Features

- **64-bit, 133 MHz PCI-X Bus**
- **4 Serial ATA Ports at 1.5 Gigabits Per Second**
- **SSC Support for Reduced EMI**
- **Automatic-DMA Engine**
  - **ATA/ATAPI Host Adapters Standard Compliant**
  - **Native Command Queuing Model**
  - **Continuous DMA**
  - **Non-queued and Queued Mode**
  - **32 Native Queued Commands**
  - **2 ATA Channels, Total 4 ATA/ATAPI Devices**
  - **64-bit Physical Address in CPB/APRD Chain and Data Buffers**
  - **Bus Master to/from Memory Space or I/O Space**
- **Host Serial ATA Interface**
  - **Native Command Queuing DMA Mechanism**
  - **48-bit LBA for Hard Drives Larger than 137 GB**
  - **BIST Function**
- **Available in a Variety of Packages Depending on Customer Requirements**

Description

The AT78C5001 is a 4-port serial ATA I host controller that provides a 64-bit PCI-X bus interface with an automatic DMA engine.

The PCI-X to Serial ATA ADMA Host Bus Adapter is a single-chip solution for a PCI-X to serial ATA controller. It accepts host transaction requests through the PCI-X bus, processes them and transmits them to one of four serial ATA devices. The AT78C5001 supports serial ATA speeds of 1.5 Gbits/s of 8/10bit-encoded data that is equivalent to 150 Mbytes/s of raw data. The AT78C5001 derives its serial ATA clocks from an external source with a reference clock of 75 MHz. On the 64-bit PCI-X bus, when run at the maximum frequency of 133 MHz, it supports a maximum burst transfer rate of 1064 Mbytes/s. It embeds four ADMA process engines, two in each ATA channel. The ADMA mechanism drastically increases the performance of systems that use ATA devices. Its major benefit is CPU overhead reduction. The device ADMA engine off-loads the host processor by automating the process of sending command requests/retrieving responses for each of the requests and queued responses. The ADMA both reduces the host processor overhead and substantially increases the number of commands that can be loaded into the queue in the device.

The AT78C5001 may be used to build stand-alone PCI-X HBA cards to interface Serial ATA Disk Drives, Serial ATA/ATAPI CD-ROM/DVD ROM or Tape drives. The AT78C5001 is completely software compatible with all existing operating systems which support ATA interfaces: Windows®, Windows NT®, Linux, Solaris™, Unix®, etc. In PC systems, the AT78C5001 may also be configured to provide basic or additional storage capacity to systems. In non-PC systems, the AT78C5001 may be used as a generic storage controller in servers, RAID subsystems and Network Attached Storage (NAS) systems. The ease-of-use, flexibility, performance and low cost of the AT78C5001 make it an ideal choice for all of these applications.

Figure 1. AT78C5001 Block Diagram

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┌──────────────┐         ┌──────────────┐         ┌──────────────┬──────────────┐
│              │         │  Channel X   │         │              │   Port 0     │
│              │ <──────>│  Device 0    │<──────> │  Channel X   ├──────────────┤
│              │         │ ADMA Engine  │         │  Serial ATA  │              │
│              │         ├──────────────┤         │     Unit     │   Port 1     │
│              │         │  Channel X   │         │              │              │
│ PCI - X Bus  │ <──────>│  Device 1    │<──────> │              │              │
│  Interface   │         │ ADMA Engine  │         ├──────────────┼──────────────┤
│    Unit      │         ├──────────────┤         │              │   Port 2     │
│              │         │  Channel Y   │         │  Channel Y   │              │
│              │ <──────>│  Device 0    │<──────> │  Serial ATA  ├──────────────┤
│              │         │ ADMA Engine  │         │     Unit     │              │
│              │         ├──────────────┤         │              │   Port 3     │
│              │ <──────>│  Channel Y   │<──────> │              │              │
│              │         │  Device 1    │         │              │              │
│              │         │ ADMA Engine  │         │              │              │
└──────────────┘         └──────────────┘         └──────────────┴──────────────┘
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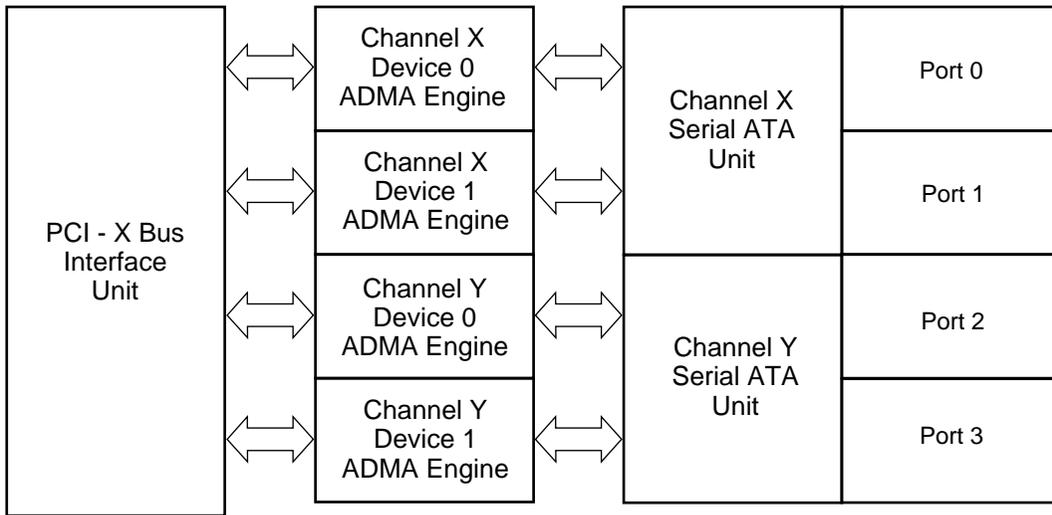
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