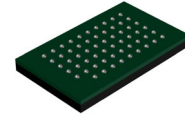


# 1/2.9-inch 8 MP CMOS Digital Image Sensor

## AR0830



ODCSP59  
CASE 570AY

### General Description

The **onsemi** AR0830 is a stacked 1/2.9-inch back side illuminated (BSI) CMOS active-pixel digital image sensor with a pixel array of 3840Hx2160V (3856H x 2176V including border pixels). The AR0830 has enhanced NIR response.

It incorporates sophisticated on-chip camera functions such as Wake on Motion (WOM), context switching and multiple subsampling modes. It is programmable through a simple I<sup>2</sup>C interface and has very low power consumption.

The AR0830 digital image sensor features **onsemi**'s breakthrough low-noise CMOS imaging technology.

The AR0830 sensor can generate full resolution image at up to 60 frames per second (fps) in 10-bit linear mode. AR0830 can achieve 30 fps in line interleaved high dynamic range (LI-HDR) and enhanced Dynamic Range (eDR) modes.

### Features

- 8 MP CMOS Sensor with Advanced 1.4 μm Pixel Stacked BSI Technology
- Enhanced NIR Response at 850 nm and 940 nm Wavelength
- LI-HDR: Supports Line Interleaved T1/T2 Readout to Enable HDR Processing in ISP Chip
- enhanced Dynamic Range (eDR)
- Super Low Power Mode (SLP)
- Wake On Motion (WOM)/Motion Detection
- Subsampling Modes: Skipping, Binning, Summing
- Data Interfaces:
  - ◆ MIPI D-PHY – 4 Lanes
- Bit-depth Compression Available for MIPI Interface
- I<sup>2</sup>C Fast Mode+ Serial Interface (I<sup>2</sup>C)
- Various Trigger Modes for Multi-sensor Synchronization
- Electronic Rolling Shutter (ERS) and Global Reset Release (GRR) Modes Supported
- Context Switching
- 800 bytes One-time Programmable Memory (OTPM) for Storing Shading Correction Coefficients and Module Information
- Programmable Controls: Gain, Horizontal and Vertical Blanking, Frame Size/Rate, Exposure, Window Size, Cropping and Mirror and Flip
- On-chip Temperature Sensor
- Simple Two-wire Fast-mode+ Serial Interface
- On-chip Lens Shading Correction

### ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

## Non-NDA Data Sheet

**Interested in what you see?** If you would like more detailed information, please request the full version of our data sheet.

[Request Full Data Sheet](#)

### Applications

- Videoconferencing Endpoints
- Webcams
- Machine Vision Cameras
- Video Doorbells
- Security Cameras
- Retail In-store Cameras, Bodycams, etc.
- 3D and Stereo Cameras

# AR0830

**Table 1. KEY PERFORMANCE PARAMETERS**

Parameter		Value
Optical Format		1/2.9-inch 8 MP (16:9)
Active Pixels		3840 x 2160
Pixel Size		1.4 $\mu\text{m}$ Back Side Illuminated (BSI),
Chief Ray Angle (CRA)		11°, 35°
Color Filter Array		RGB Bayer, RGB-IR, Monochrome
Input Clock Frequency		6-48 MHz
Interface		4-lane MIPI (1- and 2-lane supported) using D-PHY; Max data rate: 1.5 Gbps/lane
ADC Resolution		10-bits, on die
Gain Control: Gain Table		Linear Mode: 0–53.6 dB total (Analog 0–27.3 dB, Digital 0–26.3 dB)
Subsampling		Subsampling: Skipping (RGB, Mono), Binning (RGB), Summing (Mono) (Note 2)
Temperature Sensor		10-bit, controlled by two-wire serial I/F
Frame Rate	Full Size, Linear Mode	60 fps (MIPIx4), 30 fps (MIPIx2)
Compression		DPCM: 10–8
3D Support		Frame rate and exposure synchronization
Supply Voltage	Analog, Pixel	2.8 V (2.7 V < $V_{\text{supply}}$ < 2.9 V)
	I/O	1.8 V (1.7 V < $V_{\text{supply}}$ < 1.9 V)
	PLL, MIPIphy	1.05 V (1 V < $V_{\text{supply}}$ < 1.1 V)
Power Consumption		190 mW (Typical condition) at 8M and 60 fps
Responsivity		17.3 ke-/lux-sec (Clear in Mono) 8.0 ke-/lux-sec (Green in RGB-IR) 8.7 ke-/lux-sec (Green in RGB)
SNR <sub>MAX</sub>		39.9 dB
Dynamic Range		100 dB (LI-HDR Mode) 73 dB (eDR 1-exp)
Operating Temperature Range (at junction) – T <sub>J</sub>		–30°C to +85°C
Optimal Performance Temperature Range (at junction) – T <sub>J</sub>		0°C to +60°C
Package Options:		CSP-59 (6.42 mm x 3.92 mm)
$\theta_{JA}$		30°C/W (Note 1)
$\theta_{JB}$		6°C/W

1.  $\theta_{JA}$  is dependent on the customer module design and should not be used for calculating junction temperature.
2. Subsampling modes are not available for AR0830 RGBIR sensors.

# AR0830

**Table 2. 10-bit MODES OF OPERATION**

Mode Name	Mode Description	Resolution	Frame Rate
Native	4K Linear Full Res	3840 x 2160	60
Native	4K Linear Full Res, Lower Frame Rate	3840 x 2160	30
SLP Native	4K Linear Full Res, Lowest Power	3840 x 2160	1
LI Native	4K 2-exp LI-HDR	3840 x 2160	30
eDR Native	4K eDR	3840 x 2160	30
Max Frame Rate	Crop Linear for Max Fps	1650 x 1650	90
Bin2	2 MP Linear	1920 x 1080	120
Bin4	0.5 MP Linear	960 x 540	1
WOM Bin4	Wake On Motion w/ Streaming	960 x 540	1

**Table 3. 12-bit MODES OF OPERATION**

Mode Name	Mode Description	Resolution	Frame Rate
eDR Native	4K eDR	3840 x 2160	30

**Table 4. ORDERING INFORMATION**

Part Number	Product Description	Orderable Product Attribute Description
AR0830CSSC11SMKA1-CP	8 MP 1/2.9" CMOS Image sensor RGB 11° CRA	CSP with Protective Film
AR0830CSSC11SMKA1-CP2	8 MP 1/2.9" CMOS Image sensor RGB 11° CRA	CSP with Protective Film Low MOQ
AR0830CSSC11SMKAH3-GEVB	8 MP 1/2.9" CMOS Image sensor RGB 11° CRA	Demo3 Headboard

AR0830CSSM11SMKA1-CP	8 MP 1/2.9" CMOS Image sensor Mono 11° CRA	CSP with Protective Film
AR0830CSSM11SMKA1-CP2	8 MP 1/2.9" CMOS Image sensor Mono 11° CRA	CSP with Protective Film Low MOQ
AR0830CSSM11SMKAH3-GEVB	8 MP 1/2.9" CMOS Image sensor Mono 11° CRA	Demo3 Headboard

AR0830CSSH11SMKA1-CP	8 MP 1/2.9" CMOS Image sensor RGBIR 11° CRA	CSP with Protective Film
AR0830CSSH11SMKA1-CP2	8 MP 1/2.9" CMOS Image sensor RGBIR 11° CRA	CSP with Protective Film Low MOQ
AR0830CSSH11SMKAH3-GEVB	8 MP 1/2.9" CMOS Image sensor RGBIR 11° CRA	Demo3 Headboard

AR0830CSSC35SMKA1-CP	8 MP 1/2.9" CMOS Image sensor RGB 35° CRA	CSP with Protective Film
AR0830CSSC35SMKA1-CP2	8 MP 1/2.9" CMOS Image sensor RGB 35° CRA	CSP with Protective Film Low MOQ
AR0830CSSC35SMKAH3-GEVB	8 MP 1/2.9" CMOS Image sensor RGB 35° CRA	Demo3 Headboard

AR0830CSSH35SMKA1-CP	8 MP 1/2.9" CMOS Image sensor RGBIR 35° CRA	CSP with Protective Film
AR0830CSSH35SMKA1-CP2	8 MP 1/2.9" CMOS Image sensor RGBIR 35° CRA	CSP with Protective Film Low MOQ
AR0830CSSH35SMKAH3-GEVB	8 MP 1/2.9" CMOS Image sensor RGBIR 35° CRA	Demo Headboard

3. Refer to AR0830 Die Data Sheet for Die Part Numbers & Ordering Information.

# AR0830

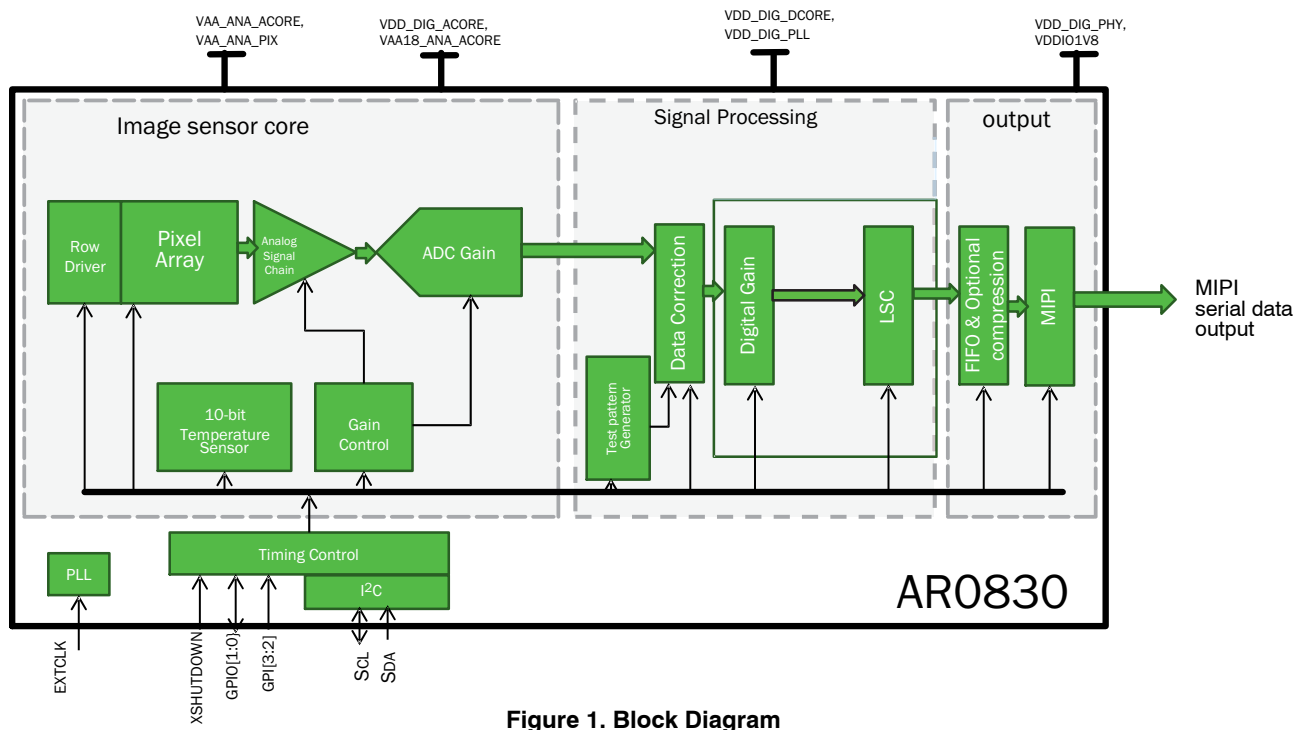
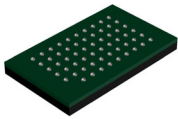
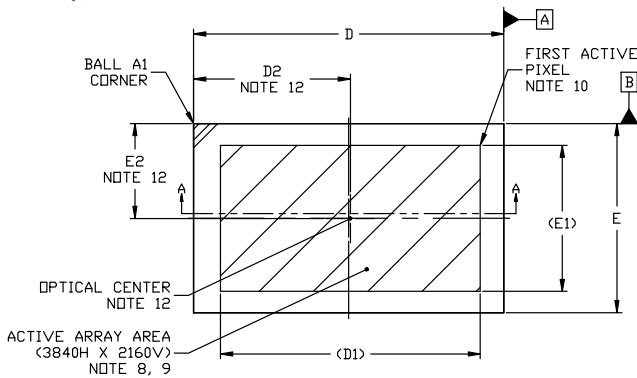


Figure 1. Block Diagram

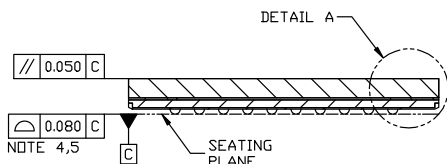


**ODCSP59 6.41x3.91x0.63, 0.50P**  
**CASE 570AY**  
**ISSUE O**

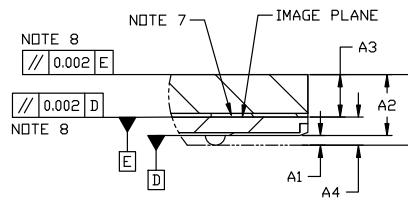
DATE 15 NOV 2023



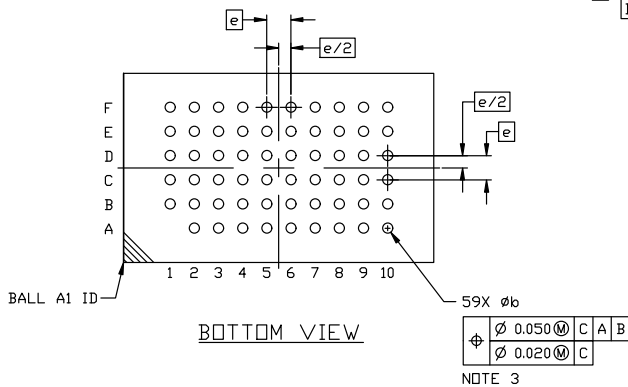
TOP VIEW



SECTION A-A

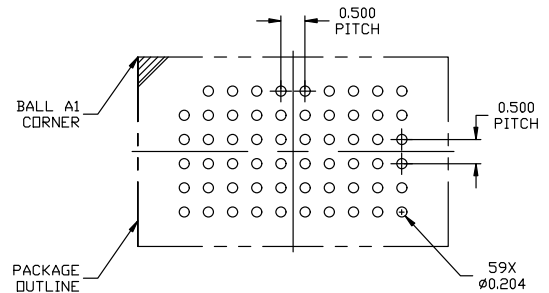


DETAIL "A"  
SCALE 2:1



BOTTOM VIEW

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	----	----	0.762
A1	0.081	0.101	0.121
A2	0.631 REF.		
A3	0.425	0.440	0.455
A4	0.252	0.292	0.332
b	0.184	0.204	0.224
D	6.392	6.417	6.442
D1	5.376 REF.		
D2	3.218	3.243	3.268
E	3.889	3.914	3.939
E1	3.024 REF.		
E2	1.937	1.962	1.987
e	0.500 BSC		



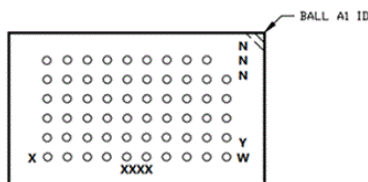
RECOMMENDED MOUNTING FOOTPRINT\*

\*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

NOTES:

- DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
- ALL DIMENSION ARE IN MILLIMETERS.
- SOLDER BALL DIAMETER IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER PARALLEL TO DATUM C.
- COPLANARITY APPLIES TO THE SPHERICAL CROWNS OF THE SOLDER BALLS.
- DATUM C, THE SEATING PLANE IS DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
- GLASS: 0.400 THICKNESS; REFRACTIVE INDEX = 1.52.
- AIR GAP BETWEEN GLASS AND PIXEL ARRAY: 0.040 THICKNESS.
- PARALLELISM APPLIES ONLY TO THE ACTIVE ARRAY.
- MAXIMUM ROTATION OF ACTIVE ARRAY RELATIVE TO DATUMS A AND B IS  $\pm 0.1^\circ$ .
- REFER TO THE DEVICE DATA SHEET FOR TOTAL PIXEL ARRAY DEFINITIONS.
- PACKAGE CENTER (X, Y) = (0.000, 0.000).
- OPTICAL CENTER RELATIVE TO PACKAGE CENTER (X, Y) = (0.035, -0.005).

**GENERIC MARKING DIAGRAM\***



XXXX = Specific Device Code  
Y = Year  
W = Work Week  
NNN = Serial Number

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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