3.1 Mpixel ½-inch Color CMOS Active-Pixel Digital Image Sensor - MI-3100

Preliminary[1] Product Brief

Description

The MI-3100 is a ½ inch color 2048(V) x 1536(H) CMOS low power progressive scan active pixel sensor that is designed specifically to meet the demands of Digital Still Cameras. The sensor utilizes 3.2µm pixels in a Bayer RGB pattern resulting in a ½-inch optical format. The MI-3100 has on-chip timing and control, programmable gain and exposure control, auto black level calibration as well as snapshot mode (flash control) and viewfinder mode.

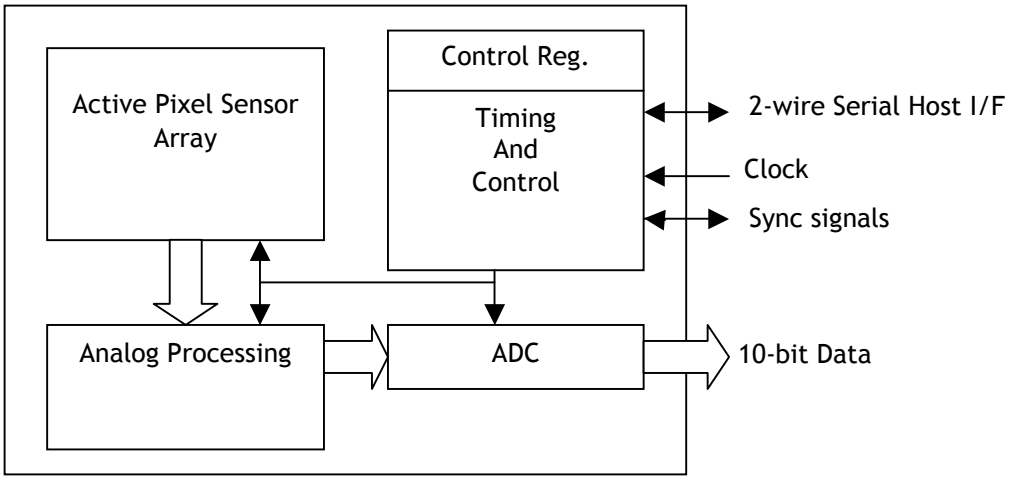
It is capable of both continuous video and single frame capture with sync input and strobe output as well as windowing, horizontal and vertical blanking control. The sensor can be operated in its default mode or programmed by the user over a two-wire serial host interface. The sensor output is 10 bits RGB at 12 frames per second.

Features

- Low power CMOS image sensor
- 3.1 Mpixel resolution (2048H x 1536V)
- ½-inch optical format
- Up to 12 frames per second progressive scan for high quality video
- Programmable gain and exposure control
- Auto black level calibration
- Viewfinder and Snapshot modes
- Auto focus and auto exposure modes
- Binning to XGA and VGA resolutions with improved image quality
- On-chip, 10-bit analog-to-digital converter
- Two-wire serial programming interface
- 10-bit parallel data output

Applications

- Digital Still Cameras
- Digital Video Cameras
- PDAs



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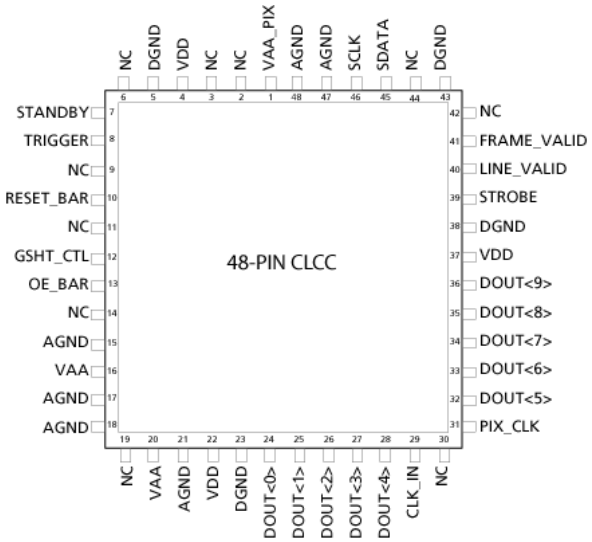
Specifications

Pixel Size and Type	3.2µm x 3.2µm Active Pinned-photodiode
Array Format (active)	2048H x 1536V
Imaging Area	6.553mm x 4.915mm
Color Filter Array	R, G, B primary color filters; Bayer pattern
Optical Format	½ inch (8.19mm diagonal)
Frame Rate	12 fps with programmable blanking
Scan Mode	Progressive
Shutter	Electronic Rolling Shutter and global reset
Programmable Controls	Gain, horizontal and vertical blanking, windowing, sampling rates, auto black level offset correction
Subsampling Modes (w/o binning)	Full, 1/2, 1/3, 1/4, 1/8
Subsampled Resolutions (w/binning)	1024 x 768 (XGA) [Bayer] @ 30 fps default 640 x 480 (VGA) [Bayer] @ 30 fps default
Auto Focus/Auto Exposure/Viewfinder Modes	2048 x 512 @ 30 fps 2048 x 256 @ 60 fps 2048 x 128 @ 120 fps
Windowing	Programmable to any size
Gain	Max. 128x
ADC	10-bit
Data Rate	48 MS/sec
Exposure Control	10µs – 500ms: 1, 2, 4, 8, 16, 32 seconds
Responsivity (Green)	1.2 V/Lux-sec
SNR (max)	43 dB
Dynamic Range (analog)	64 dB
Dark Current @ 20°C	20 e^-/sec
Master Clock	48 MHz
Supply Voltage	3.3V ± 0.3V
Power Consumption	240mW @ 12 fps (<100µW standby)
Operating Temp. Range	0°C to 60°C
Temperature Storage Range	-40°C to +125°C
Package	48-pin PLCC



PIN #	SYMBOL	TYPE	DESCRIPTION
1	VAAPIX	Supply	Analog Pixel Power: Provide power supply for pixel array, 3.3V± 0.3V
2	NC	-	No Connect: These pins must be left unconnected
3	NC	-	No Connect: These pins must be left unconnected
4	VDD	Supply	Digital Power: Provide power supply for digital block, 3.3V ± 0.3V
5	DGND	Supply	Digital Ground: Provide isolated ground for digital block
6	NC	-	No Connect: These pins must be left unconnected
7	STANDBY	Input	Standby: Activates (HIGH) standby mode, disables analog bias circuitry for power saving mode.
8	TRIGGER	Input	Trigger: Activates (HIGH) snapshot sequence.
9	NC	-	No Connect: These pins must be left unconnected
10	RESET_BAR	Input	Reset: Activates (LOW) asynchronous reset of sensor. All registers assume factory defaults.
11	NC	-	No Connect: These pins must be left unconnected
12	GSHT_CTL	Input	Global Shutter Control pin
13	OE_BAR	Input	Output Enable: OE_BAR when high places outputs DOUT<0-9>, FRAME_VALID, LINE_VALID, PIX_CLK and STROBE into a tri-state configuration
14	NC	-	No Connect: These pins must be left unconnected
15	AGND	Supply	Analog Ground: Provide isolated ground for analog block and pixel array
16	VAA	Supply	Analog Power: Provide power supply for analog block, 3.3V ± 0.3V
17	AGND	Supply	Analog Ground: Provide isolated ground for analog block and pixel array
18	AGND	Supply	Analog Ground: Provide isolated ground for analog block and pixel array
19	NC	-	No Connect: These pins must be left unconnected
20	VAA	Supply	Analog Power: Provide power supply for analog block, 3.3V ±0.3V
21	AGND	Supply	Analog Ground: Provide isolated ground for analog block and pixel array
22	VDD	Supply	Digital Power: Provide power supply for digital block, 3.3V ±0.3V
23	DGND	Supply	Digital Ground: Provide isolated ground for digital block
24	DOUT <0>	Output	Data Out: Pixel data output bits 0, DOUT<9> (MSB), DOUT<0> (LSB)
25	DOUT <1>	Output	Data Out: Pixel data output bits 1, DOUT<9> (MSB), DOUT<0> (LSB)
26	DOUT <2>	Output	Data Out: Pixel data output bits 2, DOUT<9> (MSB), DOUT<0> (LSB)
27	DOUT <3>	Output	Data Out: Pixel data output bits 3, DOUT<9> (MSB), DOUT<0> (LSB)
28	DOUT <4>	Output	Data Out: Pixel data output bits 4, DOUT<9> (MSB), DOUT<0> (LSB)
29	CLK_IN	Input	Clock In: Master clock into sensor (48 MHz maximum)
30	NC	-	No Connect: These pins must be left unconnected
31	PIX_CLK	Output	Pixel Clock: Pixel data outputs are valid during falling edge of this clock; Frequency = (Master Clock)
32	DOUT <5>	Output	Data Out: Pixel data output bits 5, DOUT<9> (MSB), DOUT<0> (LSB)
33	DOUT <6>	Output	Data Out: Pixel data output bits 6, DOUT<9> (MSB), DOUT<0> (LSB)
34	DOUT <7>	Output	Data Out: Pixel data output bits 7, DOUT<9> (MSB), DOUT<0> (LSB)
35	DOUT <8>	Output	Data Out: Pixel data output bits 8, DOUT<9> (MSB), DOUT<0> (LSB)
36	DOUT <9>	Output	Data Out: Pixel data output bits 9, DOUT<9> (MSB), DOUT<0> (LSB)
37	VDD	Supply	Digital Power: Provide power supply for digital block, 3.3V ±0.3V
38	DGND	Supply	Digital Ground: Provide isolated ground for digital block
39	STROBE	Output	Strobe: Output is pulsed high to indicate sensor reset operation of pixel array has completed
40	LINE_VALID	Output	Line Valid: Output is pulsed high during line of selectable valid pixel data (see Reg0x20 for options)
41	FRAME_VALID	Output	Frame Valid: Output is pulsed high during frame of valid pixel data
42	NC	-	No Connect: These pins must be left unconnected
43	DGND	Supply	Digital Ground: Provide isolated ground for digital block
44	NC	-	No Connect: These pins must be left unconnected
45	SDATA	Input/Output	Serial Data: Serial data bus, requires 1.5kohm resister to 3.3V for pullup
46	SCLK	Input	Serial Clock: Clock for serial interface
47	AGND	Supply	Analog Ground: Provide isolated ground for analog block and pixel array
48	AGND	Supply	Analog Ground: Provide isolated ground for analog block and pixel array