Imaging	Software	Processors	Quatro SOCs	Solutions

Product Brief

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ZORAN®

The PM-1075 Precision Digital Modulator provides state-of-the-art laser modulation for high-quality, high-speed color and monochrome laser printer systems, multifunction peripherals (MFPs) and digital copiers.

Benefits

• Precision modulator for laser printers/copiers and MFPs

• Adjustable, precision video pulse placement for superior edge photo reproduction and enhancement

• Proprietary pulse position and pulse width modulation technology

• Internal beam–detect synchronization eliminates line-to-line jitter

• All-digital design–no alignment or calibration required

Key Features

• 10-bit pulse width precision; 1024 linearized width choices

• True 7-bit pulse position precision; up to 128 position choices

• Automatic start-of-scan-line synchronization to within 1/256th of a pixel

• Internal look-up tables (LUT) compensate for operating characteristics of the printer device

• Margin control

• Supports five data modes

• Seamless pixel joining–zero dead space

• Supports any engine resolution

• No modulator calibration required–inherently linear, all-digital design

• 8-bit parallel or 2-wire serial CPU Interface

• Supports a "No CPU" mode

• 1x Clock = Data Clock = Video Rate

• Maximum video rate: 75 MHz

Description

PM-1075 Sets a New Standard
The PM-1075 is unique in two ways: 1) it modulates both pulse width and pulse position, and 2) it can operate with or without a CPU enabling easy integration into an analog modulator replacement environment or be fully utilized with its expanded feature set. Proprietary core technologies in sub-pixel modulation give virtually unlimited flexibility in the driving of laser beams to achieve the highest quality color and monochrome text, line-art and photographic images. The sub-pixel modulator precisely controls laser beam size and position, enabling very high resolutions. The high speed and low cost of the PM-1075 make it ideal for use across product lines, with no compromise in performance.

Precision Video Pulse Placement
The PM-1075 Precision Digital Modulator allows designers to adjust the pulse width, position and polarity in each pixel cell of the image, enabling superior edge and photo reproduction and enhancement. The PM-1075 controls video pulse width from 0-100% of a pixel clock period with 10-bit precision. In a high-precision mode, 1024 pulse widths can be obtained when the calibration look-up table (LUT) is bypassed. The precision modulator can position a pulse with 7-bit precision within a pixel period. In addition the polarity of any pulse can be inverted.

Beam Detect (BD) Synchronization
Start-of-scan (Line Sync) is automatically synchronized to the print engine beam detect signal (BD). The modulator uses BD to phase adjust the video cell boundaries to the start of each line within 1/256th of a video clock period, eliminating line-to-line jitter.

Data Modes and Look-up Tables
The PM-1075 supports up to 12 input bits to describe the pulse width and position within each clock period. Multiple data format options and 2 internal look-up tables (LUT) provide exceptional user flexibility. In the default mode, the LUTs are bypassed, with inputs defined as 10 bits of width information and 2 bits selecting the position (left, center, right, or reversed center). In this mode no CPU is required to operate the chip.

The PM-1075 supports multiple data mode configurations (see chart on back page). In these modes, input data is translated through the PM-1075's internal LUTs, which translate incoming data to width and position values that optimize video output to the specific engine/toner system and/or user-desired operating characteristics. The Pulse Width LUT has 256 10-bit values translating up to 8 bits of pulse width into 10 bits. The Pulse Position LUT has 256 8-bit values which describe the pulse position (7 bits) and polarity (1 bit) based on up to 8 position inputs. Naturally, the PM-1075 will support fewer bits in any mode (i.e. 6/2-bit data in the 8/4-bit mode). The LUTs allow the maximum resolution of the modulator to be used with minimal data based on the system requirements.

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Imaging-PM-1075-PB-1.2

Precision Digital Modulator

Product Brief

Descriptions (continued)

Margin Control

Once initialized by the printer controller, the PM-1075 can provide both horizontal and vertical margins using the following registers: left margin, line length, top margin and number of lines. With margin control enabled, the PM-1075 will provide data clock for just the printable area. When margin control is disabled or used in the "No CPU" mode margins must be embedded in the source data.

Seamless Pixel Joining

Because of the PM-1075's all-digital design and unique digital addressing of transition edges, pixel joining is totally seamless. There is no "recovery" time or "dead zones" between pixels.

No External Components

The PM-1075 features an all-digital modulator, requiring no external components such as delay lines, beam detect synchronization logic, external SRAM, etc. The output of the modulator directly feeds the laser diode driver.

No Modulator Chip Calibration

Due to its all-digital design, the PM-1075 is inherently linear; no alignment or calibration of the modulator chip is necessary, as is the case with many analog modulators. The PM-1075 operates at full specification without any tuning of any components.

Parallel or Serial CPU Interface

The PM-1075 supports either 8-bit parallel or 2-wire serial data, for greater CPU interface flexibility.
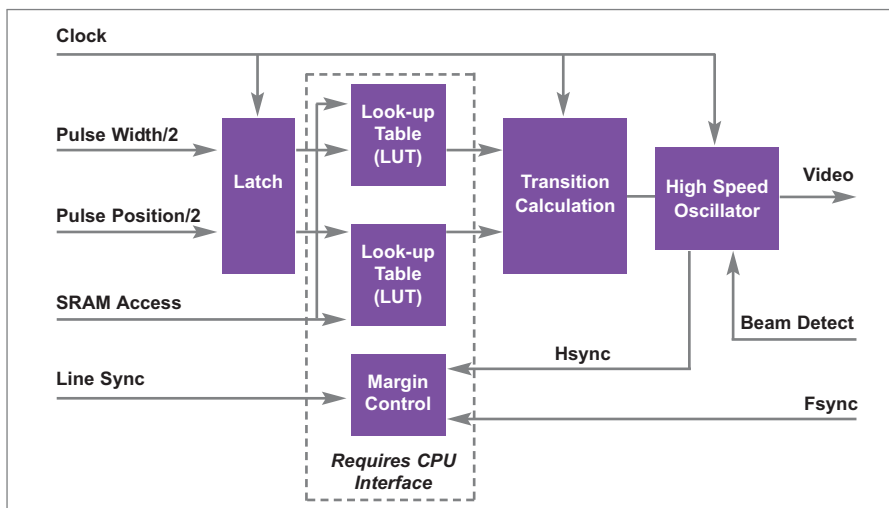
PULSE DATA MODES SUPPORTED		
10/2 bit	10 width / 2 position	* pulses are centered
8/4 bit	8 width / 4 position	
6/6 bit	6 width / 6 position	** pulses alternate left/right
4/8 bit	4 width / 8 position	
10/0 bit CTR*	10 width / 0 position	
10/0 bit LR**	10 width / 0 position	

"No CPU" Mode

When the PM-1075 is reset, it automatically enters a "no CPU" mode. All LUTs are bypassed, so that no CPU interface is required. When reset, the pulse mode is 10/2, where up to 10 width and 2 position bits are supplied. The 2-bit position data is internally hard coded, enabling 4 pulse position choices: left justified, center positive, center inverse and right justified.

All-Digital Design

The PM-1075 Precision Modulator technology is a proven design implemented in standard CMOS technology. Because of its unique design, the modulator does not require any high-speed, multiple clock frequencies; its input clock frequency equals the video frequency.

Electrical Specifications

- 3.3 Volt supply voltage
- 5 Volt tolerant I/O (TTL-compatible I/O)
- 75 MHz maximum video rate
- Available in 52-pin Metric Plastic Quad Flatpack

PM-1075 Block Diagram

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