

1/1.8-inch 20 MP CMOS Digital Image Sensor

AR2020

General Description

The **onsemi** AR2020 is a stacked 1/1.8 inch back side illuminated (BSI) CMOS active pixel digital image sensor with a pixel array of 5120H x 3840V (5136H x 3856V including border pixels). The AR2020 has enhanced NIR response.

It incorporates sophisticated on chip camera functions such as

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- On chip Temperature Sensor with $\pm 5^{\circ}\text{C}$ accuracy
- On chip Lens Shading Correction for RGB Bayer and Mono

Table 1. KEY PERFORMANCE PARAMETERS

| Parameter | | Value |
|--|------------------------|--|
| Optical format | | 1/1.8-inch 20 MP (4:3) |
| Active pixels | | 5120H x 3840V |
| Color Filter Array | | RGB Bayer, Monochrome |
| Pixel size | | 1.4 μm Back Side Illuminated (BSI) |
| Chief ray angle (CRA) | | 13° |
| Input clock frequency | | 6 – 48 MHz |
| Interface | | 2x4-lane MIPI (1x1, 1x2, 1x4, 2x4-lane supported) using D-PHY; Max data rate: 2 Gbps/lane |
| ADC resolution | | 10-bits, on die |
| Frame Rate | Full Size, Linear Mode | 60 fps (MIPIx2), 30 fps (MIPIx1) |
| Gain Control: Gain Table | | Linear Mode: 0 – 50.62 dB total (Analog 0 – 26.38 dB, Digital 0 – 24.24 dB) |
| Subsampling | | Subsampling: Skipping (RGB, Mono), Binning (RGB), Summing (Mono) |
| Scaler | | Adjustable x- and y-scaling up to 32x, with 0.05% accuracy, for Bayer and Mono variant. |
| SmartROI | | Support SmartROI feature that can send out two ROIs over different MIPI Virtual Channels. |
| Temperature sensor | | 10-bit, controlled by two-wire serial I/F, $\pm 5^{\circ}\text{C}$ accuracy |
| Compression | | DPCM: 10–8 |
| 3D Support | | Frame rate and exposure synchronization |
| Supply voltage | Analog, Pixel | 2.8 V ($2.7 < V_{\text{supply}} < 2.9$ V) |
| | I/O | 1.8 V ($1.7 < V_{\text{supply}} < 1.9$ V) |
| | Digital, PLL, MIPIphy | 1.05 V ($1.0 < V_{\text{supply}} < 1.1$ V) |
| Power consumption | | 430 mW (Typical) at (RGB) 20 MP and 60 fps |
| Responsivity | | 17.3 ke-/lux-sec (Clear in Mono) 8.7 ke-/lux-sec (Green in RGB) |
| SNRMAX | | 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 |
| Performance Specified Temperature Range (at junction) – T _J | | 0°C to +60°C |

Package O2r13::JW3lu4DX2DESUepMaD\$wp061C0 07)1E.

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Table 2. MODES OF OPERATION 10 BIT

| Modes | Sensor Resolution | Mode Name | FPS (2x4 MIPI) | FPS (1x4 MIPI) |
|-----------------|-------------------|-----------|----------------|----------------|
| 20M Linear | 5120x3840 | Native | 60 | 37 |
| 20M LI-HDR | 5120x3840 | Native | 30 | 18 |
| 20M LI-eDR | 5120x3840 | Native | 30 | 15 |
| 5M Linear | 2560x1920 | Bin2 | 120 | 120 |
| 1280x960 Linear | 1280x960 | Bin4 | 240 | 240 |
| 20M SLP Linear | 5120x3840 | Native | | |



XXXX = Specific Device Code
Y = Year
ZZZ = Lot Traceability

*This information is generic. Please refer to

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