



1/2.3-Inch 18Mp CMOS Digital Image Sensor

AR1820HS Data Sheet, Rev. F

For the latest data sheet, refer to Aptina's Web site: www.aplina.com

Features

- 1.25 μ m pixel with Aptina™ A-PixHS™, which brings BSI technology together with advanced sensor architecture pixel technology
- Simple 2-wire and 3-wire serial interface
- Auto black level calibration
- Full frame 18Mpixel, 12-bits at 24 fps for HiSPi 8 Lanes, and 10-bits 15fps for MIPI 4 Lanes.
- Support Full HD with 27.5% EIS, full of view, output 2448x1378 with X-binning/Y(in-pixel)-summing at 60 fps.
- Support 8Mp 16:9 HD cropping 77% FOV, 60 fps for HiSPi 8 Lanes, and 10-bits 30fps for MIPI 4 Lanes.
- Support for external mechanical shutter
- Support 1080p120 fps cropping 78% FOV
- Support for external LED or Xenon flash
- Programmable controls: gain, horizontal and vertical blanking, auto black level offset correction, frame size/rate, exposure, left-right and top-bottom image reversal, window size, and panning
- Data interfaces: (HiSPi™): programmable to 4 or 8 lanes HiSPi, high-speed serial pixel interface differential signaling support SLVS or sub-LVDS
- (MIPI): Programmable to 2-, 3-, or 4-lane serial mobile industry processor interface.
- On-chip phase-locked loop (PLL) oscillator
- Integrated position and color-based shading correction
- Slave mode for precise frame-rate control and for synchronizing multiple sensors
- On-chip temperature sensor, controlled by two-wire serial interface
- Supports Bit-Depth Compression for lower bandwidth receivers: A-Law Compression for HiSPi 12-10-12, 12-8-12, 10-8-10 and DPCM for MIPI: 10-8-10, 10-6-10

Applications

- Digital still cameras
- Digital video cameras
- Smart phones
- PC cameras
- Tablets

Table 1: Key Performance Parameters

Parameter	Value	
Optical format	1/2.3-inch (4:3)	
Pixel size	1.25 μ m x 1.25 μ m A-PixHS™ BSI	
Entire array format	4912H x 3684V	
Primary modes	4:3 - 18Mp full resolution at 24 fps (HiSPi-8L), 15 fps (MIPI-4L) 16:9 - 14Mp at 30 fps (HiSPi-8L), 20 fps (MIPI-4L) 16:9 - 8Mp at 60 fps (HiSPi-8L), 30 fps (MIPI-4L) 16:9 - Full HD + 27.5%EIS at 60 fps 16:9 - Full HD at 120 fps	
Chief ray angle	0°, 11.4°, and 31°	
Color filter array	RGB Bayer pattern	
Shutter type	Electronic rolling shutter (ERS) with global reset release (GRR)	
Input clock frequency	6 - 54 MHz	
Interface and maximum data rate	MIPI (4/3/2Lanes) or HiSPi (8/4-lanes) with 800 Mbps/lane	
ADC resolution	12-bit, on-chip	
Pixel data format	12/10-bit per pixel (RAW12 or RAW10)	
Analog gain	1x – 8x	
Responsivity	0.62 V/lux-sec (545nm)	
Dynamic range	65.8 dB	
SNRmax	36.3dB	
Supply voltage	Analog (VAA)	2.7 - 3.1V (2.8V nominal)
	Digital (VDD)	1.14 - 1.3V (1.2V nominal)
	Pixel (VAA_PIX)	2.7 - 3.1V (2.8V nominal)
	Digital (VDD_1V8)	1.7 - 1.9V (1.8V nominal)
	I/O (VDD_IO)	1.7 - 1.9V (1.8V nominal) or 2.7 - 3.1V (2.8V nominal)
	Serial interface (VDD_TX)	0.3 - 0.6 V (0.4V nominal for HiSPi) 1.14 - 1.3 V (1.2V nominal for MIPI)
Power consumption	Refer to Table 3 on page 2	
Package	10x10mm, 60 balls iBGA and Recon die	

**Table 1: Key Performance Parameters (continued)**

Parameter	Value
Operating temperature	-30°C to +70°C (at junction)
Storage temperature	-30°C to +80°C (at junction)

Ordering Information

Table 2: Available Part Numbers

Part Number	Description
AR1820HSSC00SHEA0	0° CRA, HiSPi, plastic iBGA
AR1820HSSC12SHEA0	11.4° CRA, HiSPi/MIPI, plastic iBGA
AR1820HSSC31SMD20	31° CRA, MIPI, Recon die

Modes of Operation and Power Consumption

Table 3: HiSPi Modes of Operation and Power Consumption

Mode	Active Readout Window (col x row)	Sensor Output Resolution (col x row)	Readout Mode	FOV	FPS	Typical Power Consumption (mW)
4:3 Snapshot Mode						
Full Resolution - 18Mp	4912x3684	4912x3684	Full mode	100%	24	624
4:3 Video Mode						
Preview 1	4896x3688	1224x922	x-ana-bin2scale2 y-ana-sum2skip2	>99%	30	356
HS-QVGA	4896x3664	306x229	x-ana-bin2skip2+x-dig-scale4 y-ana-skip16	99%	400	439
16:9 Video Mode						
14Mp HD	4912x2764	4912x2764	Full mode	100% HD aspect	30	568
8Mp HD	3840x2160	3840x2160	Full mode	>77% HD aspect	55	537
HD 1080p60 + 20+%EIS	4896x2756	2448x1378	x-ana-bin2 y-ana-sum2	>99% HD aspect	60	446
Ultra-Fast HD 1080p120	3840x2160	1920x1080	x-ana-bin2 y-ana-sum2	>78% HD aspect	120	458

- Notes:
1. 800 Mbps/lane max. HiSPi data transfer rate.
 2. Nominal voltages with external regulator.



AR1820HS: 1/2.3-Inch 18Mp CMOS Digital Image Sensor Modes of Operation and Power Consumption

Table 4: MIPI Modes of Operation and Power Consumption

Mode	Active Readout Window (col x row)	Sensor Output Resolution (col x row)	Readout Mode	FOV	FPS	Typical Power Consumption (mW)
4:3 Snapshot Mode						
Full Resolution 18Mp	4912x3684	4912x3684	Native	100%	15	481
4:3 Video Mode						
Preview 1	4896x3688	1224x922	x-ana-bin2scale2 y-ana-sum2skip2	>99%	60	349
16:9 Video Mode						
14M HD	4912 x 2764	4912 x 2763	Native	100% HD aspect	20	482
8Mp QuadHD 1	3840x2160	3840x2160	native crop	>77% HD aspect	32	496
HD 1080p60 + 20+%EIS	4896x2756	2448x1378	x-ana-bin2 y-ana-sum2	>99% HD aspect	60	385
Ultra-Fast HD 1080p120	3840x2160	1920x1080	x-ana-bin2 y-ana-sum2	>78% HD aspect	120	431

- Notes: 1. 800 Mbps/lane max. MIPI 4Lane data transfer rate.
2. Measured at nominal voltage considering dynamic power saving.