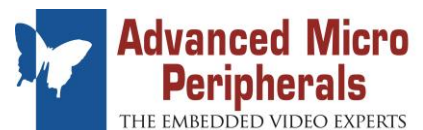


QuadGrabber

Quad D1 Video Grabber for PC/104-Plus Systems

Document version: A.04

HARDWARE REFERENCE MANUAL



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Revision History

Document version	Date	Comments	Approved
A.00	10/03/2011	Initial release	
A.01	23/03/2011	Corrected power to +5V	LF
A.02	05/03/2013	Added missing power consumption data	AS
A.03	02/08/2013	Added MTBF data	AS
A.04	07/01/2014	Added MTBF for non –EXT board	AS



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Introduction

The QuadGrabber is a high-performance 4-channel video capture and overlay controller on a single PC/104-*Plus* form factor. The QuadGrabber provides a powerful and flexible solution for capturing up to four concurrent analog video inputs for local system display or software analysis and processing, and is ideal for embedded Situational Awareness systems in the most demanding environment.

The QuadGrabber allows each of the 4 video channels to be captured at full D1 size, all at full frame rate. The video can be scaled, cropped and positioned under software control. In addition to the video capture the QuadGrabber also provides capture of up to 4 mono audio sources.

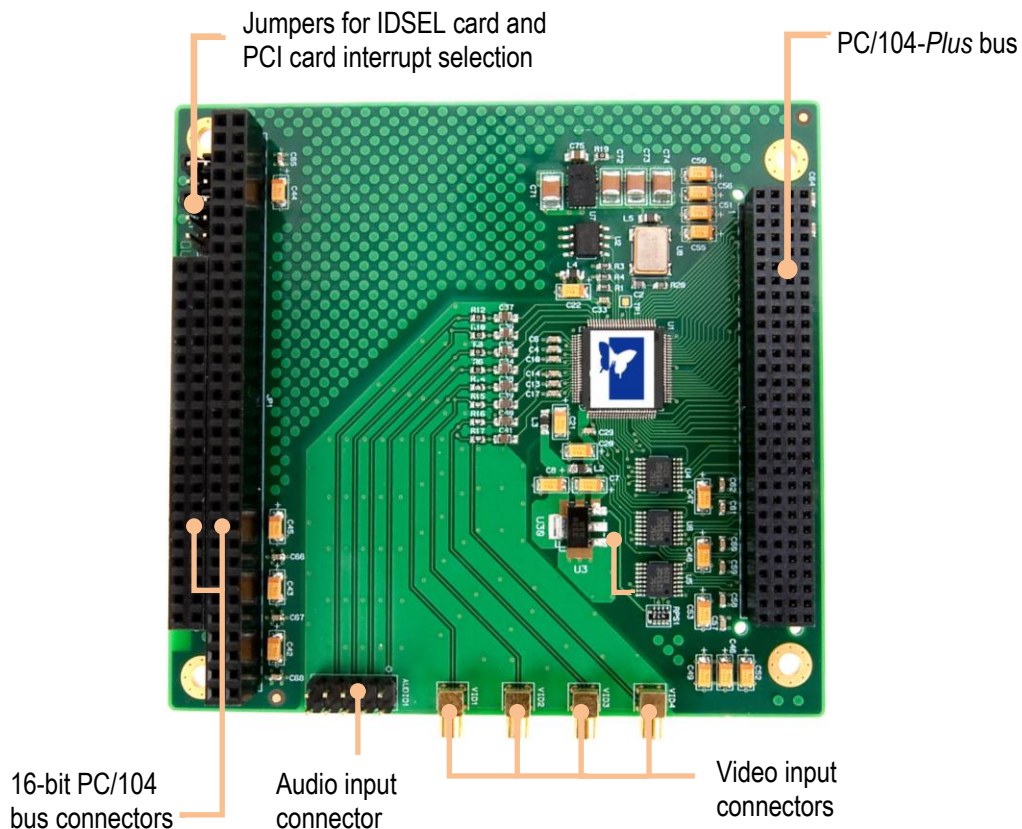
The captured video data can be streamed continuously to system memory or disk for either immediate local display or further processing. The capture engine of the QuadGrabber features hardware color space conversion to present the captured video data in the format best suited to the end application.

AMP can provide custom configurations (subject to a minimum order quantity) for the QuadGrabber. Please contact our Sales team (see [A: Contacting AMP](#), page [17](#)) to discuss your requirements

Features

- 4 Live NTSC/PAL video inputs
- 4 x D1 size capture at full frame rate
- 4 Mono Audio inputs
- Arbitrary video window sizing, cropping and scaling
- Windows DirectShow/DirectDraw support
- Efficient PCI DMA cycle operation
- Linux Video4Linux support
- Drivers for WinXP-E, Linux, QNX
- Robust PC/104-Plus construction

QuadGrabber 'at a glance'



Technical specification

PC/104-Plus Bus Interface:

Compliant with PCI Rev. 2.1
132MBytes/sec rate at 33.33MHz bus speed
Live video capture to display, memory or disk

Analog Video Input:

Up to 4 concurrent PAL/NTSC video channels
Four 10-bit Analog-to-Digital converters
Anti-aliasing filters on inputs

Video Input Formats:

NTSC-M, NTSC-Japan, NTSC (4.43), RS-170
PAL-B,G,N, PAL-D, PAL-H, PAL-I,
PAL-M, PAL-CN, PAL-60
SECAM

Video Input Adjustments:

Contrast (or luma gain) adjustable from 0 - 255% of original
Saturation (or chroma gain) adjustable from 0 - 200% of original
Hue (or chroma phase) adjustable from -36° to $+36^{\circ}$
Brightness (or luma level) can be adjusted from -128 to 127
Software adjustable Sharpness, Gamma and noise suppression

Video Capture Formats:

RGB
YCbCr 4:2:2
YCbCr 4:1:1

Audio Inputs:

4 mono audio inputs
10-bit Analog-to-Digital Converter per channel

Audio Capture Format:

8-bit PCM

Video Processing:

Arbitrary sizing, cropping, scaling of each video channel

System Requirements:

x86 PC-Compatible PC/104-Plus Host Computer
PCI or AGP Display (if Video Preview to host is required)

Power:

Single +5V supply from PCI/104 connector
5V @ 0.14A, 0.7W Max (4 channel video + audio capture)

Miscellaneous:

Operating temp 0°C to 60°C

Operating temp -40°C to +85°C (extended temp option)

PC/104-*Plus* form factor

Reliability:

MTBF figures calculated at 30degC (to MIL HDBK217) as follows:-

QuadGrabber-Ext = better than 911120 hours (Ground Benign)

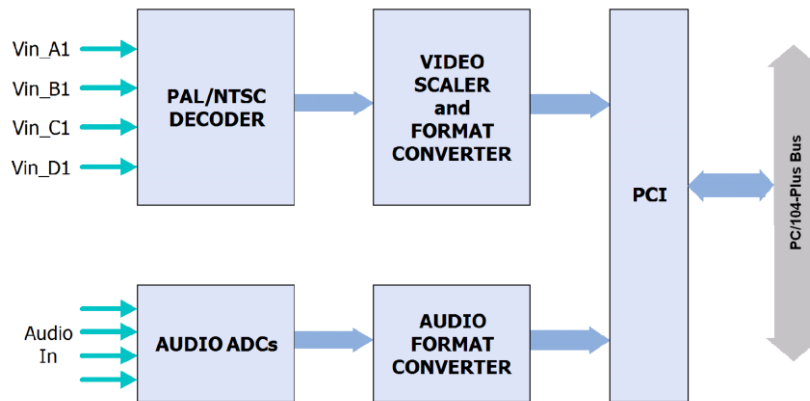
QuadGrabber =better than 911120 hours (Ground Benign)

Software Drivers:

Drivers for Windows XP, Linux, QNX

Sample video overlay and capture application in C/C++ source code

Functional Summary



Signal sources

The QuadGrabber is designed to capture and record from up to four separate and unrelated video sources simultaneously. Each of the four video input channels of the QuadGrabber features a video frame grabber and an audio digitizer. Each frame grabber contains a digital NTSC/PAL video decoder. A single audio input is associated with each live video channel.

Video digitisation

Composite NTSC or PAL video is input to the QuadGrabber through MMCX connectors, VID1, VID2, VID3, and VID4. The video is AC-coupled and fed to the on-board decoders of the individual frame grabbers. The video decoders automatically detect whether the incoming video signal is NTSC or PAL and generate the correct timing output signals. Each video channel is first decoded to chrominance and luminance signals and then digitized by high speed analog-to-digital (A2D) converters. The A2Ds output are passed to an internal digital video scaler where scaling, filtering, interpolation and channel re-timing operations are performed prior to data transfer to the host system VGA buffer (for overlay applications) or memory buffer for any further processing.

When used with a high performance host CPU, the QuadGrabber can provide captured data for all 4 video channels concurrently, each at full size and at full frame rates.

Ordering information

The following part number(s) can be used when ordering:

QuadGrabber	Video Capture and Overlay Controller. (0 °C to +60°C)
QuadGrabber-EXT	Extended temperature (-40 °C to +85°C) Video Capture and Overlay Controller

Anti-static handling

The board(s) supplied contain electrostatic components that are susceptible to permanent damage from electrostatic discharge (static electricity). To prevent electrostatic discharge, the boards are supplied in anti-static packaging.

When handling a board, observe the following anti-static precautions to alleviate risk of damage:

- Remove the board(s) from the packaging only when you are working on an anti-static, earthed surface and wearing an anti-static wrist strap.
- Retain the anti-static packaging that the board(s) were supplied in. If you remove a board from a system, store it in this packaging.

RoHS compliance



The European RoHS Directive (Restriction on the use of certain Hazardous Substances – Directive 2002/95/EC) limits the amount of six specific substances within the composition of the product. The QuadGrabber is RoHS-6 compliant.

2:

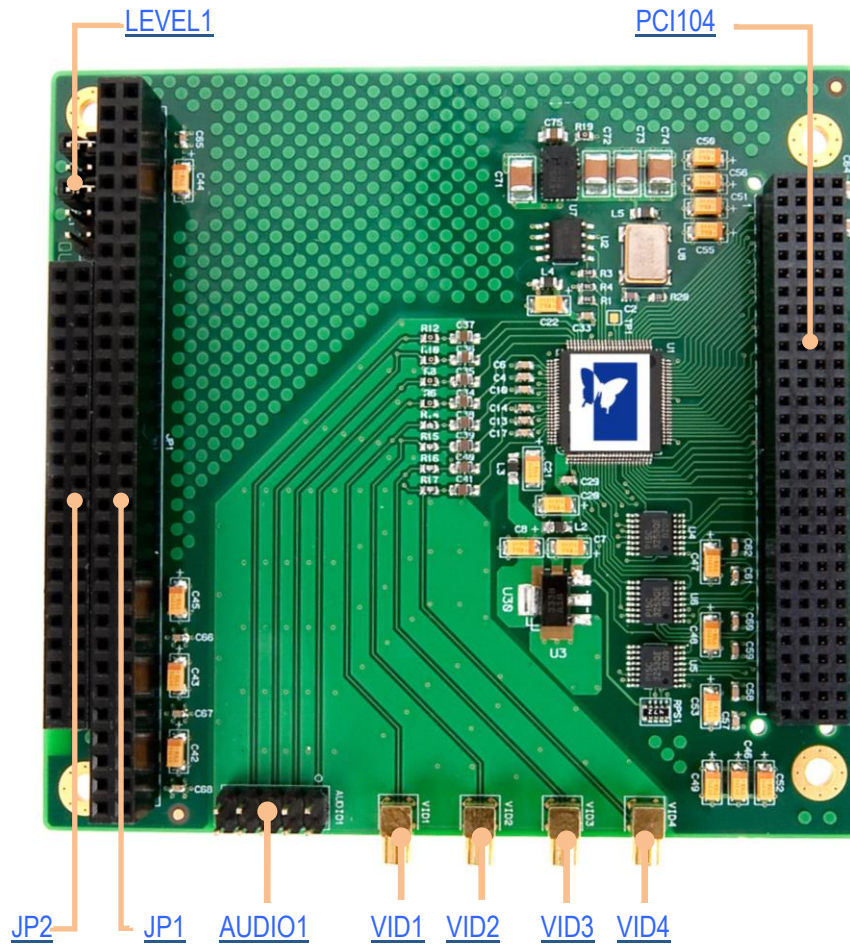
Installation

System requirements

Processor	Pentium-class CPU at 500MHz or faster
Memory	512MB or greater
Bus	PC/104- <i>Plus</i> with 3.3V or 5V logic tolerance
Operating system	Windows (XP or XP Embedded), Linux or QNX

Jumpers and connectors

The following diagram shows the location of the jumpers and connectors available on the QuadGrabber:



Conventions

The following pages provide information about these jumpers and connectors. All illustrations on these pages are shown in the same orientation as the photograph above, unless otherwise stated.

There are seven connectors on the QuadGrabber module:

Connector	Signal	See...
PCI104	PC/104+ bus.	PCI104 – Bus connector.
JP1/JP2	PC/104 bus.	JP1 and JP2.
AUDIO1	Audio input channels A – D	AUDIO1 - Audio.
VID1	Video-in channel A.	VID1 to VID4 - Composite video inputs.
VID2	Video-in channel B.	VID1 to VID4 - Composite video inputs.
VID3	Video-in channel C.	VID1 to VID4 - Composite video inputs.
VID4	Video-in channel D.	VID1 to VID4 - Composite video inputs.

PCI104 – Bus connector

Standard 32-bit PC/104-*Plus* bus PCI Rev 2.1 compliant, 3.3V and +5V tolerant operation.

JP1 and JP2

16-bit PC/104 bus connectors.

These bus connectors are not currently used on the QuadGrabber card except for routing signals to other PC/104 cards.

AUDIO1 – Audio

Audio signaling is connected via the 10-way 0.1inch header Connector.

Pin	Signal	Pin	Signal
1	Audio-in channel A	2	GND
3	Audio-in channel B	4	GND
5	Audio-in channel C	6	GND
7	Audio-in channel D	8	GND
9	Reserved	10	GND

VID1 to VID4 – Composite video inputs

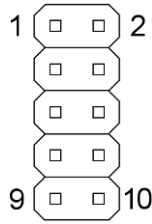
Video inputs are implemented using MMCX connectors, one input for each channel. An optional MMCX to BNC adapter cable is available from AMP to simplify the process of connecting cameras to the composite video inputs of the QuadGrabber.

Connector	Signal
VID1	Video-in channel A.
VID2	Video-in channel B.
VID3	Video-in channel C
VID4	Video-in channel D.

LEVEL – links 1-2 and 3-4

Used for IDSEL card selection.

The setting of the first two links on the LEVEL header determine the logical stack position of the QuadGrabber on the PC/104-*Plus* stack. This setting routes the appropriate IDSEL, PCICLK, REQ and GNT signals to the QuadGrabber Frame Grabber.



The following configurations are valid.

Jumpers	IDSEL	PCICLK	REQ/GNT
	IDSEL0	PCICLK0	0/0
	IDSEL1	PCICLK1	1/1
	IDSEL2	PCICLK2	2/2
	IDSEL3	PCICLK3	2/2

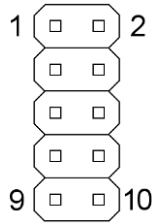
Default setting:

NOTE: WHEN USING MULTIPLE QUADGRABBER DEVICES IN A SYSTEM, EACH CARD MUST HAVE DIFFERENT REQ/GNT PAIR DEPENDING ON THE LEVEL OF THE DEVICE ON THE PC/104-PLUS STACK.

LEVEL – links 5-6 and 7-8

Used for PCI card interrupt selection.

The settings of the third and fourth links on the LEVEL header determine which of the four PCI interrupts service the QuadGrabber card on the PC/104-Plus stack.



The following configurations are valid.

Jumpers	Interrupt
	INTA
	INTB
	INTC
	INTD

Default setting:

QuadGrabber card installation

Software for the QuadGrabber is provided on a CD-ROM.

The video input cable should be plugged into VID1 and a suitable live video source connected.

If you are using a recent BIOS version and operating system, the QuadGrabber should be detected automatically.

Software driver installation should be done from the supplied CD-ROM.

Further instructions (and demo programs) pertinent to particular operating systems are provided on the driver CD-ROM

A:

Contacting AMP

Sales

AMP's sales team is always available to assist you in choosing the board that best meets your requirements. Contact your local sales office or hotline.

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Web: www.ampltd.com

Technical support

Comprehensive technical information is available on our websites (see above).

If you can't find the information or solution you require, AMP has a team of technical support engineers / embedded video experts available to provide a quick *and free* response to your technical queries.

Please submit your technical support query to the appropriate email address:

Technical support US

E-mail: support@amp-usa.com

Technical support UK

E-mail: support@ampltd.com