per device is 8 Kbits across the entire family.
- **Real-Time In-System Programmability (ISP)**—Users can reconfigure MAX II devices in real time without interrupting functionality. This allows customers to add functionality and flexibility to field-deployed customer systems.

For a complete description of the MAX II device feature set, please see the Altera® web site at www.altera.com/max2.

Table 1. Product Family Table

Feature	EPM240	EPM570	EPM1270	EPM2210
LEs	240	570	1,270	2,210
Typical Equivalent Macrocells	192	440	980	1,700
Maximum User I/O Pins	80	160	212	272
User Flash Memory Bits	8,192	8,192	8,192	8,192
Speed Grades	3, 4, 5	3, 4, 5	3, 4, 5	3, 4, 5
t _{pd1} Corner-to-Corner Performance ⁽¹⁾ (ns)	4.5	5.5	6.0	6.5
t _{pd2} Fastest Performance (ns)	3.6	3.6	3.6	3.6
Available Packages ⁽²⁾	100-pin TQFP ⁽³⁾	100-pin TQFP 144-pin TQFP 256-pin BGA ⁽⁴⁾	144-pin TQFP 256-pin BGA ⁽⁴⁾	256-pin BGA ⁽⁴⁾ 324-pin BGA ⁽⁴⁾

Notes:

- (1) Correlates to the fastest commercial speed grade, which is a corner-to-corner delay path through the device.
- (2) All packages support vertical migration across all densities.
- (3) TQFP: thin quad flat pack.
- (4) FineLine BGA® package (1.0-mm pitch).

Quartus II Design Software

MAX II devices are supported by Altera's Quartus® II software, the highest-performance and easiest-to-use design software available for CPLDs, FPGAs, and HardCopy™ devices. The Quartus II software now includes a MAX+PLUS® II look-and-feel option, giving traditional MAX customers the full benefits of the Quartus II software without having to learn a new user interface. Quartus II software also integrates seamlessly with all of the leading third-party synthesis and simulation tools.

A free version of the software, Quartus II Web Edition, can be downloaded from the Altera web site at www.altera.com.

Pricing, Packaging & Availability

The MAX II device family includes 4 members ranging in density from 240 to 2,210 logic elements. Low-cost packages are available for the MAX II devices, including 1.0-mm FineLine BGA® (FBGA) and 0.5-mm thin quad flat pack (TQFP) packages.

Table 2. Pricing Table

Device	Price 1 (1)
EPM240	\$1.50
EPM570	\$2.30
EPM1270	\$4.25
EPM2210	\$7.00

(1) Resale price based on 500K unit volumes in 2005