

# *SunPCi™ Hardware Constraints*

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*By the SunPCi Engineering Team*

<http://www.sun.com/desktop/products/sunpci/>

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# Introduction

The SunPCi™ hardware was designed as a PC motherboard on a PCI card. This design decision was made to significantly leverage both PC-industry compatible hardware and Microsoft Windows software. However, due to PCI and system constraints, the SunPCi hardware cannot offer the same expansion and upgrade opportunities as a PC. This paper outlines some of the hardware limitations and describes why those limitations exist.

There are three types of constraints that exist within the SunPCi hardware: upgrades to components on the SunPCi card, access to Sun system devices from the SunPCi card, and access to SunPCi devices from the Sun system.

## Overview of the PCI Specifications

Since the SunPCi card is a PCI device, it must meet the PCI requirements (see <http://www.pcisig.com/specifications>). Meeting those requirements has placed both mechanical and electrical constraints on the card.

Mechanically, the card can be no larger than 312mm (length) by 175.9mm (width) by 106mm (height). PCI cards are significantly smaller than the size of typical PC motherboards.

Electrically, the card can consume no more than 25 Watts. Likewise, PCI cards consume considerably less power than most PC motherboards. In fact, the 2G Intel Pentium 4 processor consumes a whopping 88.4 watts (see <ftp://download.intel.com/design/Pentium4/datashts/24985701.pdf>)

## Upgrades to Components on the SunPCi Card

Adding system memory is frequently done on a PC. Likewise, you can add memory to the SunPCi hardware. However, to insure the card continues to meet PCI specifications the SunPCi Engineering Group has qualified memory from specific vendors. This qualification insures that all components on your SunPCi card work together correctly and that the SunPCi card also works correctly in your Sun System. Using non-Sun memory on your SunPCi card will void your warranty.

Also, processors are sometimes upgraded on a PC. This is not permitted for the SunPCi product for several reasons:

- Overall power consumption for the SunPCi card must be less than 25 watts. Adding a processor almost certainly will cause the card to consume too much power.
- The heat sink may not be capable of cooling a faster processor. If the processor is not adequately cooled, it may be permanently damaged.
- The SunPCi Engineering Team has not qualified faster processors. Increasing the speed of the processor may cause your Sun system to run out of specification (*e.g.*, too hot) and may damage both your SunPCi card and your Sun system.
- The SunPCi BIOS may not recognize this new processor. The SunPCi card may not boot if the BIOS does not recognize the new processor.
- Finally, as with using non-Sun memory, changing your processor will void your warranty.

# Accessing Sun System Devices from the SunPCi Card

Several users of the SunPCi card have asked if the card can access devices on the Sun system. This access may seem desirable in some circumstances. However, the SunPCi card and the Sun system need to "own" their own devices. This ownership permits the operating system on each system to configure and access devices as needed. If Windows could access the SCSI controller on the Sun system, Windows might program the device in a way that is incompatible with the Solaris™ Operating Environment. This could cause the system to panic or may cause other more harmful errors.

To prevent Windows from identifying (enumerating) Sun devices, the SunPCi card contains a special interface chip separating the SunPCi device space from the Sun system device space.

Observant users of the SunPCi card probably wonder then how the SunPCi product accesses certain Sun system devices. Each of these devices is handled by special software and/or hardware.

The SunPCi card's keyboard and mouse are emulated in hardware. The SunPCi user process receives keyboard and mouse events directly from the X11 window system and sends them to a pseudo device on the SunPCi card. This also allows the card to run on one system and be displayed on a different system. The CD-ROM and virtual Ethernet are supported using special drivers in Windows and other software running on the Sun system. Finally, the SunPCi BIOS handles floppy requests sending requests to Sun software.

## Accessing SunPCi Devices from the Sun System

For the same reasons as outlined above, SunPCi devices are not accessible to the Sun system.

## Other SunPCi Hardware Constraints

One other hardware restriction exists on the SunPCi card. Because of the PCI power consumption limit noted above, a USB hub must be used when connecting USB devices.

As of SunPCi 2.2, multiple cards are supported in Sun systems. However, because of the amount of power consumed by the SunPCi card, there are limits to the number of cards supported in each platform. Consult the SunPCi Installation Guide for more information.

Also, some PC users may overclock their processors. This is not supported by Sun and will void your warranty.

## Summary

Upgrading your processor as a field replaceable unit (FRU) or adding non-Sun memory to your SunPCi card may seem like an easy method of increasing performance. However, these modifications are not supported by Sun and may render your SunPCi card or your Sun system unusable.