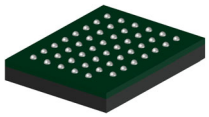
1/4.2-inch 5 MP CMOS Digital Image Sensor

AR0544



ODCSP47
CASE 570DD

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

Public Data Sheet

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Request Full Data Sheet

General Description

The **onsemi** AR0544 is a stacked 1/4.2-inch back side illuminated (BSI) CMOS active-pixel digital image sensor with a pixel array of 2592 x 1944 (2608H x 1960V including border pixels). The AR0544 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 AR0544 digital image sensor features **onsemi**'s breakthrough low-noise CMOS imaging technology.

The AR0544 sensor can generate full resolution image at up to 60 frames per second (fps) in 10-bit linear mode and 30 fps in line interleaved high dynamic range (LI-HDR) mode. AR0544 also supports enhanced Dynamic Range (eDR) mode.

Features

- 5 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
- Wake on Motion (WOM)/Motion Detection
- Subsampling Modes: Skipping, Binning, Summing
- Data Interfaces:
  - 2-lane MIPI D-PHY
- Bit-depth Compression Available for MIPI Interface
- Various Trigger Modes for Multi-sensor Synchronization
- Electronic Rolling Shutter (ERS) and Global Reset Release (GRR) Modes Supported
- 2360 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
- On-chip Temperature Sensor
- Simple Two-wire Fast-mode+ Serial Interface
- On-chip Lens Shading Correction

Applications

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

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Table 1. KEY PERFORMANCE PARAMETERS

Parameter		Value
Optical Format		1/4.2-inch 5 MP (4:3)
Active Pixels		2592 x 1944
Pixel Size		1.4 μm Back Side Illuminated (BSI)
Chief Ray Angle (CRA)		11°, 33°
Color Filter Array		RGB, Monochrome, RGBIR
Input Clock Frequency		6−48 MHz
Interface		2-lane MIPI using D-PHY @; Max data rate: 1.72 Gbps/lane
ADC Resolution		10-bits, on die
Gain Control: Gain Table		Linear Mode: 0−50.62 dB (Analog gain range: 0 ~ 27.37 dB, Digital gain range: 0 ~ 23.25 dB)
Subsampling		Subsampling: Skipping (RGB, Mono), Binning (RGB), Summing (Mono)
Temperature Sensor		10-bit, controlled by two-wire serial I/F
Frame Rate	Full Size, Linear Mode	60 fps
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		158 mW at 5 MP 60 fps
Responsivity		8.7 ke-/lux-sec (Green in RGB) 17.3 ke-/lux-sec (Clear in Mono)
SNR_{MAX}		39.9 dB
Dynamic Range		73 dB (eDR 1-exp) 100 dB (LI-HDR Mode)
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-47 (4.67 x 3.68) Bare Die
θ_{JA}		46 °C/W (Note 1)
θ_{JB}		17 °C/W

1. θJA is dependent on the customer module design and should not be used for calculating junction temperature.

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Table 2. 10-bit MODES OF OPERATION

Mode Name	Mode Description	Resolution	Frame Rate
Native	5 MP Linear Mode Full Resolution	2592 x 1944	60
LI Native	5 MP LI-HDR Mode	2592 x 1944	30
Crop	1080P Linear	1920 x 1080	110
SLP Native	5M Linear Mode Full Resolution, Lowest Power	2592 x 1944	1
Bin4	0.3 MP Linear, Lowest Power	648 x 486	1
WoM Bin4	Wake On Motion w/ Streaming	648 x 486	1
WoM Bin4Skip2 (Note 2)	Wake On Motion without Streaming	324 x 243	1

2. Sensor resolution is actually 648 x 486. GB columns are skipped which helps reduce power consumption. The stream output of the sensor cannot be used in this mode.

Table 3. 12-bit MODES OF OPERATION

Mode Name	Mode Description	Resolution	Frame Rate
eDR Native	5M eDR Mode	2592 x 1944	30

Table 4. ORDERING INFORMATION

Part Number	Product Description	Orderable Product Attribute Description
AR0544CSSC11SMKA1-CP	5 MP 1/4.2” CMOS Image sensor RGB 11° CRA	CSP with Protective Film
AR0544CSSC11SMKA1-CP2	5 MP 1/4.2” CMOS Image sensor RGB 11° CRA	CSP with Protective Film Low MOQ
AR0544CSSC11SMKA1-CR	5 MP 1/4.2” CMOS Image sensor RGB 11° CRA	CSP without Protective Film
AR0544CSSC11SMKAH3-GEVB	5 MP 1/4.2” CMOS Image sensor RGB 11° CRA	Demo3 Headboard
AR0544CSSM11SMKA1-CP	5 MP 1/4.2” CMOS Image sensor Mono 11° CRA	CSP with Protective Film
AR0544CSSM11SMKA1-CP2	5 MP 1/4.2” CMOS Image sensor Mono 11° CRA	CSP with Protective Film Low MOQ
AR0544CSSM11SMKA1-CR	5 MP 1/4.2” CMOS Image sensor Mono 11° CRA	CSP without Protective Film
AR0544CSSM11SMKAH3-GEVB	5 MP 1/4.2” CMOS Image sensor Mono 11° CRA	Demo3 Headboard
AR0544CSSH11SMKA1-CP	5 MP 1/4.2” CMOS Image sensor RGBIR 11° CRA	CSP with Protective Film
AR0544CSSH11SMKA1-CP2	5 MP 1/4.2” CMOS Image sensor RGBIR 11° CRA	CSP with Protective Film Low MOQ
AR0544CSSH11SMKA1-CR	5 MP 1/4.2” CMOS Image sensor RGBIR 11° CRA	CSP without Protective Film
AR0544CSSH11SMKAH3-GEVB	5 MP 1/4.2” CMOS Image sensor RGBIR 11° CRA	Demo Headboard
AR0544CSSC33SMKA1-CP	5 MP 1/4.2” CMOS Image sensor RGB 33° CRA	CSP with Protective Film
AR0544CSSC33SMKA1-CP2	5 MP 1/4.2” CMOS Image sensor RGB 33° CRA	CSP with Protective Film Low MOQ
AR0544CSSC33SMKA1-CR	5 MP 1/4.2” CMOS Image sensor RGB 33° CRA	CSP without Protective Film
AR0544CSSC33SMKAH3-GEVB	5 MP 1/4.2” CMOS Image sensor RGB 33° CRA	Demo3 Headboard
AR0544CSSH33SMKA1-CP	5 MP 1/4.2” CMOS Image sensor RGBIR 33° CRA	CSP with Protective Film
AR0544CSSH33SMKA1-CP2	5 MP 1/4.2” CMOS Image sensor RGBIR 33° CRA	CSP with Protective Film Low MOQ
AR0544CSSH33SMKA1-CR	5 MP 1/4.2” CMOS Image sensor RGBIR 33° CRA	CSP without Protective Film
AR0544CSSH33SMKAH3-GEVB	5 MP 1/4.2” CMOS Image sensor RGBIR 33° CRA	Demo Headboard

3. Refer to AR0544 Die Data Sheet for Die Part Numbers & Ordering Information.

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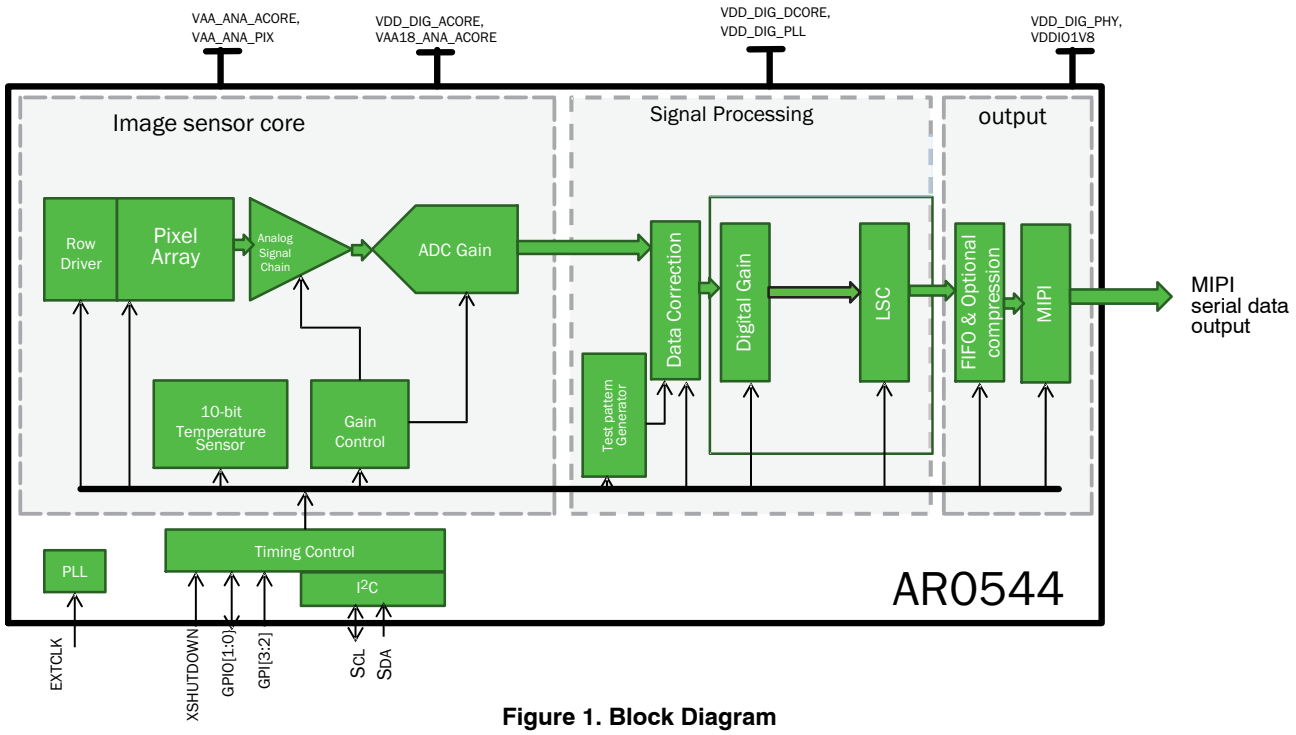
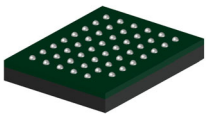


Figure 1. Block Diagram

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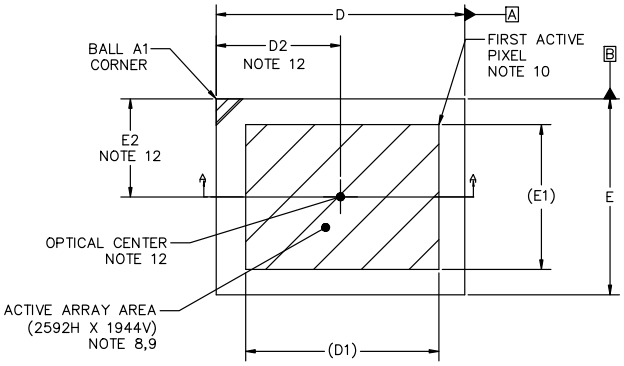


ODCSP47 4.67x3.68x0.63, 0.50P
CASE 570DD
ISSUE A

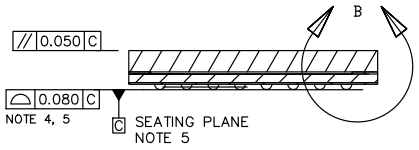
DATE 05 JUN 2025

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS [mm].
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) = (0.034, −0.005).
13. PLAIN COVER GLASS WITHOUT AR COATING.

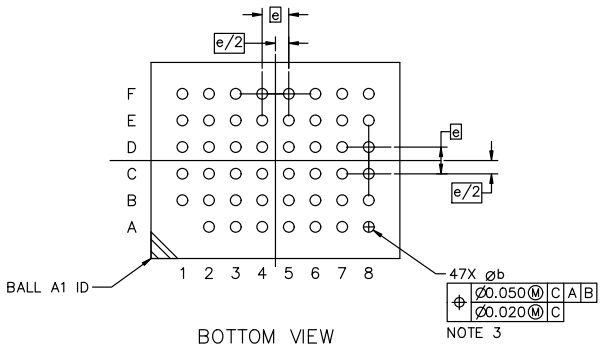
MILLIMETERS			
DIM	MIN	NOM	MAX
A	---	---	0.762
A1	0.081	0.101	0.121
A2		0.631 REF	
A3	0.426	0.440	0.454
A4	0.180	0.191	0.202
b	0.184	0.204	0.224
D	4.645	4.670	4.695
D1		3.629 REF	
D2	2.344	2.369	2.394
E	3.657	3.682	3.707
E1		2.722 REF	
E2	1.821	1.846	1.871
e		0.500 BSC	



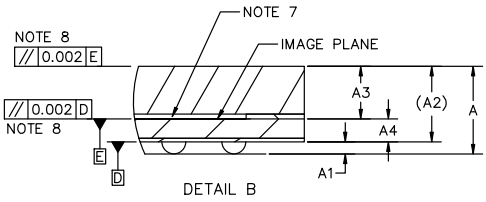
TOP VIEW



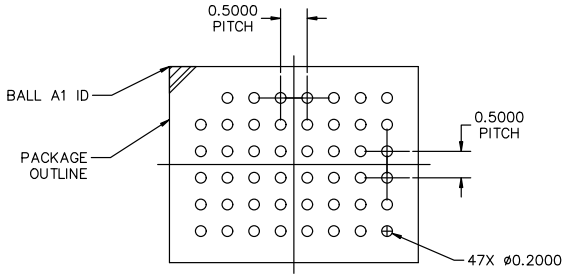
SECTION A–A



BOTTOM VIEW



DETAIL B



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.

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