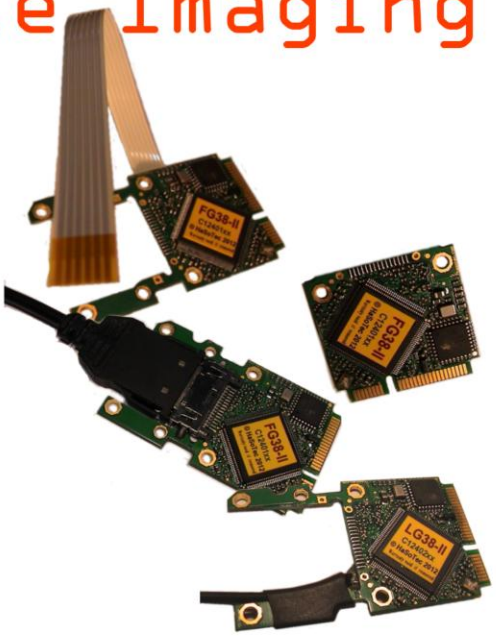
FG-38-III
miniPCIe Framegrabber
half-size / full size
mini PCI express Card

HaSoTec Mobile Imaging



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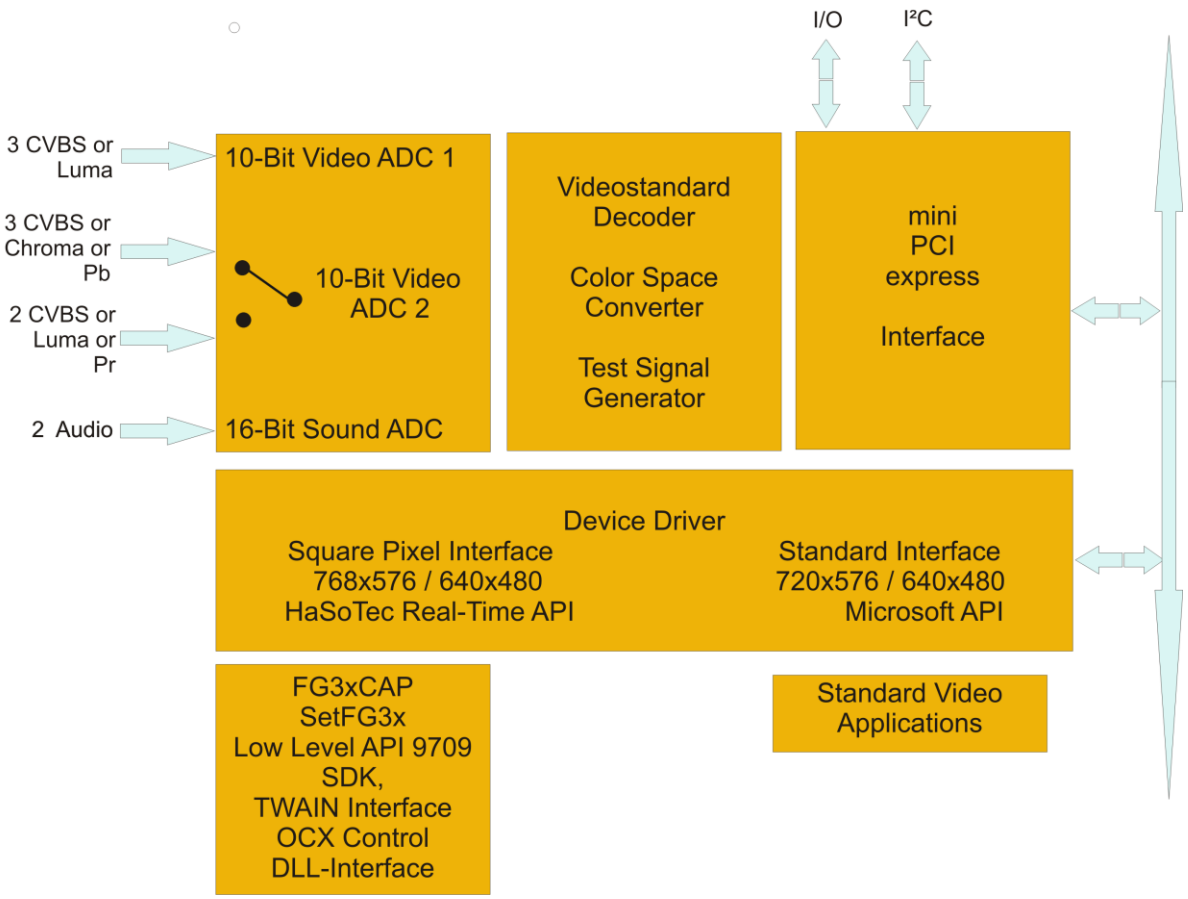


Software

FG-38-III has signed drivers for 32-bit and 64-bit Microsoft Windows. The standard interfaces such as Microsoft Video for Windows / WDM and Twain are supported to use third party video software. The HaSoTec Real-Time API 9709 adds low latency and square pixel support. The supplied video application FG3xCAP allows to capture single frames up to full resolution square pixel based film sequences with 25/30 fps. It interfaces the HaSoTec Real-Time API with standard codecs such as Mpeg2, Mpeg4 or H264. The drivers allow to use hardware features to run Codecs at low CPU loads. The Software Developmet Kit with more than 45 source code examples for the most popular compilers is always supplied.

Analog Video Inputs

FG-38-III integrates two high-performance 10-bit ADCs and provides a full 10-bit data path through the video decoder to maintain optimum end-to-end video quality. Eight analog inputs are provided with flexible analog muxing that can be configured for one or a combination of the following audio and video inputs:

- Eight composite inputs
- Four Y/C inputs
- Two composite with one Y/C, one YPbPr, and one sound IF
- One composite with two YPbPr and one sound IF

Time multiplexing the various inputs to the chroma and sound ADC allows for the simultaneous digitalization of Pb and Pr inputs in component mode, or chroma with sound-IF for supporting Y/C sources with broadcast audio. All video inputs have integrated anti-alias filters, eliminating the need for external filter components.

Integrated Clamping and Automatic Gain Control
DC restoration and Automatic Gain Control (AGC) are provided to compensate for sources with differing average picture levels. Manual gain control is also supported. Gain values can be read from and written to the device, allowing for the calibration of each input and facilitating fast switching from one source to another.

Flexible Decoder Rates
The video data path includes a sample rate converter to enable multiple pixel rates and to track any timing fluctuations that may be present within the video source. With the sample rate converter, one can use the Microsoft interface to decode video at output pixel rates of 13.5 MHz for an ITU-R BT.656 compliant output stream or the HaSoTec API at 12.27 MHz and 14.75 MHz for NTSC and PAL/SECAM square pixel rates, respectively. The sample rate converter with internal FIFO monitors the horizontal timing of the input source to create a fixed number of samples per line. It controls a PLL to slowly adjust the FIFO level such that short-term jitter in the input source is filtered out of the digitized video stream. This provides stable video data and output clocks, even with sources like VCRs that can have inherently unstable timing.

High Performance Luma and Chroma Separation
Luma/chroma separation of composite video sources is accomplished through a 5-line adaptive chroma comb filter for NTSC and PAL standards. The adaptive comb filter looks across five lines of incoming video and determines which of the five lines are appropriately correlated enough to average together. Depending on the amount of correlation among the lines, two or three lines are averaged together to form the resulting combed filtered line. In the case where no correlation exists between lines, the decoder automatically falls back to chroma band-pass and luma notch filtering. The output of the chroma comb filter is also remodulated and fed back into the luma channel. The result is a high- quality image with reduced cross-chrominance and cross-luminance artefacts—such as dot crawl, hanging dots, rainbow effects—that restore full bandwidth to luminance data from composite sources. Additionally, a SECAM “Bell” filter is present to improve SECAM luminance and chroma separation. This is because SECAM uses an FM modulated signal carrier that is always present regardless of whether or not there is color information being broadcast. This results in a visible artefact in the luminance at the carrier frequency. To eliminate this effect, an “Inverse Bell” filter is applied at the encoder to attenuate color frequencies near the Dr and Db carriers. Thus, if little or no color information is present in the signal, the carriers will be reduced in amplitude.

Video Processing Functions
Back-end video processing functions include contrast, brightness, hue, saturation, and scaling. In addition, the luma data path provides white crush compensation for sources that exceed sync tip to white level ratios. The decoder also provides four sets of selectable peaking filters for sharpening the image. The luma data output range is selectable so that luma codes can be limited to the nominal ITU-R BT.656 code range, or can support values below black level, or can use the entire 10-bit range of values where 0 is black level, and 1023 is nominal white. Additional chroma functions include AGC to compensate for attenuated color subcarriers, a color killer for true black and white sources, and coring for limiting low-level chroma noise.

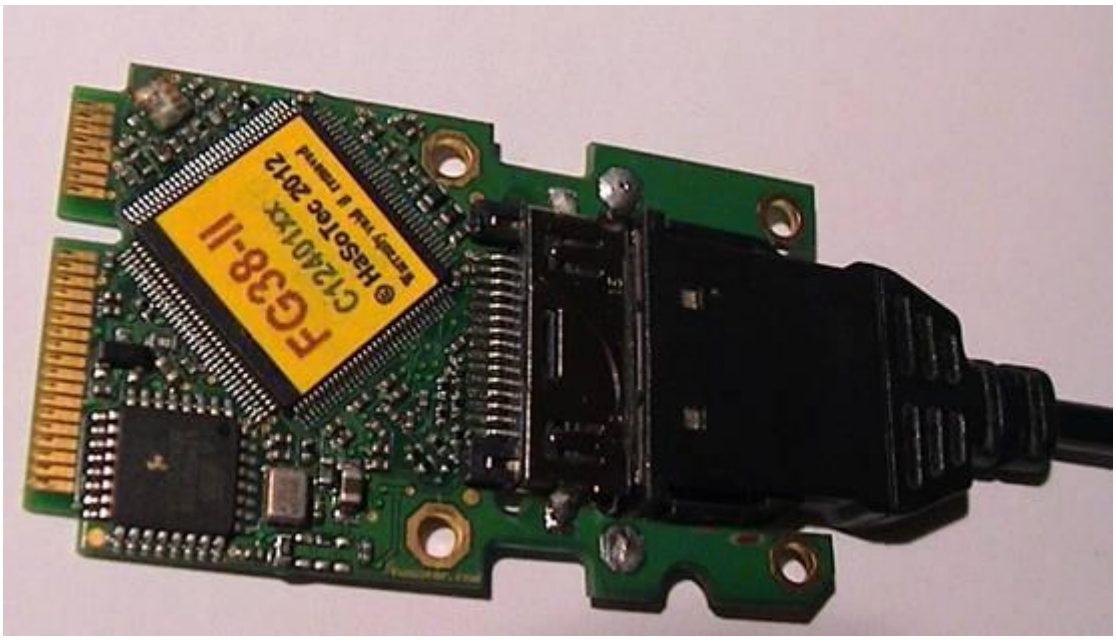
Audio Processing Functions
The FG-38-III is optional populated with baseband analog audio input integrating a stereo 16-bit delta sigma analog to digital converter including multi-stage decimation filter. It supports up to 192 kHz internal sample rate, minimum 88 dB SNR, 17.6 kHz bandwidth, and 0.1 dB passband ripple. this stereo 2.0 Vrms full-scale input can be selected from most standard video applications.

Cable options

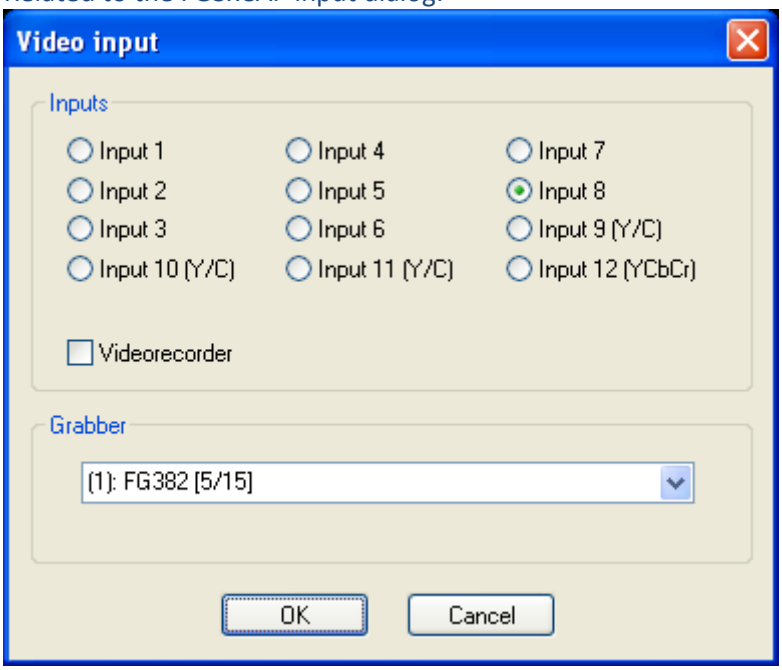
The simplest cable option is to have just one composite video input:

This is possible with a U.FL cable or it can be ordered with a soldered thin coax cable.

Some systems have enough room around the miniPCIe slot to make use of cables made for HaSoTec ExpressCard FG-37.



Related to the FG3xCAP input dialog:



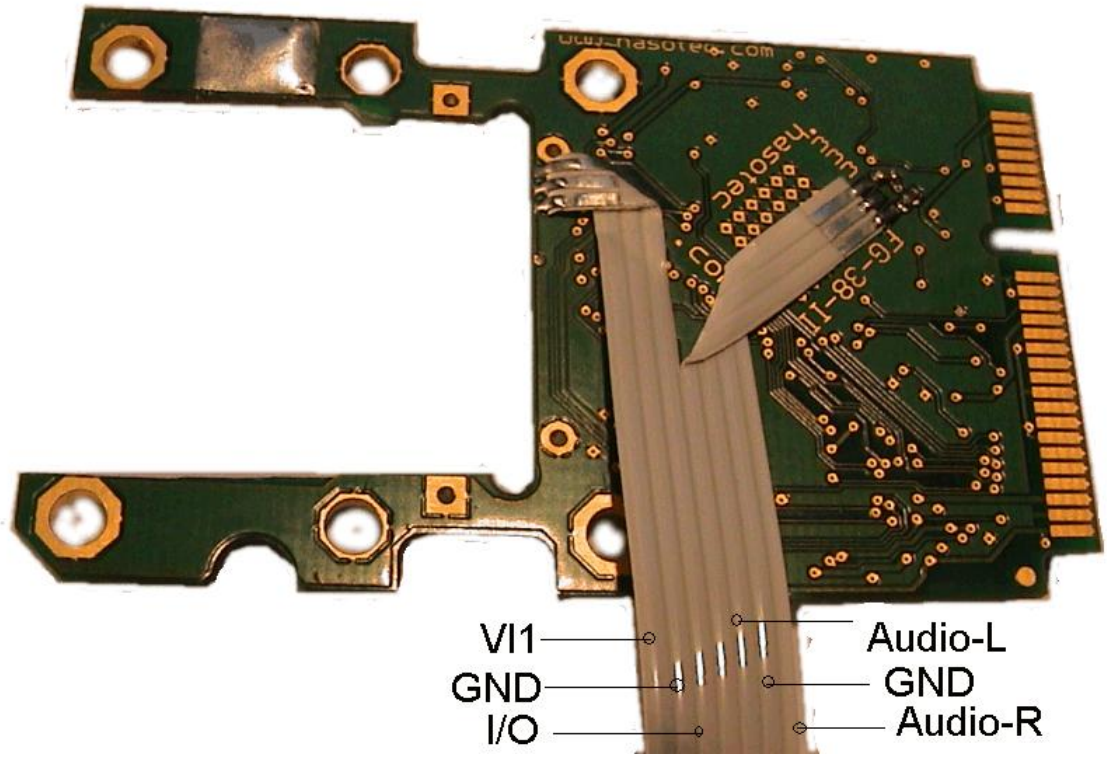
The 15 pin connector has the following signals:

PinNr	FG38-II	
15	GND	
14	3P3 (max. 100mA)	
13	VI1 – Video Input1: Composite1	Component12:Y
12	bus extension: clock	
11	bus extension: data	
10	User4 ADC/I/O – only AD-38-II	
9	User3 ADC/I/O – only AD-38-II	
8	User2 ADC/I/O – only AD-38-II	

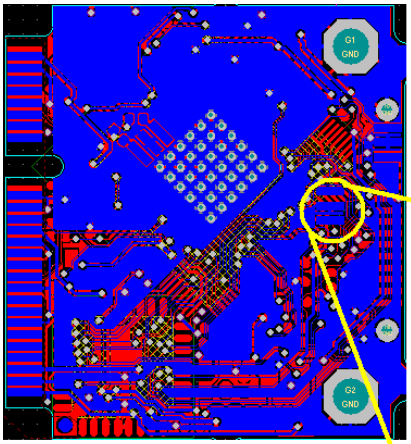
7	User1 ADC/I/O – only AD-38-II		
6	VI4 – Video Input4: Composite4	S-Video11: C	
5	VI6 – Video Input6: Composite6	S-Video10: C	Component12: Cb
4	VI3 – Video Input3: Composite3	S-Video11: Y	
3	VI8 – Video Input8: Composite8	S-Video9: C	Component12: Cr
2	VI5 – Video Input5: Composite5	S-Video10: Y	
1	VI7 – Video Input7: Composite7	S-Video9: Y	
16	Common shield = GND		

VI2 is used for a test image and is not routed to this connector.

FG-38-II is available with FFC cable option:



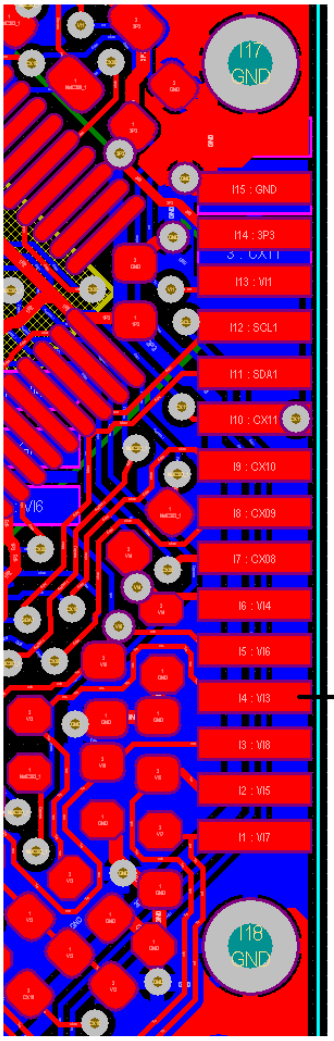
Instead of the Audio inputs the wires can be used to connect S-Video Input11. The FFC cables have 1mm distance e.g. Molex 98267-0211.



bottom side

VI4 and VI6 can be
used together as
S-Video Input(12)

VI1 current Video input
VI2 is Test image
VI3 at 15-pin connector
top side (marked --->)
VI4 at 3pin Pad bottom&15pin top
VI5 15pin top
VI6 at 3pin Pad bottom&15pin top
VI7 15pin top
VI8 15pin top



VI3

FG-38-II power supply data	Firmware Z14		Firmware Z15	
Supply line	1.5V	3.3V	1.5V	3.3 V
	+/- 5%	+/- 5%	+/- 5%	+/- 5%
system start	320mA	320mA	320mA	270mA
Driver loaded (Windows booted)	85mA	240mA	90mA	195mA
Live Video full size full framerate	290mA	330mA	290mA	305mA
Power consumption	**0,78 … 1,55W**			

All values based on worst case measurements and peak currents at 25°C

FG-38-II is available in 2 different temperature ranges.

FG-38-II	**Standard temperature range**		**Extended temperature range**	
	Chip surface		Chip surface	
	Lower limit	Higher limit	Lower limit	Higher limit
recommended	0 °C	65 °C	-30°C	70°C
samples tested	-5°C	70°C	-31°C	80°C
burn-in tested each FG-38-II	ca. 25°C	65°C	ca. 25°C	70°C
Heat sink	no		yes, ca. +10mm high, can be replaced with thermal pads to spread heat over housing	

FG-38-III power supply data	Firmware Z16		Firmware Z17	
	Low Power			
PCIe Generation	**Only Gen 1.0a**		1.0a, 2.0, 3.0	
Supply line	1.5V	3.3V	1.5V	3.3 V
	+/- 10%	+/- 5%	+/- 5%	+/- 5%
system start	170mA	145mA	320mA	270mA
Driver loaded (Windows booted)	85mA	160mA	90mA	195mA
Live Video full size full framerate	185mA	175mA	290mA	305mA
Power consumption	**0,68W … 0,90W**		**0,78 … 1,55W**	

All values based on worst case measurements and peak currents at 25°C

FG-38-III is available in 2 different temperature ranges.

FG-38-III	**Standard temperature range**		**Extended temperature range**	
	Chip surface		Chip surface	
	Lower limit	Higher limit	Lower limit	Higher limit
recommended	0 °C	65 °C	-30°C	70°C
samples tested	-5°C	70°C	-31°C	80°C
burn-in tested each FG-38-III	ca. 25°C	65°C	ca. 25°C	70°C
Heat sink	No		yes, ca. +10mm high, can be replaced with thermal pads to spread heat over housing	