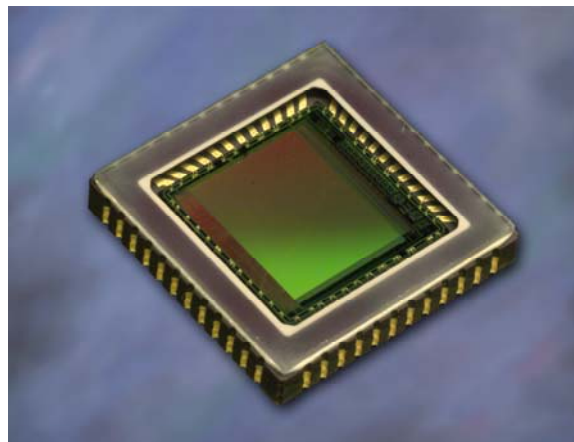




Kodak Digital Science KAC-0311 Image Sensor

KAC – 0311
640 x 480 VGA CMOS Image Sensor
Fully Integrated Timing, Analog Signal Processing & 10 bit ADC



Features

- 1/3" Color VGA Digital Image Sensor
- 640 x 480 pixel progressive/interlace scan
- 7.8µm square pixels with patented pinned photodiode architecture
- Bayer - CMY CFA, Monochrome
- High sensitivity, quantum efficiency, and charge conversion efficiency
- Low fixed pattern noise / Wide dynamic range
- Patented Electronic Shutter Operation
- 30fps full VGA at 10MHz Master Clock Rate
- 60fps full VGA at 20MHz Master Clock Rate
- Antiblooming and continuous variable speed shutter
- 10x linear programmable gain
- 10-bit, pipelined algorithmic RSD ADC
- User selectable digital output formats:
 - 8-bit companded data
 - 10-bit linear data
- Pixel addressability to support 'Window of Interest' windowing, resolution, and sub-sampling
- Analog column offset correction
- Integrated on-chip timing/logic circuitry
- Digitally programmable via I²C interface
- CDS sample and hold for suppression of low frequency and correlated reset noise
- Dark reference pixels with automatic Frame Rate Clamp
- Single master clock operation
- Single 3.3V power supply
- 48 pin CLCC package

Key Specifications

- **Pixel Size:** 7.8µm x 7.8µm
- **Fill factor:** 40%
- **Image Size:** 5.0mm x 3.7mm (1/3")
- **Responsivity:** 90,000 electrons/Lux-sec
- **Saturation Signal:** 45,000 electrons
- **Min Light:** 5 Lux at 30FPS/F2 lens
- **Scan Modes:** Progressive/Interlace
- **Operation Modes:** Continuous & Single
- **Shutter Modes:** Rolling or Global
- **Nominal Readout Rate:** 14 MHz
- **Maximum Readout Rate:** 20 MSPS
- **Frame Rate:** 0-60 frames per second
- **System Dynamic Range:** 49 dB
- **Programmable gain:** -3.0dB to 17.4dB
- **ADC:** 10-bit, RSD ADC (DNL +/-0.5 LSB, INL +/-1.0 LSB)
- **Power Dissipation:** 215mW (dynamic) / 25mW (standby)

Release Date: 8/5/2002

Eastman Kodak Company - Image Sensor Solutions

Revision No. 1
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For the most current information regarding this product:



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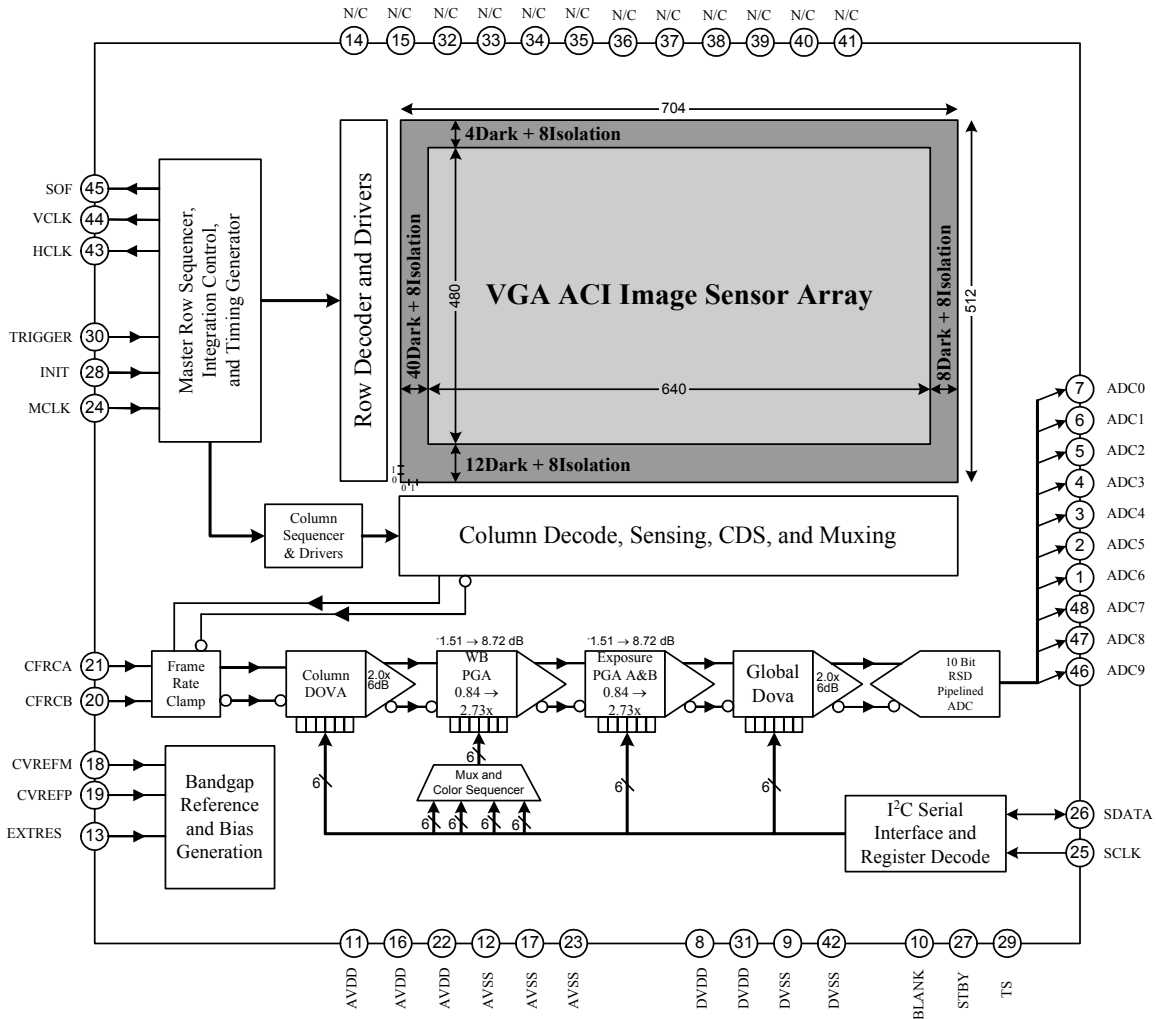


Figure 1: KAC-0311 Block Diagram

The KAC-0311 is a fully integrated, high performance 1/3" optical format VGA CMOS image sensor including integrated timing control and programmable analog signal processing. This sensor provides system designers a complete imaging solution with a monolithic image capture and processing engine. System benefits enable design of smaller, portable, low cost and low power systems. Each pixel on the sensor is individually addressable allowing the user to control the "Window of Interest" (WOI), panning and zooming, sub-sampling, resolution, exposure, white balance, and other image processing features via a two pin I²C compatible interface. This device runs from a single 3.3V supply and single master clock.

The imager uses Kodak's patented Pinned Photodiode CMOS active pixels. The 7.8µm pixel design provides true correlated double sampling for low read noise operation, high quantum efficiency, low dark current, and no image lag. Kodak's patented pixel design combined with low noise mixed signal circuits provides a high sensitivity, low noise integrated "camera on a chip".



Kodak Digital Science KAC-0311 Image Sensor

Pin No.	Pin Name	Description	Pin Type	Power	Value	Pin No.	Pin Name	Description	Pin Type	Power	Value
1	ADC6	Output Bit 6=64d	O	D		25	SCLK	I ² C Serial Clock Line	I	D	
2	ADC5	Output Bit 5=32d	O	D		26	SDATA	I ² C Serial Data Line	I/O	D	
3	ADC4	Output Bit 4=16d	O	D		27	STBY	Power Down Standby Enable	I	D	
4	ADC3	Output Bit 3=8d	O	D		28	INIT	Sensor Initialize	I	D	
5	ADC2	Output Bit 2=4d	O	D		29	TS	Dig Output Tri-State Enable	I	D	
6	ADC1	Output Bit 1=2d	O	D		30	TRIGGER	Still Frame Capture Trigger	I	D	
7	ADC0	Output Bit 0=1d	O	D		31	DVDD	Digital Power	P	D	3.3 V
8	DVDD	Digital Power	P	D	3.3 V	32	NC	Unused	I	D	
9	DVSS	Digital Ground	G	D	0 V	33	NC	Unused	I	D	
10	BLANK	Pixel Invalid	O	D		34	NC	Unused	I	D	
11	AVDD	Analog Power	P	A	3.3 V	35	NC	Unused	I	D	
12	AVSS	Analog Ground	G	A	0 V	36	NC	Unused	I	D	
13	EXTRES	External Bias Resistor	I	A	27k Ω	37	NC	Unused	I	D	
14	NC	Unused		A		38	NC	Unused	I	D	
15	NC	Unused		A		39	NC	Unused	I	D	
16	AVDD	Analog Power	P	A	3.3 V	40	NC	Unused	I	D	
17	AVSS	Analog Ground	G	A	0 V	41	NC	Unused	I	D	
18	CVREFM	ADC Bottom Bias Ref Capacitor	O	A	0.1μF	42	DVSS	Digital Ground	G	D	0 V
19	CVREFP	ADC Top Bias Ref Capacitor	O	A	0.1μF	43	HCLK	Pixel Sync	O	D	
20	CFRCB	Frame Rate Clamp Capacitor	O	A	1.0μF	44	VCLK	Line Sync	O	D	
21	CFRCA	Frame Rate Clamp Capacitor	O	A	1.0μF	45	SOF	Start of Frame Sync	O	D	
22	AVDD	Analog Power	P	A	3.3 V	46	ADC9	Output Bit 9=512d	O	D	
23	AVSS	Analog Ground	G	A	0 V	47	ADC8	Output Bit 8=256d	O	D	
24	MCLK	Master Clock = Pixel Rate	I	D		48	ADC7	Output Bit 7=128d	O	D	

KAC-0311 Pin Definitions

Legend:
P = VDD
G = VSS
I = Input
O = Output
D = Digital
A = Analog

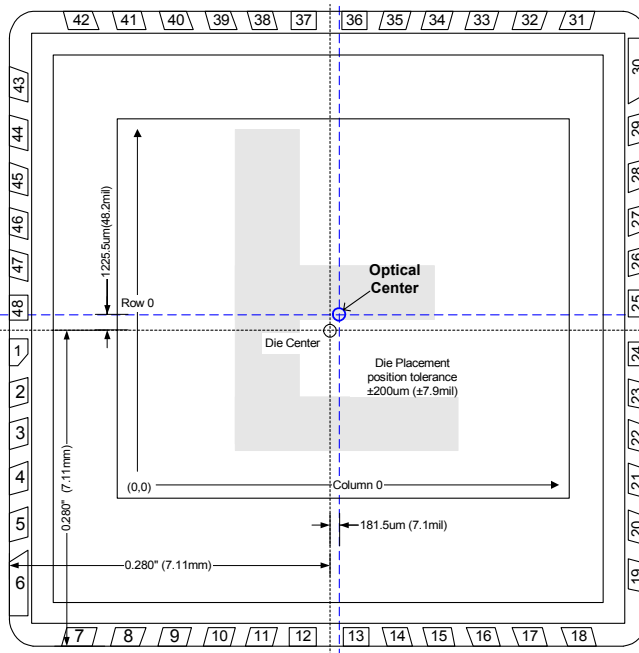


Figure 2 Pinout Diagram



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