Product Brief

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The PM-44ix is a high-performance, programmable digital signal processor (DSP) for applications such as low-cost multifunction peripherals (MFPs). Based on an advanced parallel processing architecture designed specifically for image processing, the PM-44ix delivers superior price/performance over conventional DSPs in similar applications. The PM-44ix provides MFP designers with all the flexibility advantages of a software-based image processing solution at the price/performance of fixed-function silicon.

Benefits

- **Unmatched price/performance**–Third-generation SIMD parallel processing architecture

- **Flexible platform**–Software development kit that enables OEMs to rapidly deploy their intellectual property

- **Fast time-to-market**–Complete suite of customizable image pipelines

- **Superior image quality**–Advanced image processing algorithms

- **Cost-effective solution**–Embedded memory and small package ideal for high-volume, lowcost MFP

Key Features

- 3,700 MIPS and 930 MMACS
- 4 parallel pipelined processors
- 225 MHz internal clock
- Up to 16 color inkjet copies per minute
- Up to 30 monochrome laser copies per minute
- Internal 64 Kbyte high-speed data memo
- Interface to external SDRAM–up to 64 Mbytes
- Flexible input, output, and host CPU ports
- Programmed in iDSP algebraic assembly language
- DSP Integrated Development Environment
- Code-compatible with PM-44i
- 128-pin LQFP
- 1.8 Volt supply with 3.3 Volt TTL-compatible I/O

Description

High-Performance Imaging Platform

Low-cost MFPs are advancing at an increasingly rapid rate. In addition to improved performance and lower price, new functions such as digital photo printing, color fax, Internet fax, and higher quality copying are making MFPs more compelling to consumers, and quickly making current models obsolete. To implement this growing list of functions with ever shorter time-to-market, MFP designers need a programmable, high-performance imaging platform. The PM-44ix is that platform.

Advanced Parallel Architecture

A single PM-44ix delivers up to 16 color inkjet or 30 monochrome laser copies per minute. The PM-44ix achieves its impressive performance by processing image data in parallel. The PM-44ix is based on Zoran's advanced DSP single instruction, multiple data (SIMD) parallel processing architecture. The DSP SIMD architecture takes advantage of the parallelism inherent in image data by processing columns of an image in parallel. Conventional DSPs, based on very long instruction word (VLIW) parallel processing architectures, attempt to take advantage of the parallelism hidden in sequential code. For image processing applications, the DSP SIMD architecture achieves a much higher degree of parallelism and, as a result, provides superior price/performance.

The PM-44ix contains four symmetric parallel pipelined processors that together deliver 3,700 MIPS and 930 MMACS.

Advanced Memory Architecture

The PM-44ix's advanced memory architecture boosts performance and lowers cost. The PM-44ix employs three different types of memory:

- 2 Kbyte instruction memory
- 64 Kbyte high-speed embedded SRAM
- Up to 64 Mbytes of external SDRAM

Data is transferred between the memories using programmable DMA controllers.

The PM-44ix's instruction memory ensures single-cycle instruction execution.

The PM-44ix's high-speed embedded SRAM provides high bandwidth for memory-intensive image processing algorithms. The PM-44ix's processors operate directly on data stored in this memory.

An integrated controller provides an interface to low-cost external SDRAM that can be used as a large buffer for input, output, or intermediate image data.

Programmable Imaging DSP

Product Brief

Descriptions (continued)

PM-44ix Development Environment

The PM-44ix is programmed in the DSP algebraic assembly language. Code is written in a simple C-like syntax. The following example of 3x1 matrix multiplication shows how each of the three input values is extracted from registers containing packed data, multiplied by the appropriate coefficient, accumulated into a result, and inserted into register containing packed data.

RZ = LA = EXT(mM3x1InWord1) * mM3x1Coeff1;

RZ = LA = EXT(mM3x1InWord2) * mM3x1Coeff2 + LA;

mM3x1OutWord = LI = INS(EXTI(mM3x1InWord3) * mM3x1Coeff3 + LA, LI);

The PM-44ix programming environment contains all the tools needed to program the PM-44ix:

• DSP Integrated Development Environment (IDE)

• DSP Library

• PM-44ix Evaluation Board

Color Inkjet and Monochrome Laser Solution

The PM-44ix is ideal for both color inkjet and monochrome laser MFPs. The PM-44ix performs all the image processing required in a MFP, eliminating the need for dedicated image processing or compression silicon.

Flexible Integration

The PM-44ix can be easily integrated into a variety of peripheral controllers. Design features include:

• Internal phase-locked loop (PLL) for generating PM-44ix's clock from a lower-frequency external signal

• Simple host CPU interface for use with any standard processor

• Flexible input and output ports with Burst, Video Burst, and Single DMA modes

• Easily daisy-chained for configurations with multiple PM-44ix's

PM-44ix Application
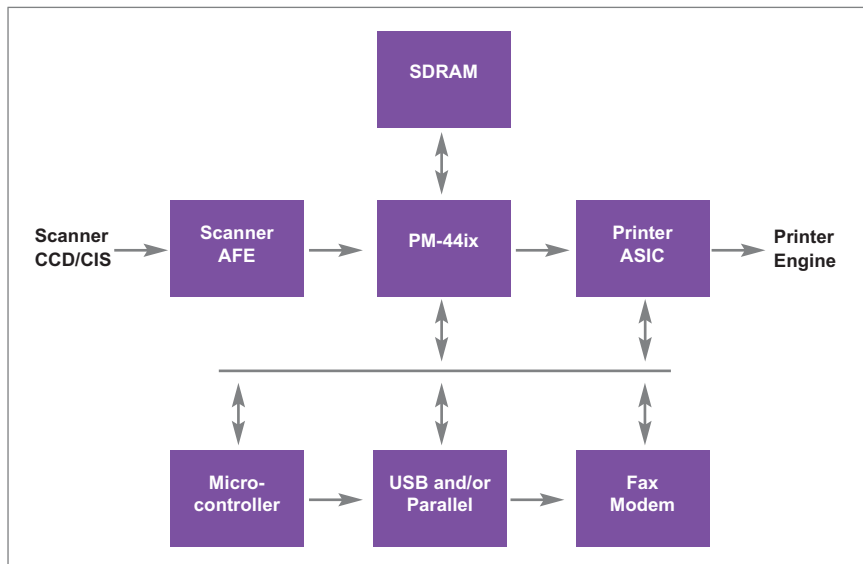
PM-44ix Inkjet MFP

• $149-$399 retail price
• Standalone high-quality color copying
  - 600 dpi scanning
  - 1200 dpi printing
  - 8 ppm color normal mode
  - 16 ppm color fast mode
  - Copy speed equal to print speed
• Standalone color and monochrome faxing
• Standalone digital photo printing