



MCM20114
VGA CMOS Sensor



Preliminary Advance Information
640 x 480 pixel
Color VGA Digital Image Sensor
progressive scan solid state image sensor with
integrated CDS/PGA/ADC, digital programming,
control, timing, and pixel correction features

Features:

- VGA resolution, active CMOS image sensor with square pixel unit cells
- 5.6µm pitch pixels with patented pinned photodiode architecture
- RGB color filter array with micro lenses
- High sensitivity, quantum efficiency, and charge conversion efficiency
- Low fixed pattern noise / wide dynamic range
- Global and continuous variable speed shutter
- Single master clock operation- 15MHz Max
- Digitally programmable via I²C interface
- Integrated on-chip timing/logic circuitry
- Single 3.3V power supply with optional 2.7V Digital I/O support
- Low Power consumption - 100mW @ 30 fps
- CDS sample and hold for suppression of low frequency and correlated reset noise
- 1-9x programmable variable gain to optimize dynamic range and facilitate white balance and iris adjustment
- 10-bit, pipelined algorithmic RSD ADC (DNL ±0.5 LSB, INL ±1.0 LSB)
- Pixel addressability to support 'Window of Interest' windowing, resolution, and subsampling
- Digitally controlled encoded data stream
- 30 fps full VGA at 13.5 MHz Master Clock Rate
- 36 pin CLCC package

Part Number	Description	Package
MCM20114IBBL	Color RGB sensor with Lenslets	36 Pin CLCC
MCM20114IBMN	Monochrome sensor without Lenslets	36 Pin CLCC
SIDEWINDER	Integrated VGA Image Module - complete w/ a MCM20114 and 1/4" Optic.	

The MCM20114 is a fully integrated, high performance CMOS image sensor with features such as integrated timing, control, and analog signal processing for digital imaging applications. The part provides designers a complete imaging solution with a monolithic image capture and processing engine thus making it a true "camera on a chip". System benefits enable design of smaller, portable, low cost and low power systems. Thereby making the product suitable for a variety of consumer applications including still/full motion imaging, security/surveillance, and automotive among others.

The imaging pixels are based on active CMOS pixels using pinned photodiodes that are realized using Motorola's sub-micron ImageMOS™ technology. A maximum frame rate of 30 FPS at full resolution can be achieved, further the frame rate is completely adjustable, independent of the system clock. Each pixel on the sensor is individually addressable allowing the user to control "Window of Interest" (WOI) panning and zooming. Control of sub-sampling, resolution, exposure, gain, and other image processing features is accomplished via a two pin I²C interface. The sensor is run by supplying a single Master Clock. The sensor output is 10 digital bits providing wide dynamic range images.

This document contains information on a new product.
Specifications and information herein are subject to change without notice.



Specifications

- Image Size:** 3.584 mm x 2.688 mm (4.48 mm Diagonal, 1/4" Optic)
- Resolution:** 668 x 488 pixels, available digital zoom and region of interest (ROI) windowing
- Pixel Size:** 5.6µm x 5.6µm
- Monochrome Sensitivity:** 1.68 V/Lux-sec
- Min. Detectable Light Level:** 5 Lux @ 30Fps with F/1.8 lens
- Shutter Modes:** Global shutter, continuous or single frame rolling shutter modes available
- Readout Rate:** 15.0 MSPS
- Frame Rate:** 0-30 Full frames (640x480) per second
- Master Clock Frequency:** 2.0 - 15.0MHz
- System Dynamic Range:** 60dB
- On Chip programmable gain:** 0dB to 19.1dB
- On Chip Image Correction:** Programmable offset non-uniformity correction
- Analog to Digital Converter:** 10-bit, RSD ADC (DNL +/-0.5 LSB, INL +/-1.0 LSB)
- Power Dissipation:** 100mW RMS, operating @13.5Mhz
- Package:** 36 pin ceramic LCC
- Temperature Operating Range:** -10 to 40°C

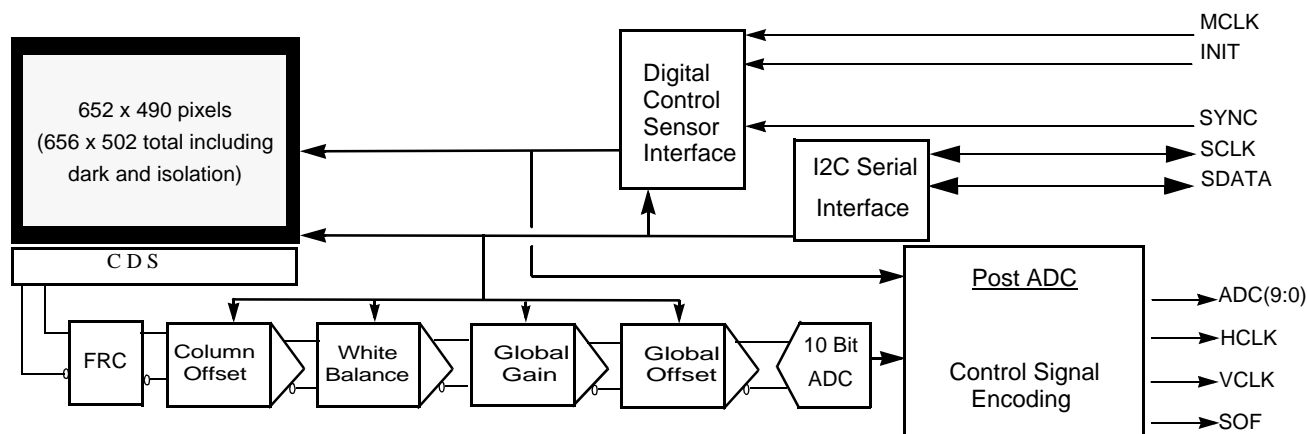


Figure 1. MCM20114 Simplified Block Diagram

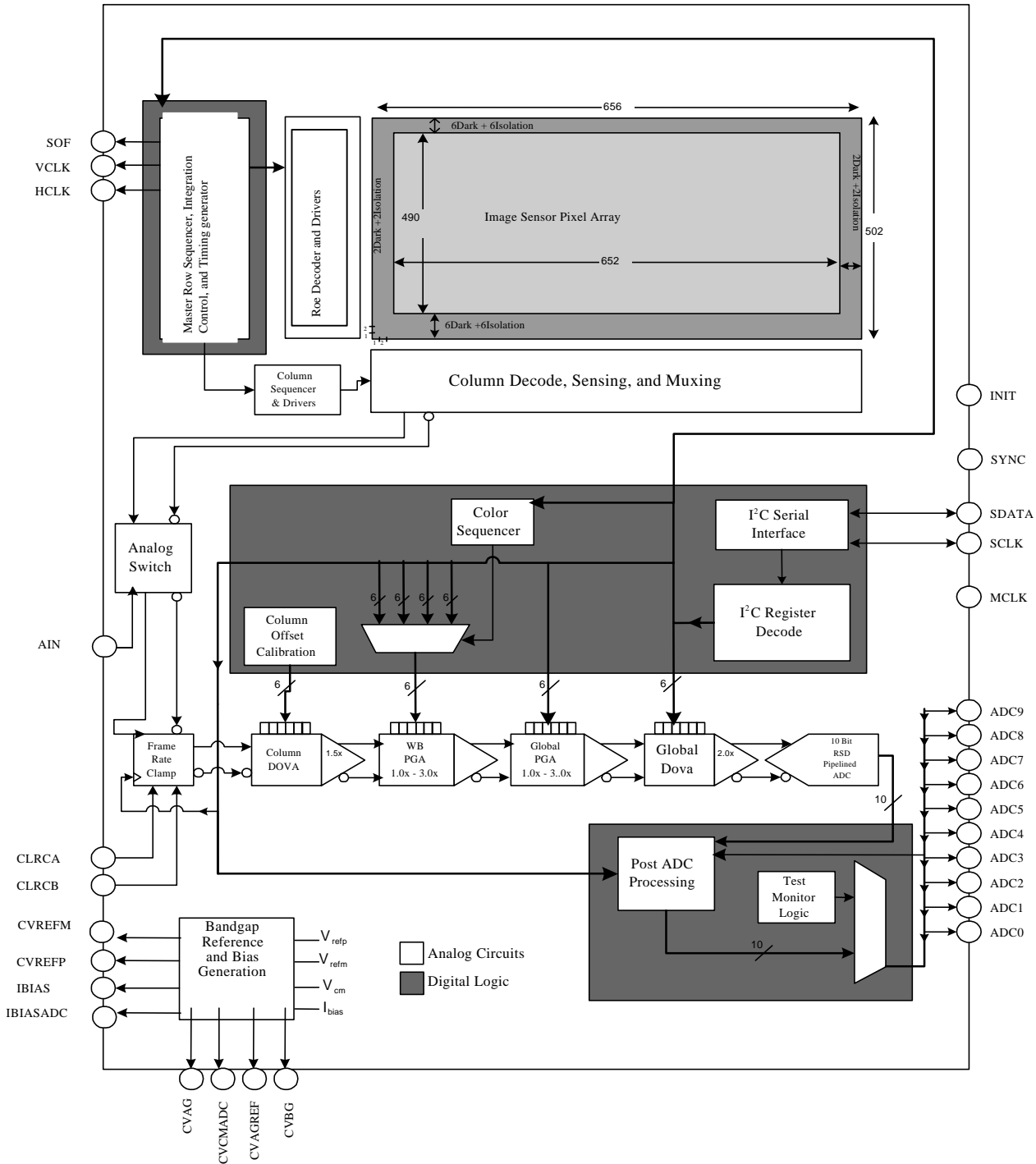


Figure 2. MCM20114 Detailed Block Diagram



Pin Definitions

Pin	Name	Function	I/O	Description
1	DVDDC	Digital Core Power	P	(3.3V +/-10%)
2	MCLK	Master Clock	I	15 MHz Maximum Frequency - 0-DVDDIO Volts @ 50% Duty Cycle.
3	DVSS	Digital I/O and Core Return	P	Ground
4	PIX_OUT0	Data Output 0 (LSB)	O	
5	PIX_OUT1	Data Output 1	O	
6	PIX_OUT4	Data Output 4	O	
7	PIX_OUT5	Data Output 5	O	
8	HCLK	Horizontal output clock	O	Pixel Data Valid Signal (Default Active High)
9	VCLK	Vertical output clock	O	Line Sync signal (Default Active High)
10	SOF	Start of Frame, readout data begin signal	O	Indicates beginning of Frame data read- out (Active High)
11	SCLK	I ² C Clock	I	Pull-up resistor required
12	SDATA	I ² C Data	I/O	Pull-up resistor required
13	AVDD	Analog Power	P	(3.3V +/-10%)
14	AVSS	Analog Power Return	P	Ground
15	AIN	Analog Input Signal/Reset Test	I	During Normal operation - Set to Ground
16	CLRCA	Frame Rate Clamp Reference A	I	During Normal operation - Bypass w/ 0.1uF Capacitor
17	CLRCB	Frame Rate Clamp Reference B	I	During Normal operation - Bypass w/ 0.1uF Capacitor
18	CVAGREF	Common Mode Reference	I	During Normal operation - Bypass w/ 0.1uF Capacitor
19	CVAG	Common Mode Reference	I	During Normal operation - Bypass w/ 0.1uF Capacitor
20	CVBG	Bandgap Voltage Reference	I	During Normal operation - Bypass w/ 0.1uF Capacitor
21	CVREFM	ADC Reference Bottom	I	During Normal operation - Bypass w/ 0.1uF Capacitor




Pin	Name	Function	I/O	Description
22	CVREFP	ADC Reference Top	I	During Normal operation - Bypass w/ 0.1uF Capacitor
23	CVCMADC	ADC Common Mode Reference	I	During Normal operation - Bypass w/ 0.1uF Capacitor
24	IBIAS	Analog Bias Input	I	Optional external resistor - Tie to nn KΩ resistor
25	AVSS	Analog Power Return	P	Ground
26	AVDD	Analog Power	P	(3.3V +/-10%)
27	IBIASADC	ADC Bias Input	I	Optional external resistor - Tie to nn KΩ resistor
28	SYNC	Start Data Capture	I	Initiates a single frame capture in Global Shutter and SFRS modes (Default Active High)
29	INIT	Initialize Signal - Sensor Reset	I	ACTIVE HIGH - Synchronous Reset, 4 MCLKs signal wide
30	PIX_OUT9	Data Output 9 (MSB)	O	
31	PIX_OUT8	Data Output 8	O	
32	PIX_OUT7	Data Output 7	O	
33	PIX_OUT6	Data Output 6	O	
34	PIX_OUT3	Data Output 3	O	
35	PIX_OUT2	Data Output 2	O	
36	DVDDIO	Digital I/O Power	P	(3.3V +10% to 2.7V -5%)



Sample Images using IMAGEMOS Digital Image Sensor technology

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