

# The Pulsar Card

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# Connectors

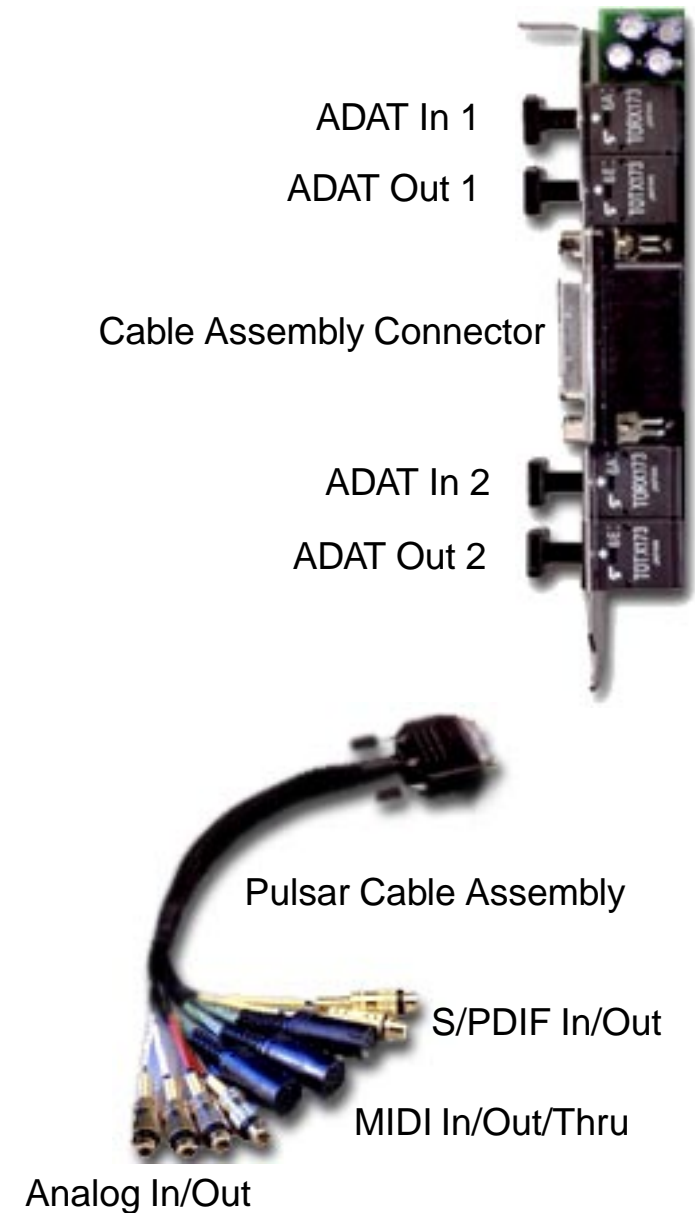
Directly on the rear card edge connector panel are two independent **ADAT optical interfaces**. Each one transfers 8 channels of digital audio in and out at one time. These interfaces can be used separately or in 16-channel tandem for digital audio connection to ADAT machines and numerous other devices which support the ADAT optical interface, including the **Creamware A8 and A16 audio converters**.

The other Pulsar card interfaces are available via the **Pulsar Cable Assembly**, which plugs into the **Cable Assembly Connector** on the rear edge of the Pulsar card and brings all signals out to individual clearly-labelled cable-end connectors. These signals include:

- two **Analog Inputs** and two **Analog Outputs**
- one **S/P-DIF Digital Input** and **Digital Output**
- **MIDI In**, **MIDI Out** and **MIDI Thru**

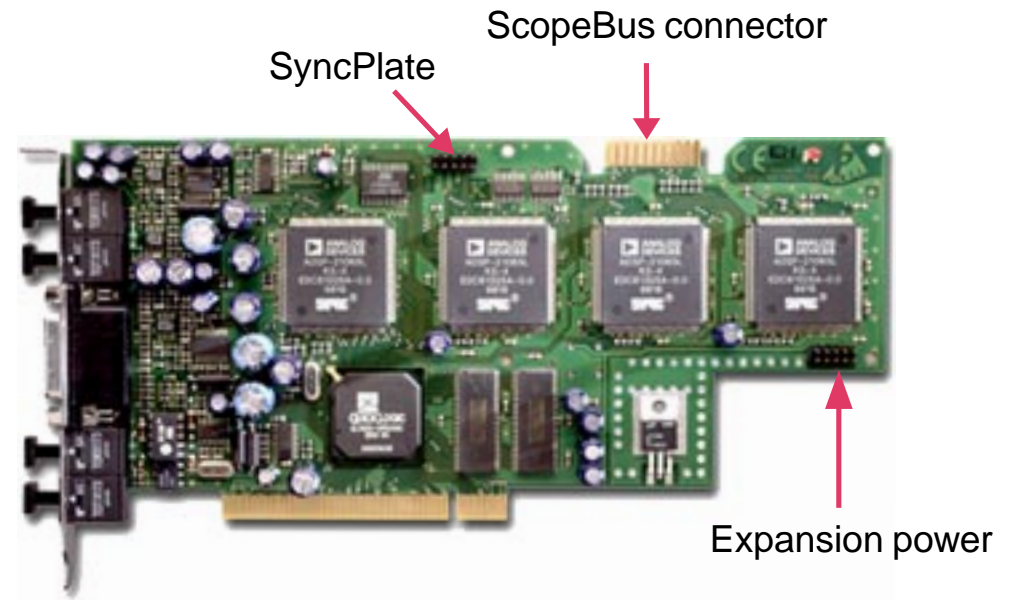
MIDI In and Out are linked directly to the Pulsar DSPs. These MIDI signals thus operate with negligible delays within Pulsar and are unaffected by circumstances elsewhere within the PC system.

Typical applications for the audio interfaces are described in the following pages.

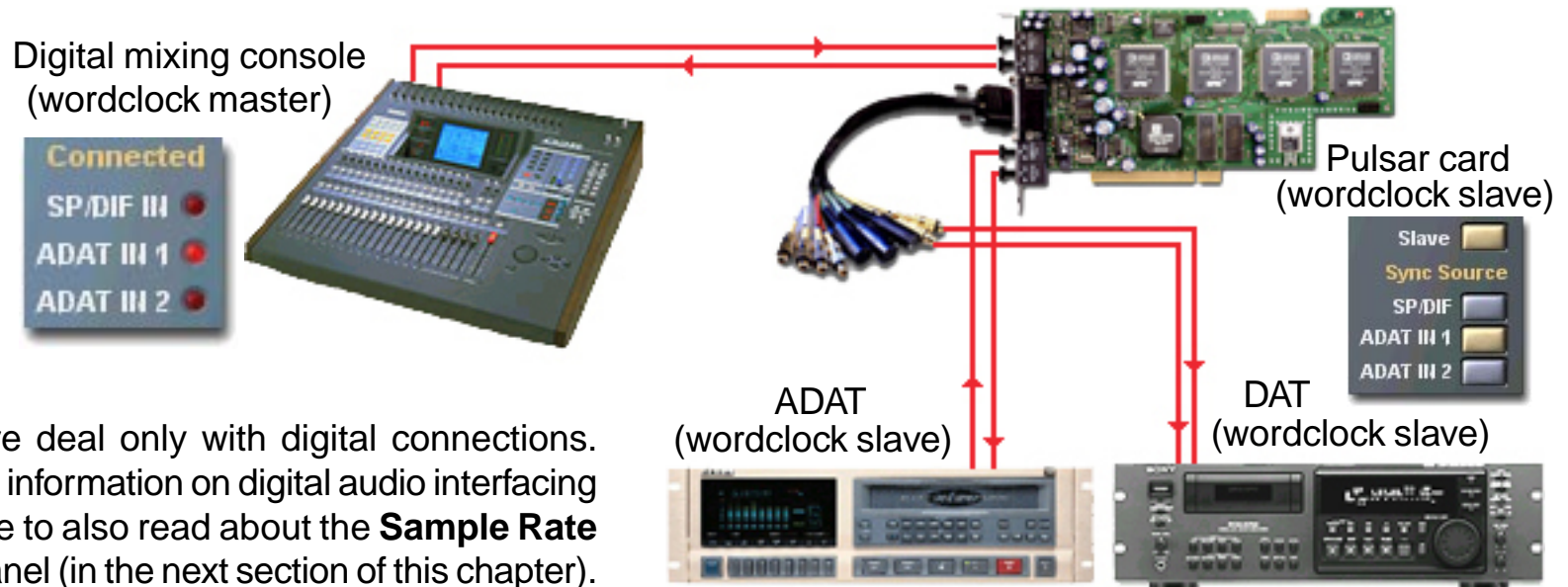


The Pulsar card features a number of additional connectors for use with anticipated expansion options.

**These connectors should be used only with the intended expansion options. Any other use of these connectors is likely to result in permanent damage to your Pulsar card!**



# Digital Connections



The examples here deal only with digital connections. For more important information on digital audio interfacing with Pulsar, be sure to also read about the **Sample Rate Settings** control panel (in the next section of this chapter).

## Digital Audio Connections

The Pulsar **ADAT 1 In and ADAT 1 Out** connectors are shown connected to a digital mixing console. A stereo DAT recorder with coaxial S/P-DIF interface is connected to the Pulsar **S/P-DIF In and S/P-DIF Out** connectors. A digital 8-track recorder (which just happens to be an ADAT) is connected to **ADAT 2 In and ADAT 2 Out**.

## Digital Audio Synchronization – The Word Clock

When digital audio connections are made between devices, the devices must be **synchronized**. This is done with reference to a **wordclock**. One device operates as

the wordclock **master** and produces the wordclock signal. The connected devices operate as **slaves** and synchronize to this clock, which can often be derived directly from incoming ADAT or S/P-DIF audio signals.

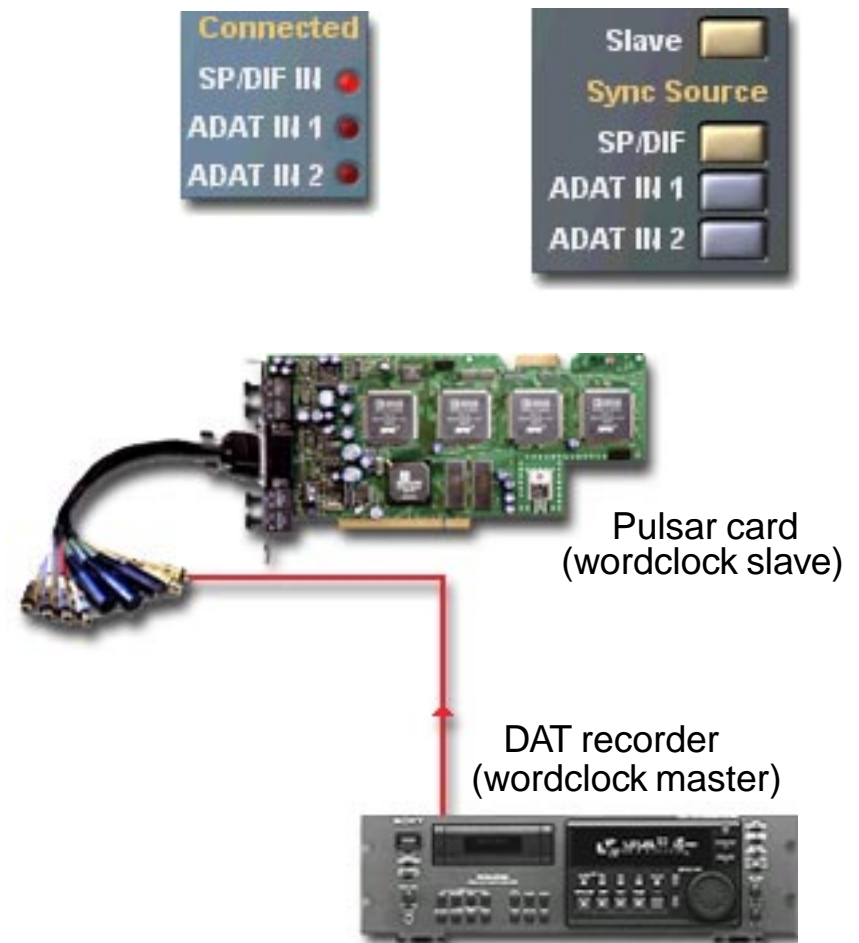
In the example above, the digital mixer is the wordclock master. Pulsar is set up as a wordclock slave via the **Sample Rate Settings** control panel (see the next section) and synchronizes itself to the mixer's wordclock via the ADAT 1 input signal. Both the ADAT machine and the DAT recorder also operate as wordclock slaves. These, however, synchronize themselves to the Pulsar card ADAT and S/P-DIF output signals, respectively.

## DAT And S/P-DIF Interfacing

An S/P-DIF input always operates as a wordclock slave (and an output as master). For example, when **recording a digital signal with a DAT recorder**, the DAT recorder synchronizes itself to the S/P-DIF signal fed to its input.

In the example on the preceding page, this functions properly even though the Pulsar card, which is sending an S/P-DIF digital audio signal to the DAT recorder, is itself operating as a wordclock slave to the digital mixing console. The S/P-DIF *output* signal which Pulsar sends to the DAT recorder serves as the sync source for the DAT recorder, even though Pulsar itself is in this case slaved to the signal coming in on its own ADAT 1 input.

**Digital playback from a DAT recorder** via Pulsar is also done via an S/P-DIF connection. The S/P-DIF input of the Pulsar card likewise operates only as a wordclock slave. Thus, the Pulsar *card* must in this case be set into slave mode via the **Sample Rate Settings** control panel (see the next section), with its S/P-DIF input selected as the sync source, so that it synchronizes itself to the S/P-DIF output of the DAT recorder. (To continue using the digital mixer in this case, it would have to be slaved to the Pulsar card.) These settings and the corresponding connections are shown in the diagram at right.



Configuration for digital playback from DAT recorder via Pulsar



# Sample Rate Settings

Pulsar can operate as either wordclock master or slave for digital audio interfacing. Wordclock settings are made via the **Sample Rate Settings** control panel, which is accessed via the Window menu.

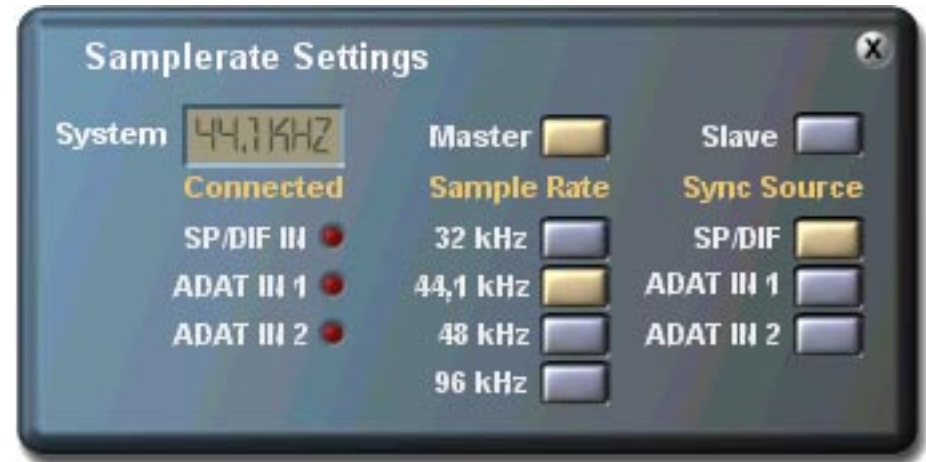
The preceding Digital Connections section provides some background on the role of the wordclock in a system.

## Settings

Under **System**, the current Pulsar wordclock frequency or **sample rate** is shown (valid for both internal and external wordclock sources). Below this, LEDs indicate the Pulsar inputs on which a digital audio signal is present.

Clicking on the **Master** button puts Pulsar into wordclock master mode. In this mode, the buttons below allow selection of the system **Sample Rate**. Connected devices may limit your choices, since **all devices must operate at the same rate**, and not every device supports all rates. (44.1 kHz is almost universal, thus always a safe choice.)

Clicking on the **Slave** button puts Pulsar into wordclock slave mode. Here it is necessary to click on one of the **Sync Source** buttons below to tell Pulsar which of its digital inputs to use as the wordclock sync source. In slave mode, no sample rate selection is needed or possible, as this is determined by the master device.

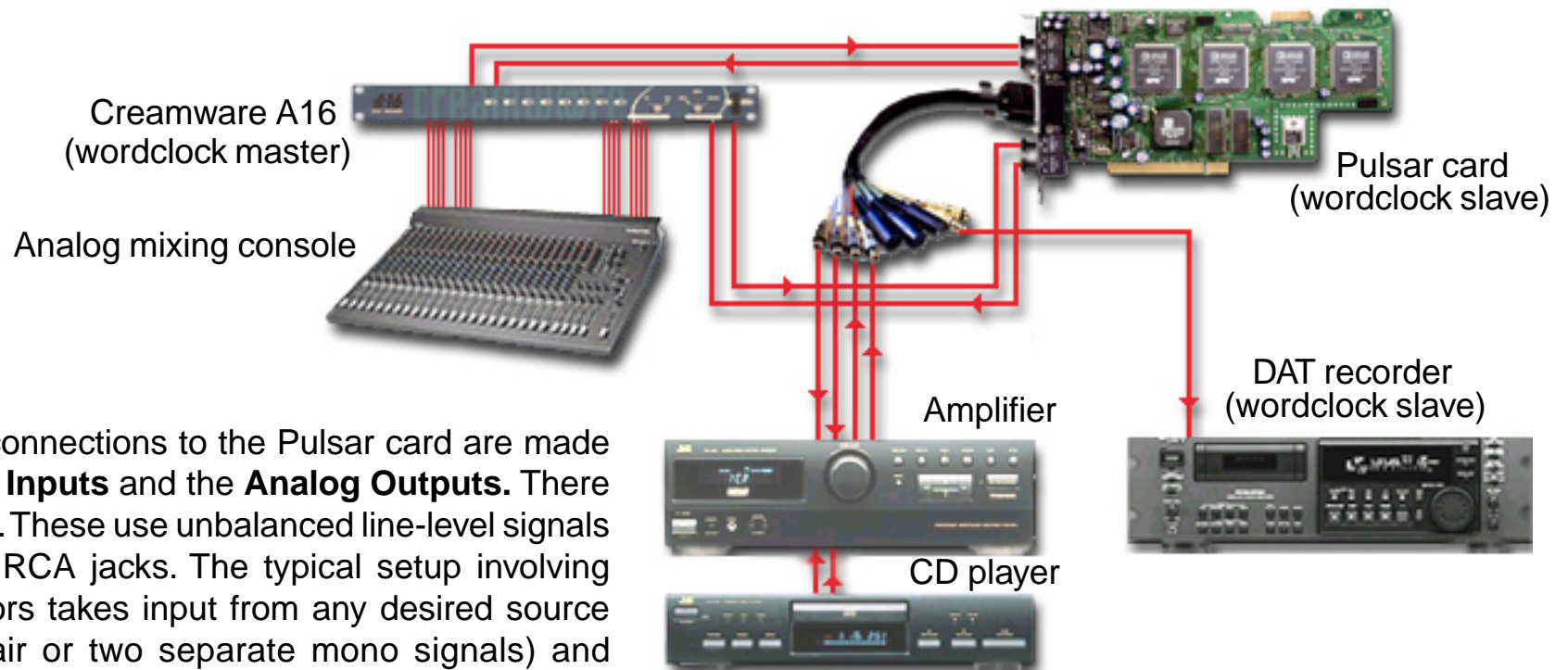


## Wordclock Settings And Pulsar Performance

**It is important to be aware that the system wordclock (internal *or* external) is also the Pulsar DSP sample clock.** While higher sample rates do increase audio bandwidth and quality, they correspondingly reduce the available DSP computation time and thus the number of synths, synth voices, etc which Pulsar can maintain. Aside from specific "pro" uses, 44.1 kHz is generally optimal.

**A lower sample rate *can* sometimes be preferable.** If you're using *only* Pulsar synths (no audio or samples), or if audio fidelity is not highly critical, the reduced bandwidth at 32 kHz may not be objectionable. You might choose to trade it off against the increased functional capacity which you get in return. But when working with audio sequencers or external gear, this option may not always be available.

# Analog Connections



Direct analog connections to the Pulsar card are made via the **Analog Inputs** and the **Analog Outputs**. There are two of each. These use unbalanced line-level signals connected via RCA jacks. The typical setup involving these connectors takes input from any desired source (one stereo pair or two separate mono signals) and delivers stereo output to a monitoring system.

In the example, both analog inputs and outputs are connected to a stereo integrated amplifier which provides basic monitoring and has a CD player (among other possibilities) as a signal source. The inputs and outputs could alternatively be connected to an external analog mixer, providing more flexible signal routing.

Extended possibilities for the use of Pulsar with external analog equipment (effects units, mixing consoles etc.) are afforded by the addition of an external **multi-channel**

**A/D-D/A converter** such as the **Creamware A8** or **A16** into the setup. These devices connect to the Pulsar **ADAT interfaces** (set the Pulsar into wordclock slave mode – see the preceding sections) and provide an additional eight or sixteen analog inputs and outputs, respectively, for use as desired.

In addition, the Pulsar **S/P-DIF interface** can offer analog I/O expansion options by means of connection to a DAT recorder or other digital audio device which incorporates A/D-D/A conversion functions.

# Technical Specifications

Sampling rates: 96 khz / 48 kHz / 44.1 kHz / 32 kHz (as wordclock master)  
30 kHz - 100 kHz (as AES/EBU or wordclock slave)  
38 kHz - 50 kHz (as ADAT slave)

Number of channels: 20 inputs, 20 outputs:  
ADAT optical (2 x 8 in / 2 x 8 out)  
S/P-DIF (stereo in / stereo out)  
analog (stereo in / stereo out)

## Analog inputs:

Balanced: XLR (Pulsar Plus)  
Input sensitivity: + 4 dBu (nominal)  
Maximum input level: +20 dBu (0 dBFS)  
Input impedance: 20 k $\Omega$

Unbalanced: RCA  
Input sensitivity: - 10 dBV (nominal)  
Maximum input level: + 2 dBV (0 dBFS)  
Input impedance: 10 k $\Omega$



## Analog outputs:

Balanced:	XLR (Pulsar Plus)	
	Output level:	+ 4 dBu (nominal)
	Maximum output level:	+ 20 dBu (0 dBFS)
	Output impedance:	600 $\Omega$
Unbalanced:	RCA	
	Output level:	-10 dBV (nominal)
	Maximum output level:	+2 dBV (0 dBFS)
	Output impedance:	300 $\Omega$

## Digital inputs and outputs

ADAT*:	EIAJ fiber-optic connectors: each connector:	2 in / 2 out 8 channels, 24 bits
AES/EBU:	XLR (Pulsar Plus)	balanced, 110 $\Omega$ , 96 kHz capable
S/P-DIF:	RCA	unbalanced, 75 $\Omega$
MIDI:	5-pin DIN	In / Out / Thru
S/TDM:	SCOPE Bus connector	128 channels, 32 Bit
SYNC:	Syncplate connector	Wordclock in / out ADAT sync (9-Pin)

## Audio performance

Digital - Analog:	Frequency response:	< +/- 0.15 dB (20Hz - 20 kHz)
	Dynamic range:	> 102 dB
	THD+N:	> 99 dBA typ.
	Channel separation:	> 105 dB @ 997 Hz
Analog - Digital:	Frequency response:	< +/- 0.05 dB (20Hz - 20 kHz)
	Dynamic range:	> 98 dB
	THD+N:	> 95 dBA typ.
	Channel separation:	> 102dB @ 997 Hz
Analog - Analog:	Frequency response:	< +/- 0.2 dB (20Hz - 20 kHz)
	Dynamic range:	> 97 dB
	THD+N:	> 94 dBA typ.
	Channel separation:	> 102 dB @ 997 Hz

## Audio converters

DAC:	(digital-to-analog converter): 24 Bit Multibit SD-modulator with “Perfect Differential Linearity Restoration” for reduced idle tones and noise floor
ADC:	(analog-to-digital converter): 20 Bit SD, 64x oversampling

## General specifications

PCI expansion card: Rev. 2.1 compliant 33 MHz (PCI bus-slot master capable)

Vendor-ID: 14B5 hex, **creamw@re**

Power consumption: 7.5 W

Dimensions: 23.6 cm x 10.8 cm

Standard package includes:

- Pulsar card
- Pulsar cable assembly
- Pulsar CD
- Installation booklet

Pulsar CD includes:

- Installation utility
- Driver software
- Program software
- User's manual (in Adobe Acrobat .pdf format)