LFG-PCI / PMC / PC/104-Plus

HIGH-PERFORMANCE COLOUR / MONO FRAME GRABBER

The LFG card is a low-cost high-performance frame grabber for the acquisition of standard 50Hz or 60Hz video.

- **Available in PCI, PMC and PC/104-Plus form factors**
- **Comprehensive Software Developers Kit**
- **Windows, DOS, MacOS X, Linux, VxWorks**
- **Royalty-free JPEG and Wavelet compression**
- **Colour / mono / S-video real-time video acquisition**
- **Audio capture: 44kHz @ 16 bit to 8kHz @ 8 bit**
- **Acquisition and display with no software overhead**
- **Data formatting for real-time display/processing**
- **Trigger input & three digital I/O lines**
- **1 x BNC composite input for easy setup**
- **25-way D-type I/O for industrial use**
- **4 x composite video inputs, 1 x S-Video, 3 x audio**
- **3rd party driver support: Twain, VFW, CVB**

Full resolution colour (PAL/NTSC/SECAM at 768x576) or monochrome images are digitised in real-time and transferred into system memory under master mode DMA without any software intervention.

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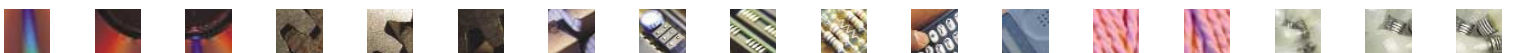
There are four "luma" inputs and a single "chroma" input. These allow one of four composite/monochrome sources to be selected or three composite and one S-Video. There is also I^{2}C available at the connector along with a TTL trigger input, 3 digital I/O and 12V & 5V fused outputs, for use as a camera PSU.

Raw video data may be optionally converted into one of several formats suitable for image processing or direct display. These include 32, 24, 15 and 16 bit RGB (using the internal colourspace converter and formatter), as well as grayscale and YUV 4:2:2. DMA scatter/gather is performed fully in hardware as part of the DMA process, along with de-interlacing, region of interest generation and scaling, thus without any software overhead.
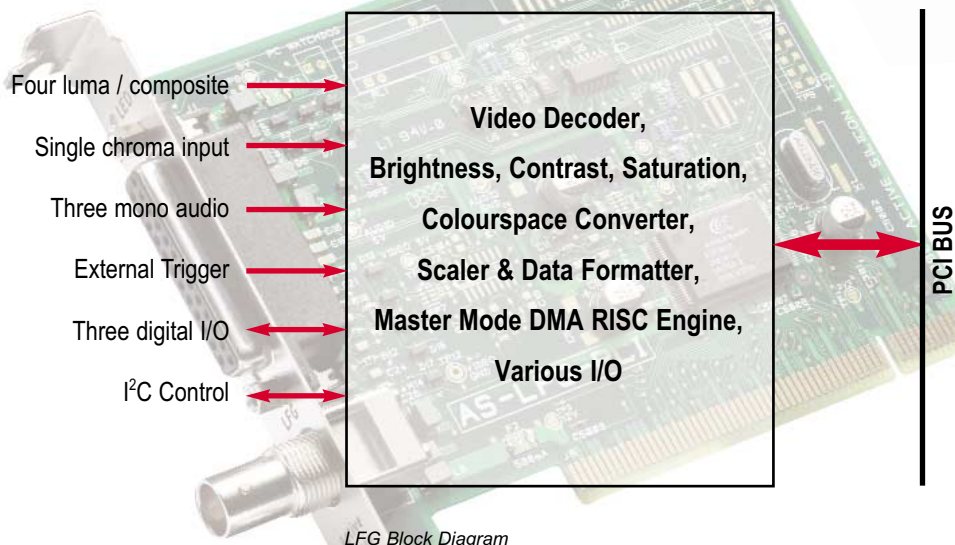
The Software Development Kit (SDK) has been specifically designed for OEM integration and includes a licence for the TMG Imaging Library (one licence per LFG card).This includes JPEG and wavelet compression, decompression, various pixel data mappings, image display and support for the major image file formats.

LFG Software Developers Kit

A variety of operating systems are supported via a common API, including Windows 98, NT, 2000, ME, XP, DOS, MacOS X, Linux and VxWorks. Additional operating systems can be supported upon request. Standard drivers are included for Twain, Video For Windows (audio and video - NetMeeting compliant) and Common Vision Blox.

The SDK also includes a fully populated cable for the 25 way D-type, phono adapters and three months telephone and email support. All hardware is provided with a one year warranty. Extended warranties may be purchased.

Four luma / composite →
Single chroma input →
Three mono audio →
External Trigger →
Three digital I/O ↔
I^{2}C Control ↔

Video Decoder, Brightness, Contrast, Saturation, Colourspace Converter, Scaler & Data Formatter, Master Mode DMA RISC Engine, Various I/O

↔ PCI BUS

LFG Block Diagram

SPECIFICATION

Video Chip:	The LFG is based around the Fusion 878 video decoder with 100% proprietary drivers written by Active Silicon, designed for cross-platform operation.
Video Input:	The video input consists of four luminance/composite inputs, one of which may be used as the luma input as part of a S-Video source, and a separate single chrominance input. This architecture allows multiplexing between four composite/monochrome sources or three composite/monochrome sources and a single S-Video source.
Audio Input:	The audio input consists of three 8 / 16bit mono inputs with sampling from 8kHz to 44kHz.
Sampling:	The internal video clock operates at 4x colour subcarrier frequency (17.73 MHz for PAL and 14.31818MHz for NTSC). Analogue video is sampled at double this frequency and low-pass filtered prior to decimation to the 4x subcarrier sampling rate. The effective output pixel rate is programmable and typically square pixel rates would be used for full resolution (14.75MHz for 50Hz systems and 12.27MHz for 60Hz systems).
Colour Decoder:	PAL, NTSC and SECAM support using either standard notch and bandpass filters, or a single line comb filter.
Digital Levels:	Normal operation: Luma 16 to 253. Chroma 2 to 253 (128 = no colour).
Full Range Option:	Luma 0 to 255. Chroma 2 to 253 (128 = no colour).
Video Controls:	Hue Adjustment: +90 degrees to –90 degrees.
	Contrast: 0 to 200%
	Saturation: 0 to 200%
	Brightness: -128 to +127 offset on luma digital level.
AGC:	Automatic gain control on luma and optional automatic gain control on chroma.
Scaling:	Down-scaling to 16:1, independently in both horizontal and vertical directions. Horizontal scaling uses a 6-tap interpolation filter and vertical scaling uses a 5-tap filter with a line store.
Region of Interest:	Region of interest readout is achieved using cropping registers that define the start and active regions independently in the horizontal and vertical directions.
Colourspace Conversion:	Optional colourspace conversion from YUV4:2:2 to various RGB formats as described below.
Data Formats:	BGRX32, BGR24, RGB16, RGB15, YUV422, Y8 (grayscale) packed formats with optional endian control as described below.
Endian / Byte Swapping:	Optional byte and/or word swapping to provide support for big-endian processors (e.g. Apple Macintosh).
DMA Control:	Bus master operation using a RISC engine to read DMA instructions from host memory. These instructions contain scatter/gather table information as physical addresses and lengths encoded in the RISC/DMA instructions. This results in full resolution, continuous DMA without any software intervention.
DMA FIFO:	70 words for luma channel and 35 words for each chroma channel (i.e. U and V). The FIFO is located between the output of the data formatter and the DMA engine.
DMA Speed:	132 MBytes/sec.
Interrupts:	Field, Frame, End of Sequence and Trigger interrupts are available.
Test Options:	Optional hardware generated colour bars for test purposes.
I²C:	Standard I²C at 99.2 or 396.8kHz supporting multi-byte sequence transitions.
5V & 12V Outputs:	Both supplied through a 500mA resettable fuse for use as a camera PSU.
Trigger I/O:	A separate TTL trigger input is provided for synchronisation with external events – for example to synchronise to a strobed flash gun. This input may be used as an interrupt. The trigger may also be used as an output.
Digital I/O:	Three TTL I/O lines with output capability of +64mA @ 0.55V / –32mA @ 2.0V.
Connector:	A 25 way D-type socket with the pinout as shown overleaf.

25 WAY D-TYPE CONNECTOR

Pin Number	Name	Cable Pinout	Description
1	Video Ground	Video coax screen	Ground for video coax screen
2	Video Input 2	BNC - 2	
3	Chroma Input 1	S-Video connector	Chrominance as part of S-Video signal
4	Video Ground	Video coax screen	Ground for video coax screen
5	Audio Input 1	Phono - 1	
6	Audio Input 3	Phono - 3	
7	Reserved		
8	+12V	15w D-Type Pin 1	Power output with 500mA resettable fuse
9	Trigger Out	15w D-Type Pin 13	TTL I/O
10	Digital I/O 2	15w D-Type Pin 4	TTL I/O
11	Digital I/O 3	15w D-Type Pin 5	TTL I/O
12	I^2C Data	15w D-Type Pin 7	Standard I^2C Data
13	Control Ground	15w D-Type Pin 11	Ground for trigger input
14	Video Input 1	BNC - 1	Commoned with luma signal on S-Video connector
15	Video Input 3	BNC - 3	
16	Video Input 4	BNC - 4	
17	Audio Ground	Audio coax screen	Ground for audio coax screen
18	Audio Input 2	Phono - 2	
19	Audio Ground	Audio coax screen	Ground for audio coax screen
20	Reserved		
21	Trigger In	15w D-Type Pin 6	TTL Input
22	Digital I/O 1	15w D-Type Pin 3	TTL I/O
23	Digital I/O Ground	15w D-Type Pin 14	Ground for digital I/O connections
24	I^2C Clock	15w D-Type Pin 8	Standard I^2C Clock
25	+5V	15w D-Type Pin 2	Power output with 500mA resettable fuse

PHYSICAL AND ENVIRONMENTAL DETAILS

Board Dimensions: 122mm x 93mm. Max component height 12mm (PC version)
Weight: 54g
Temperature: Storage: -15ºC to +70ºC. Operating: 0ºC to +55ºC
Relative Humidity: 10% to 90% non-condensing (operating and storage)
Electromagnetic and Safety: · EU: CE mark for EMC EN 55022:1998 (class B) & EN 50082-1:1997
USA: EMC FCC Class A
The printed circuit board is manufactured by UL recognised manufacturers and has a flammability rating of 94-V0

Full mechanical drawings are available on request

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ORDERING INFORMATION

Part Number	Description
AS-LFG-SDK-xxx	LFG frame grabber, software CD, on-line software documentation, developer's cable, phono adapters and presentation case. xxx represents the form factor
AS-LFG-PCI	LFG frame grabber – PC form factor with 32 bit PCI bus
AS-LFG-PMC	LFG frame grabber – PMC form factor with 32 bit PCI bus
AS-LFG-PC104P	LFG frame grabber – PC/104-Plus form factor with 32 bit PCI bus
AS-LFG-CBL-25D-SDK	LFG Developer's Cable

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ORDERING NOTES
• Support for alternative operating systems can be accommodated – please contact your supplier for details
• All hardware items are supplied with a 12 month return to manufacturer warranty
• Software is provided with three months telephone and email support
• Custom cables can be manufactured to order