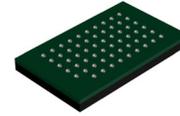# 1/2.9-inch 8 MP CMOS Digital Image Sensor

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^2C 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^2C Fast Mode+ Serial Interface (I^2C)
- 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.

Public 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 μm 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_{supply} < 2.9 V)
	I/O	1.8 V (1.7 V < V_{supply} < 1.9 V)
	PLL, MIPIphy	1.05 V (1 V < V_{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_{MAX}		39.9 dB
Dynamic Range		100 dB (LI-HDR Mode) 73 dB (eDR 1-exp)
Operating Temperature Range (at junction) – T_J		–30 °C to +85 °C
Optimal Performance Temperature Range (at junction) – T_J		0 °C to +60 °C
Package Options:		CSP-59 (6.42 mm x 3.92 mm)
θ_{JA}		30 °C/W (Note 1)
θ_{JB}		6 °C/W

1. θ_{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.

Share Feedback
Your Opinion Matters

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.
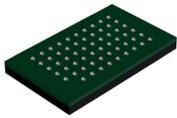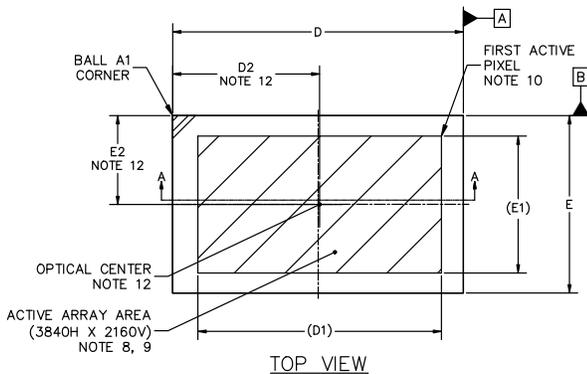
AR0830
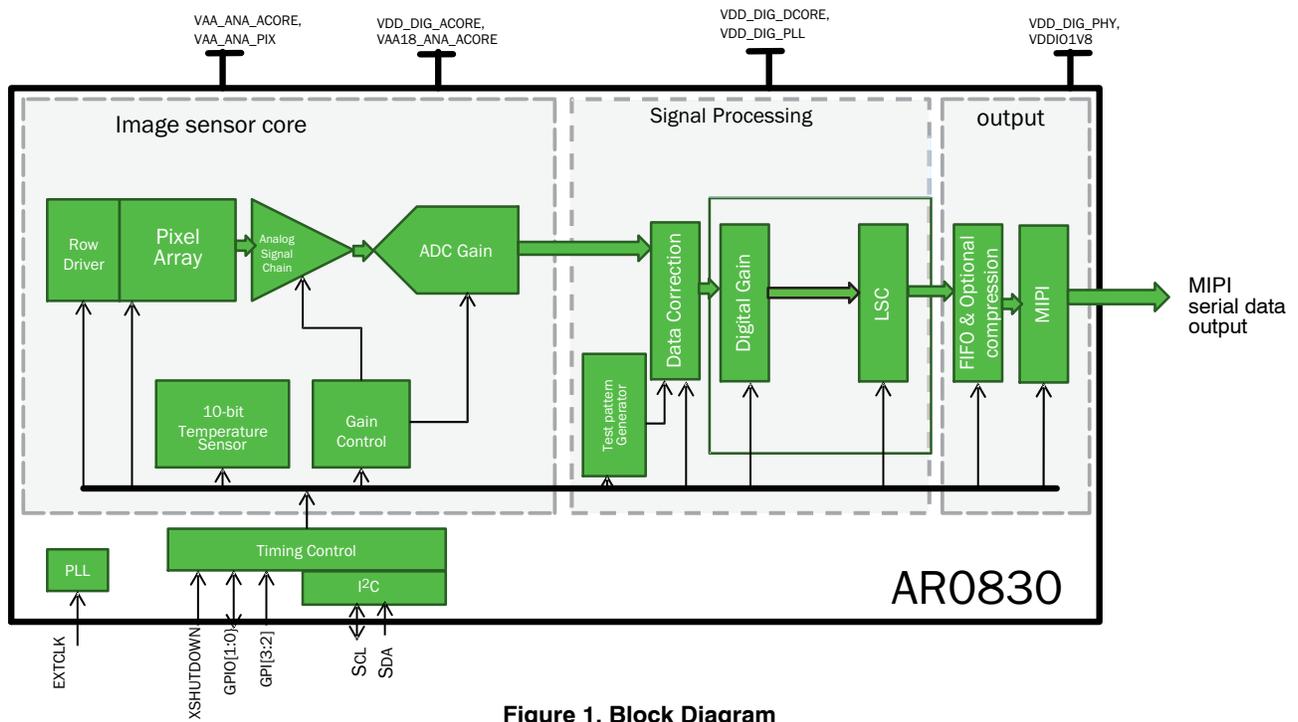

Figure 1. Block Diagram

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

DATE 05 JUN 2025

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5−2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. SOLDER BALL DIAMETER IS MEASURED AT THE MAXIMUM SOLDER BALL DIAMETER PARALLEL TO DATUM C.
4. COPLANARITY APPLIES TO THE SPHERICAL CROWNS OF THE SOLDER BALLS.
5. DATUM C, THE SEATING PLANE IS DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.
6. GLASS: 0.400 THICKNESS; REFRACTIVE INDEX = 1.52.
7. AIR GAP BETWEEN GLASS AND PIXEL ARRAY: 0.040 THICKNESS.
8. PARALLELISM APPLIES ONLY TO THE ACTIVE ARRAY.
9. MAXIMUM ROTATION OF ACTIVE ARRAY RELATIVE TO DATUMS A AND B IS ±0.1°.
10. REFER TO THE DEVICE DATA SHEET FOR TOTAL PIXEL ARRAY DEFINITIONS.
11. PACKAGE CENTER (X, Y) = (0.000, 0.000).
12. OPTICAL CENTER RELATIVE TO PACKAGE CENTER (X, Y) = (0.035, −0.005).
13. PLAIN COVER GLASS WITHOUT AR COATING.

TOP VIEW

DETAIL A

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		
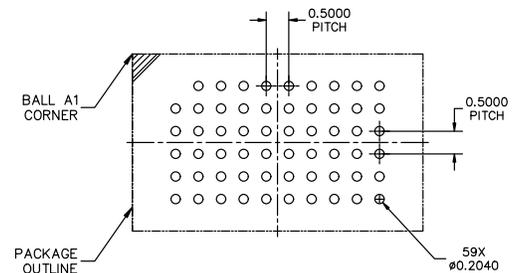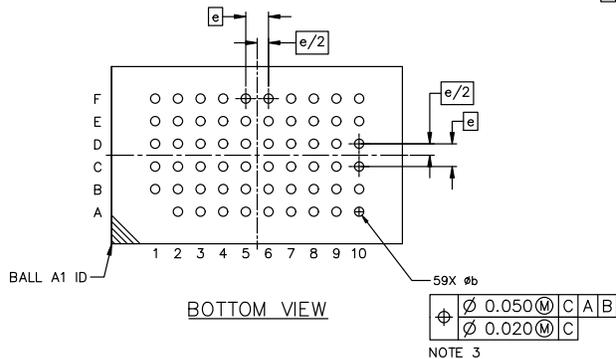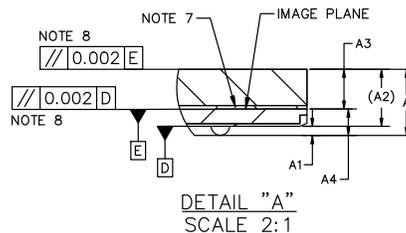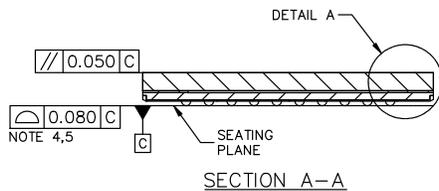
RECOMMENDED MOUNTING FOOTPRINT*

* For additional information on our Pb−Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*
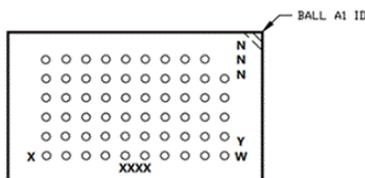
XXXX = Specific Device Code
Y = Year
W = Work Week
NNN = Serial Number

*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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DESCRIPTION:	**ODCSP59 6.41x3.91x0.63, 0.50P**		**PAGE 1 OF 1**

ADDITIONAL INFORMATION

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