

1/4.3-inch 1 MP CMOS Digital Image Sensor with Global Shutter AR0145CS

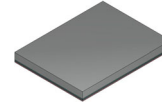
Description

The AR0145CS is a 1/4.3-inch CMOS digital image sensor with an active-pixel array of 1280 (H) x 800 (V). It incorporates a new innovative global shutter pixel design optimized for accurate and fast capture of moving scenes. The sensor produces clear, low noise images in both low-light and bright scenes. It includes sophisticated camera functions such as auto exposure control, windowing, row skip mode, column-skip mode, pixel-binning and both video and single frame modes. It is programmable through a simple two-wire serial interface. The AR0145CS produces extraordinarily clear, sharp digital pictures, and its ability to capture both continuous video and single frames makes it the perfect choice for a wide range of applications, including scanning and industrial inspection.

Table 1. KEY PERFORMANCE PARAMETERS

| Parameter | Typical Value |
|--|--|
| Optical Format | 1/4.3-inch (4.23 mm) |
| Active Pixels | 1280 (H) x 800 (V) not including 8 border pixels on each side |
| Pixel Size | 2.8 μm |
| Color Filter Array | RGB Bayer, Monochrome |
| Chief Ray Angle | 0 or 28° |
| Shutter Type | Global Shutter |
| Input Clock Range | 10–48 MHz |
| Output Interface | 8/10-bit MIPI, 1/2-lane |
| Output Data Rate | Maximum Serial Output Data Rate 800 Mbps/lane |
| Frame Rate Full Resolution | 120 fps (10-bit) |
| Responsivity Monochrome | 41.9 ke-/lux*s |
| SNR _{MAX} | 37 dB |
| Dynamic Range | 65.3 dB |
| Supply Voltage I/O Digital Analog | 1.8 V 1.2 V 2.8 V |
| Power Consumption | 150 mW (Full Resolution, 120 fps) |
| Operating Temperature | (–30°C < T _J < +85 °C) |
| Optimal Performance Temperature Range | (0°C < T _J < +60 °C) |
| Package Options | 5.74 x 4.42 mm 47-ball CSP θ_{JA} : 31.6 °C/W (Note 1) θ_{JB} : 9.5 °C/W Bare Die |

1. θ_{JA} is dependent on the customer module design and should not be used for calculating junction temperature.



ODCSP47
CASE 570CZ

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 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](#)

Features

- Superior Low-light and IR Performance
- 1/2-lane 8/10-bit MIPI
- Automatic Black Level Calibration (ABLC)
- Horizontal and Vertical Mirroring, Windowing and Pixel Binning
- 5 x 5 Statistics Engine for On-chip Auto Exposure Control for Any Programmable Region of Interest (ROI)
- Flexible Control for Row and Column Skip Mode
- On-chip Trigger Mode for Synchronization
- Built in Flash Control
- Two On Chip Phase Lock Loop (PLL)
- Context Switching
- 960 bytes One-time Programmable Memory (OTPM)
- Simple Two-wire Fast-mode + Serial Interface

Applications

- Bar Code Scanner
- Gesture Recognition
- 3D Scanning
- Positional Tracking
- Iris Scanning
- Augmented Reality
- Virtual Reality
- Biometrics
- Machine Vision

AR0145CS

ORDERING INFORMATION

Table 2. AVAILABLE PART NUMBERS

| Part Number | Product Description | Product Attribute Description |
|-------------------------|---------------------|---|
| AR0145CSSM00SMKA0-CP | Mono, 0° CRA | CSP with Protective Film |
| AR0145CSSM00SMKAH3-GEVB | Mono, 0° CRA | Demo Board |
| AR0145CSSM00SMKA0-CP2 | Mono, 0° CRA | CSP with Protective Film, MOQ 50 Pieces |
| AR0145CSSM00SMKA0-CR | Mono, 0° CRA | CSP without Protective Film |

| | | |
|-------------------------------|---------------|---|
| AR0145CSSM28SMKA0-CP | Mono, 28° CRA | CSP with Protective Film |
| AR0145CSSM28SMKA0-CP2 | Mono, 28° CRA | CSP with Protective Film, MOQ 50 Pieces |
| AR0145CSSM28SMKA0-CR | Mono, 28° CRA | CSP without Protective Film |
| AR0145CSSM28SMKAH3-GEVB | Mono, 28° CRA | Demo Board |
| PRISM1M-AR0145CSSM130110-GEVB | Mono, 28° CRA | Premier Reference Image Sensor Module (PRISM) |

| | | |
|-------------------------|-------------|-----------------------------------|
| AR0145CS1C00SMKA0-CP-E | RGB, 0° CRA | CSP, with Protective Film, Sample |
| AR0145CSSC00SMKA0-CP | RGB, 0° CRA | CSP, with Protective Film |
| AR0145CSSC00SMKA0-CP2 | RGB, 0° CRA | CSP, with Protective Film, MOQ 50 |
| AR0145CSSC00SMKA0-CR | RGB, 0° CRA | CSP, without Protective Film |
| AR0145CSSC00SMKAH3-GEVB | RGB, 0° CRA | Demo Board |

| | | |
|-------------------------------|--------------|---|
| AR0145CS1C28SMKA0-CP-E | RGB, 28° CRA | CSP, with Protective Film, Sample |
| AR0145CSSC28SMKA0-CP | RGB, 28° CRA | CSP, with Protective Film |
| AR0145CSSC28SMKA0-CP2 | RGB, 28° CRA | CSP, with Protective Film, MOQ 50 |
| AR0145CSSC28SMKA0-CR | RGB, 28° CRA | CSP, without Protective Film |
| AR0145CSSC28SMKAH3-GEVB | RGB, 28° CRA | Demo Board |
| PRISM1M-AR0145CSSC130110-GEVB | RGB, 28° CRA | Premier Reference Image Sensor Module (PRISM) |

NOTE: Refer to AR0145 Die Data Sheet for Die Part Numbers and Ordering Information.

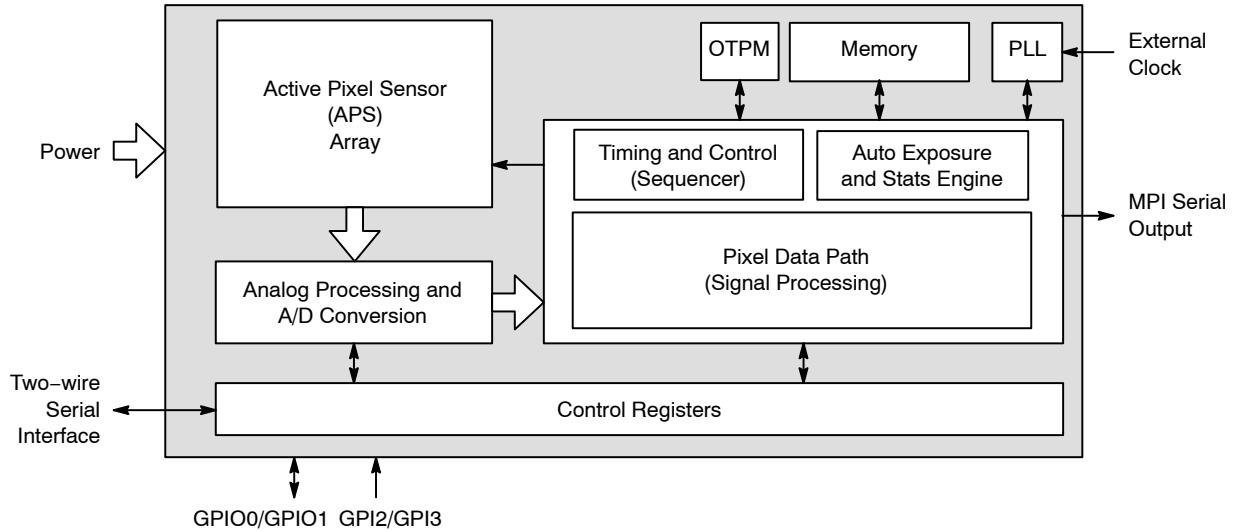
See the **onsemi** Device Nomenclature document ([TND310/D](#)) for a full description of the naming convention used for image sensors. For reference documentation, including information on evaluation kits, please visit our web site at www.onsemi.com.

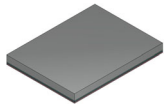
Table 3. FRAME RATE OF DIFFERENT MODES OF OPERATION

| Resolution | Mode | Frame Rate (frames per sec) |
|-------------------------------|---|--|
| Full Resolution 1280 x 800 | Master | 120 |
| | Slave Integration Start | 90 |
| | Slave Integration Time | 90 |
| | Slave Integration Start and Readout Start | 90 |
| | Slave Integration Start and Integration | depends on exp (not constant frame rate) |

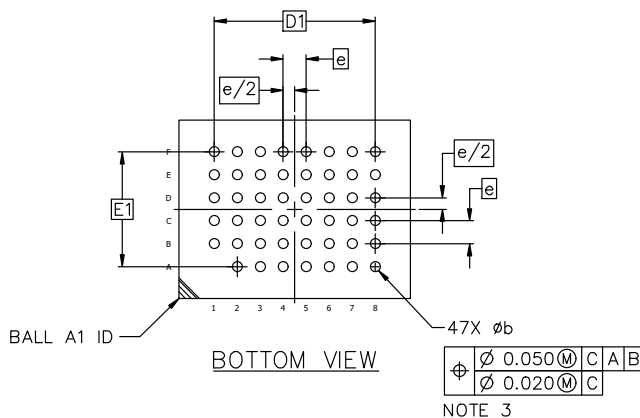
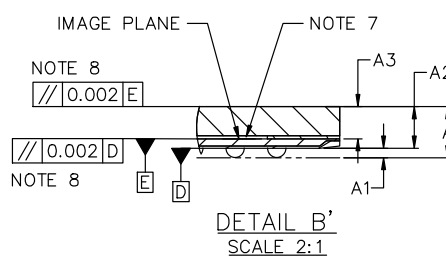
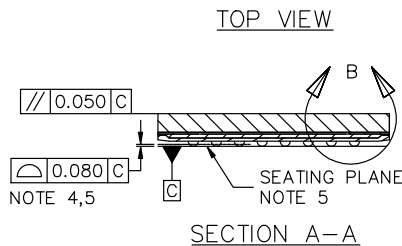
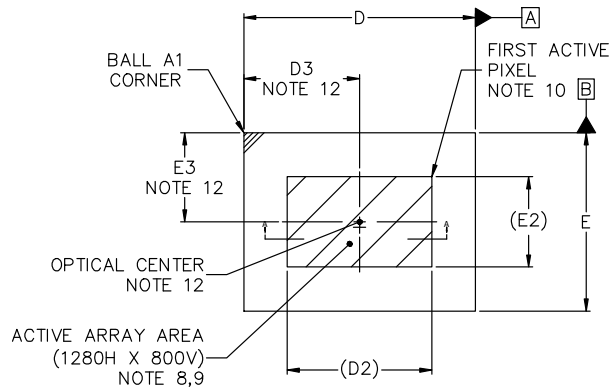
Table 3. FRAME RATE OF DIFFERENT MODES OF OPERATION (continued)

| Resolution | Mode | Frame Rate (frames per sec) |
|------------------------------|---|--|
| 2x2_Subsampling 640 x 400 | Master | 230 |
| | Slave Integration Start | 160 |
| | Slave Integration Time | 160 |
| | Slave Integration Start and Readout Start | 160 |
| | Slave Integration Start and Integration | depends on exp (not constant frame rate) |

**Figure 1. Block Diagram**


ODCSP47 5.74x4.42x0.63, 0.57P
CASE 570CZ
ISSUE B

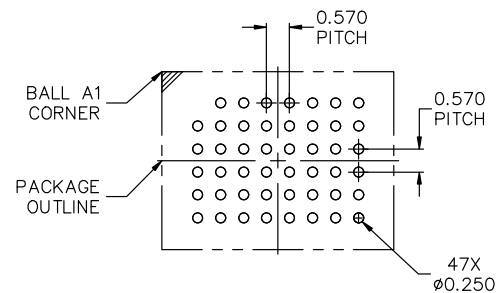
DATE 20 AUG 2024



NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSIONS 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: 0.045 THICKNESS.
8. PARALLELISM APPLIES ONLY TO THE ACTIVE ARRAY.
9. MAXIMUM ROTATION OF ACTIVE ARRAY RELATIVE TO DATUMS A AND B IS $\pm 1^\circ$.
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) = (-0.001, 0.133).

| DIM | MILLIMETERS | | |
|-----|-------------|-------|-------|
| | MIN. | NOM. | MAX. |
| A | ---- | ---- | 0.816 |
| A1 | 0.100 | 0.130 | 0.160 |
| A2 | 0.581 | 0.626 | 0.671 |
| A3 | 0.420 | 0.440 | 0.460 |
| b | 0.220 | 0.250 | 0.280 |
| D | 5.719 | 5.744 | 5.769 |
| D1 | 3.990 BSC | | |
| D2 | 3.584 REF. | | |
| D3 | 2.846 | 2.871 | 2.896 |
| E | 4.391 | 4.416 | 4.441 |
| E1 | 2.850 BSC | | |
| E2 | 2.240 REF. | | |
| E3 | 2.050 | 2.075 | 2.100 |
| e | 0.570 BSC | | |



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

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