

# Bus Switch Applications

For Laptop Computers, Memory Modules, Analog/Digital Video, & Datacom Circuits

by Mike Parsin June 11, 1997

## Introduction

This brief shows common uses for the Pericom family of Bus Switch products. These applications include laptop/desktop computers, memory modules, analog/digital video, and datacom circuits.

## General Applications

### Cache / DRAM Module Voltage Translator

With new 3.3V SRAM/DRAM readily available and Cache / DRAM controllers still running at 5V, a voltage translator is required. Figure 1 shows this 5V-to-3V translation using the PI5C16212 bus switch. The bus switch can double as an isolation device to insure hot insertion protection. See Application Brief 8 for more information.

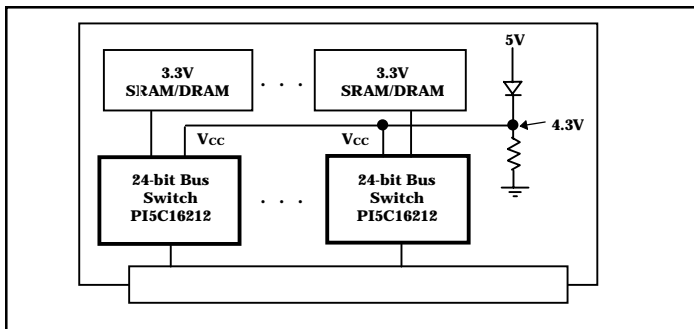


Figure 1. L2 Cache/DRAM Memory Module – 5V-to-3V Translation using PI5C16212

### External Bus Insertion

It is common for desktop or laptop computers to have external connectors for PCI, SCSI, IDE, Floppy, PCMCIA, Cardbus, and PC Card bus connections. Notebooks usually have a PCI slot to connect to a docking station for direct access to a desktop computer. Generally, these bus switches are used for hot insertion, bus isolation, multiplexing, and voltage translation.

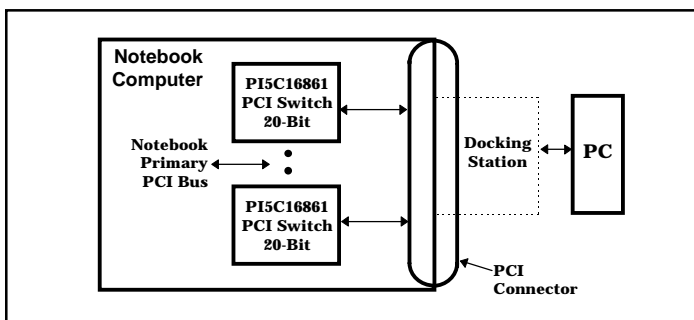


Figure 2a. Docking Using PI5C16861 Bus Switch

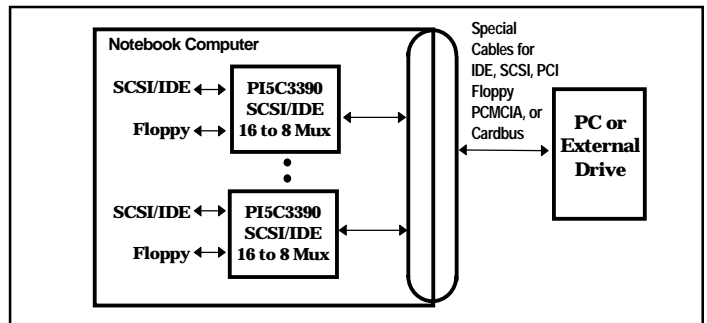


Figure 2b. SCSI/IDE to Floppy Mass Storage Multiplexer

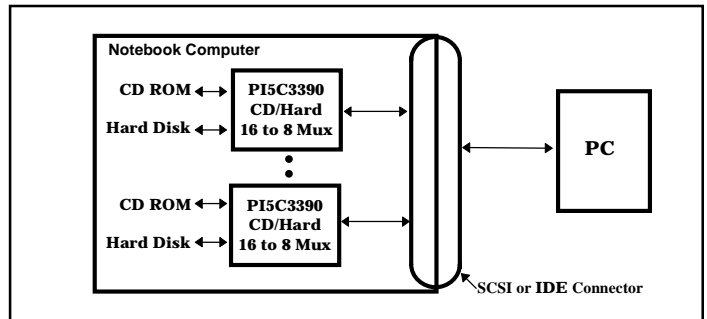


Figure 2c. CD ROM and Hard Disk Multiplexer

### Memory Interleaving

The purpose of interleaving or “Ping-Pong” data is mainly to increase throughput. If DRAM has an access time of 50ns and the data can be transferred at 15ns or 66MHz clock rate, then it becomes obvious that if 2 memory banks can access data at 25ns then access is twice as fast as one bank. A bus switch multiplexer or bus exchange part like the PI5C16212 can switch at a 10ns rate used as a demux or 1:2 switch. Hence the throughput doubles.

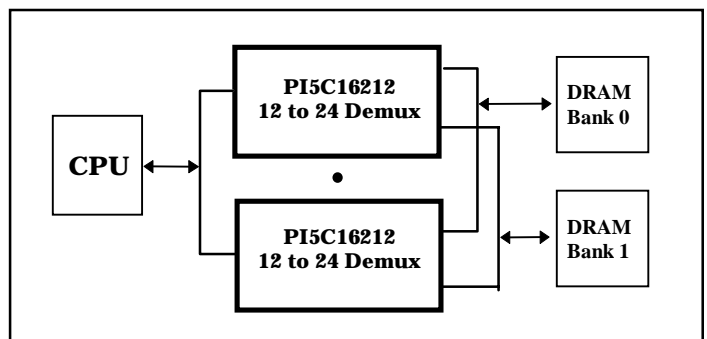
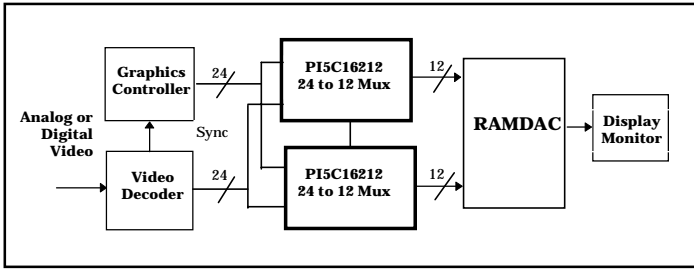
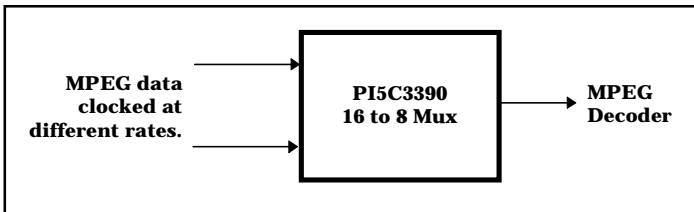


Figure 3. Memory Interleaving to Increase Data Rate



**Figure 4. Overlaying Graphics onto Video – 48 to 24 Mixing Application**

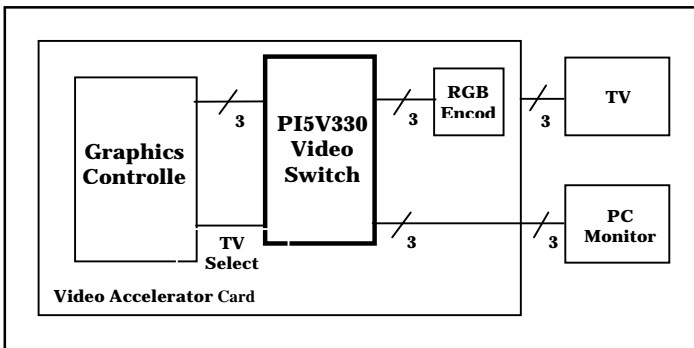
Switching compressed data as in MPEG can be accomplished with the bus switch when data has been converted from serial to parallel. This format is a YCrCb 8-bit video stream. Data is generally in a parallel format.



**Figure 5. Switching MPEG Format Data Stream**

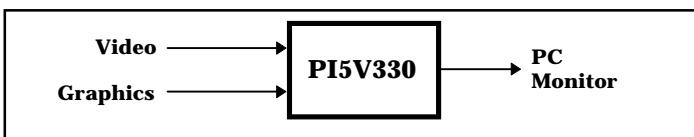
**Analog Video Switching**

Pericom's PI5V330 is part of the bus switch family and is ideal for RGB analog. Figure 6 shows a Video Accelerator card used to switch between TV and computer monitor. Also see Application Brief 4.



**Figure 6. RGB Analog Switch – Switching Between TV and Monitor**

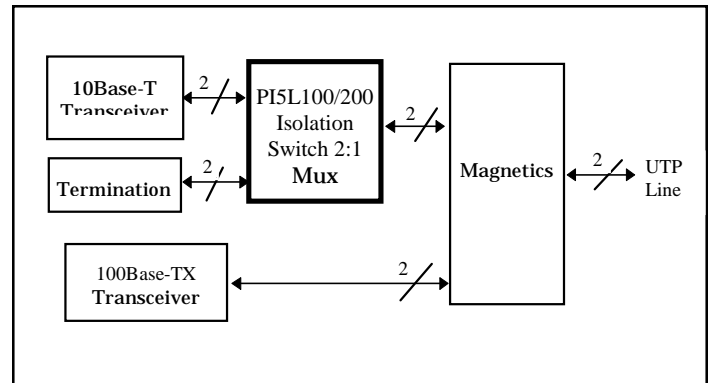
Figure 6a shows an analog switching technique for graphics overlay. Also see Application Brief 9 for more information.



**Figure 6a. Video Pixel-Rate Switch**

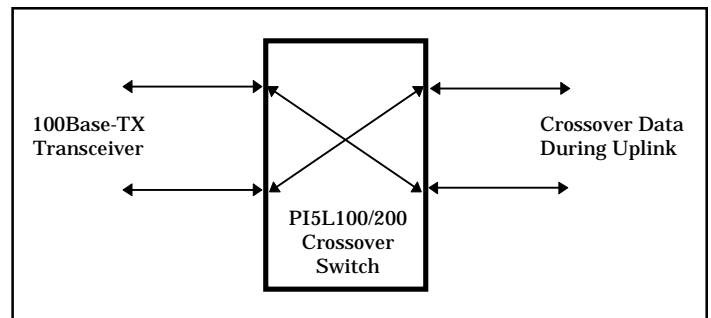
**DataComm Switching**

Bus switches can be used in a variety of LAN applications. (See Application Brief 6.)



**Figure 7. 10/100 Ethernet Switching**

The RJ45 UTP 8-lead cable requires wire crossover during an uplink function (see Figure 8). For more information, see Application Brief 6.



**Figure 8. Inter Repeater Link (IRL) Crossover**