OG02B1B 2MP product brief

available in a lead-free package

High-Resolution, Cost-Effective Global Shutter Image Sensors for Machine Vision Applications

OmniVision's OG02B1B (monochrome) and OG02B10 (color) are global shutter image sensors designed to cost-effectively enable a wide range of consumer and industrial machine vision applications such as AR/VR headsets and accessories, industrial automation, robotics, agricultural drones and 3D modeling. These sensors provide designers with best-in-class resolution and the option for full-color imaging, and both have a 15 degree chief ray angle (CRA) to support wide field-of-view lens designs. This combination of color imaging and CRA is excellent for applications such as agricultural drones that must capture high-resolution color images for crop and field monitoring.

Available in a 1/2.9 inch optical format, the OG02B1B and OG02B10 capture 2 megapixel or 1600 x 1300 resolution images and video at 60 frames per second (fps) using advanced 3 x 3 micron OmniPixel®3-GS pixel technology. This global shutter technology eliminates motion artifacts and blurring, and dramatically improves low-light sensitivity. Additionally, both sensors' excellent near infrared (NIR) sensitivity at 850 nm and 940 nm helps reduce device power consumption to extend battery life.

Find out more at www.ovt.com.

OmniVision

OG02B1B

Applications

- Augmented and Virtual Reality
- Drones
- 3D Imaging
- Machine Vision
- Industrial Bar Code Scanning
- Industrial Automation

Ordering Information

- **OG02B1B-G04A-Z**
  (b&w, chip probing, 200 µm backgrinding, reconstructed wafer with good die)

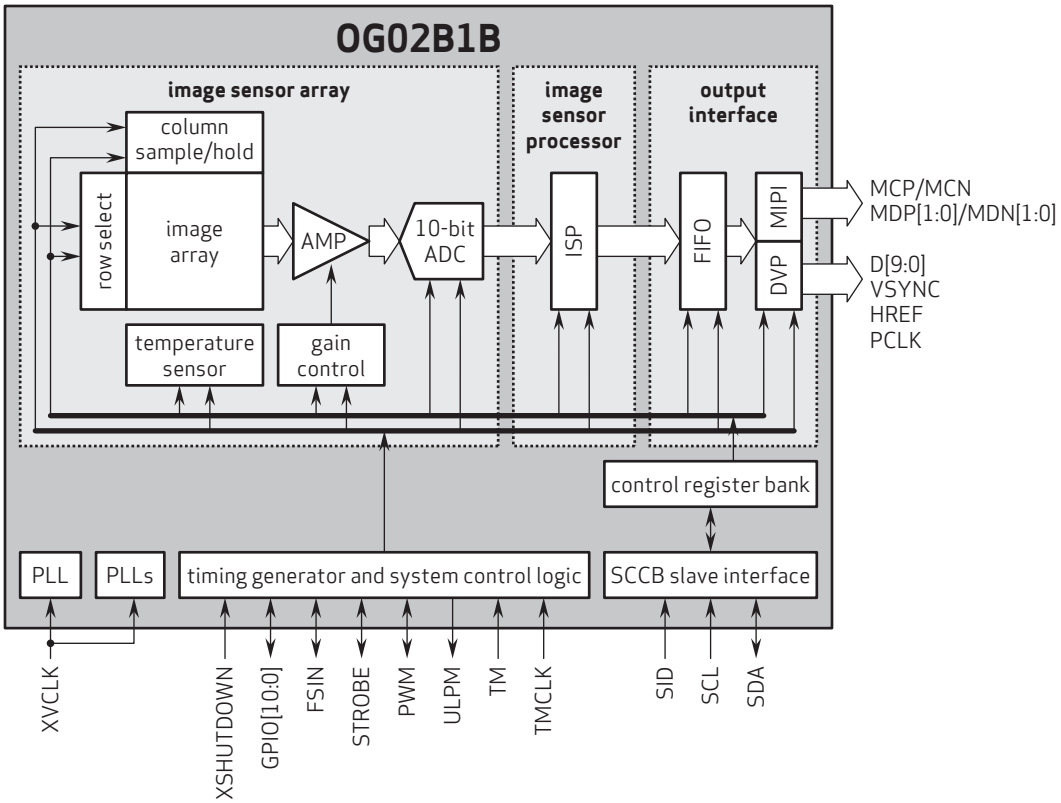
Product Features

- 3 µm x 3 µm pixel with OmniPixel®3-GS technology
- automatic black level calibration (ABLC)
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- support output formats: 8/10-bit RAW
- fast mode switching
- supports 2x2 monochrome binning
- two-lane MIPI serial output interface
- DVP parallel output interface
- supports horizontal and vertical 2:1 monochrome subsampling
- support for image sizes:
  - 1600 x 1300
  - 1280 x 720
  - 640 x 480
- embedded 128 bytes of one-time programmable (OTP) memory
- two on-chip phase lock loops (PLLs)
- LED PWM
- temperature sensor
- built-in strobe control

Product Specifications

- **active array size:** 1600 x 1300
- **power supply:**
  - **analog:** 2.8V (nominal)
  - **core:** 1.2V (nominal)
  - **I/O:** 1.8V (nominal)
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
- **output interface:** 2-lane MIPI serial output and DVP parallel output
- **output formats:** 10-bit RAW
- **lens size:** 1/2.9"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 15° linear
- **maximum image transfer rate:**
  - **1600 x 1300:** 60 fps
- **minimum exposure time:** 1 row period
- **maximum exposure time:** frame length - 12 row periods, where frame length is set by registers {0x380E, 0x380F}
- **pixel size:** 3 µm x 3 µm

Functional Block Diagram



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Version 1.0, September, 2018

OS02A1Q 2-megapixel product brief

available in a lead-free package

Ultra Low-Light Performance for Professional-Grade Security Cameras

OmniVision's high-performance OS02A1Q is a native 16:9 big pixel image sensor for high-end professional security cameras. Utilizing OmniVision's PureCel® technology, the OS02A1Q delivers high-resolution video with optimized low-light performance to enable downstream analytics for facial recognition and a host of advanced features, including night vision.

The OS02A1Q captures 1080p full high definition (FHD) video at up to 60 frames per second (fps) with staggered two-exposure high dynamic range (HDR), which is widely supported by back-end image signal processors (ISPs). The sensor's large 4-micron PureCel pixel and a 1/2-inch optical format ensure high-quality color images and video in both high- and low-light conditions.

The sensor also features a 11-degree chief ray angle (CRA) to accommodate many wide field-of-view and fisheye lenses.

Find out more at www.ovt.com.

OmniVision

OS02A1Q

Applications

- Security Cameras
- Action Cameras
- High Resolution Consumer Cameras
- Digital Video Camcorders (DVC)

Product Features

- 4 µm x 4 µm pixel
- optical size of 1/2"
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports output formats:
  - 12-/10-bit RAW RGB
- standard serial SCCB interface
- 12-bit ADC
- up to 4-lane MIPI/LVDS serial output interface (supports maximum speed up to 1500 Mbps/lane)
- 2-exposure staggered HDR support
- programmable I/O drive capability
- light sensing mode (LSM)
- PLL with SCC support
- support for FSIN

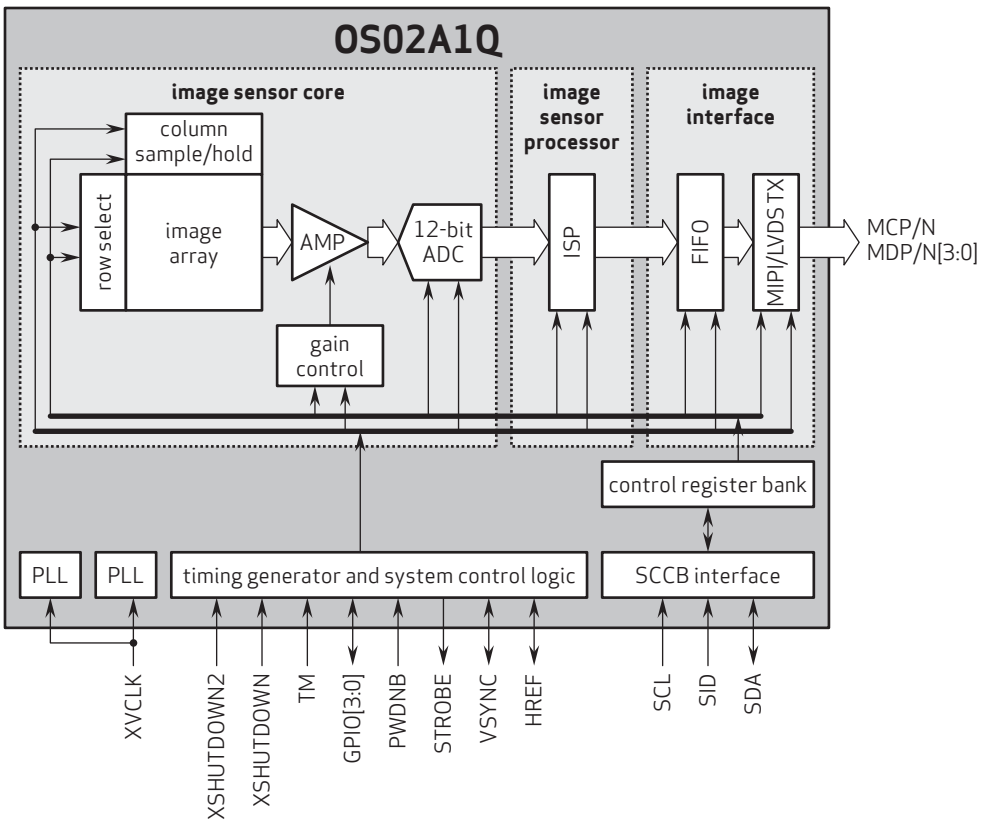
Ordering Information

- **OS02A1Q-H92A-Z**
  (color, lead-free, 92-pin CSP)

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 221 mW
  - **standby:** 210 µA
  - **XSHUTDOWN:** 0.6 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10/12-bit RGB RAW
- **lens size:** 1/2"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 11° linear
- **maximum image transfer rate:**
  - **1080p (with HDR):** 60 fps
  - **1080p (without HDR):** 120 fps
- **sensitivity:** 51884 e-/Lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** 1112 × t_{ROW}
- **pixel size:** 4.0 µm x 4.0 µm
- **image area:** 7736 µm x 4379 µm
- **package dimensions:**
  8939 µm x 6340 µm

Functional Block Diagram



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Version 1.1, September, 2017

OS02C10 2-megapixel product brief

available in a lead-free package

Image Sensor Combines Ultra Low Light and Nyxel™ NIR Technologies for Industry's Best Nighttime Camera Performance

OmniVision's OS02C10 is a 2.9-micron, 2-megapixel image sensor with breakthrough ultra-low-light (ULL) technology. Combining ULL with OmniVision's industry-leading Nyxel™ near-infrared (NIR) technology, the OS02C10 works equally well in all lighting conditions. It can detect incident light in both visible and NIR wavelengths and produce precise color and monochrome images for security applications such as remote surveillance cameras with AI for accurate facial recognition.

Nyxel NIR technology infuses the OS02C10 with exceptional quantum efficiency (QE) of 60% at 850 nm and 40% at 940 nm, which is 2x to 4x better than competing devices. This enables the use of lower-power IR illumination in total darkness, resulting in an estimated 3x reduction in system-level power consumption. Additionally, 940 nm NIR lighting cannot be detected by the human eye in dark indoor settings, while 850 nm light is ideal for outdoor security cameras. The OS02C10's ability to capture crisp, clear images using undetectable 940 nm NIR light means that indoor security cameras will not disturb sleeping occupants, and can be easily concealed from intruders.

The amount of NIR light that a sensor requires to capture high-quality images can be quantified with a new metric called NIR SNR1, which takes into account the QE, pixel size and read noise. The OC02C10 achieves an $SNR1_{850nm}$ of $23nW/cm^2$ and an $SNR1_{940nm}$ of $31nW/cm^2$, which means designers can reduce IR illumination to consume 2x to 4x less power compared to the competitors' sensors, for the same environment and over the same image-detection range.

The OC02C10 has a superior low-noise design, achieving an SNR1 of 0.16 lux while producing high definition 1080p images. OmniVision's proprietary dual-conversion-gain technology allows this sensor to achieve the industry's best ULL performance, while the 3-frame staggered shutter minimizes motion artifacts and enables a high dynamic range (HDR) of 120 dB. Additionally, these technologies are easily upgradable to 2K and 4K resolution as security systems begin their transition to higher-quality displays.

Find out more at www.ovt.com.

OmniVision

OS02C10

Applications

- Security Camera
- Action Camera
- High Resolution Consumer Camera

Product Features

- QE enhancement in NIR range
- support for image size:
  - 1920 x 1080
  - VGA
  - QVGA, and any cropped size
- high dynamic range
- high sensitivity
- programmable conversion gain
- image sensor processor functions:
  - defective pixel cancelation
  - automatic black level correction, etc.
- pixel data: 12b RAW RGB
- SCCB for register programming
- programmable GPIOs
- high speed serial data transfer with MIPI CSI-2 or LVDS
- external frame synchronization capability
- embedded temperature sensor
- one time programmable (OTP) memory

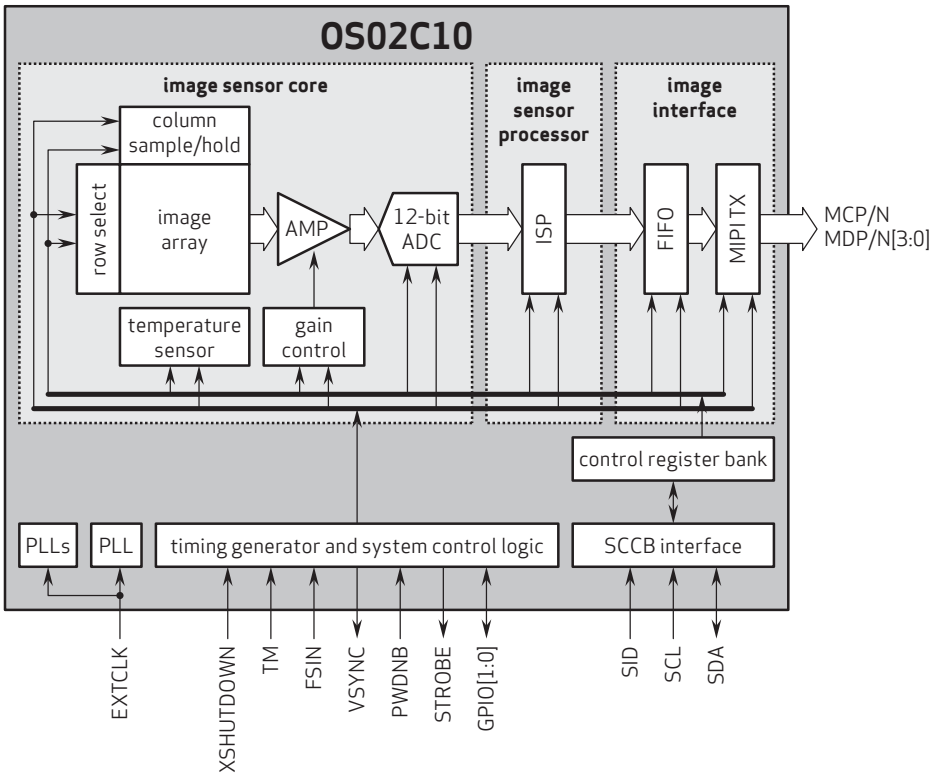
Ordering Information

- **OS02C10-J70A-Z**
  (color, lead-free) 70-pin fan-out package

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **analog:** 2.8V
  - **digital:** 1.1V
  - **I/O pins:** 1.8V
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
- **output interfaces:**
  up to 4-lane MIPI CSI-2 or LVDS
- **input clock frequency:** 6 - 36 MHz
- **lens size:** 1/2.8"
- **lens chief ray angle:** 9° linear
- **SCCB speed:** up to 1 MHz
- **scan mode:** progressive
- **shutter:** rolling shutter
- **output formats:** linear output, dual exposure HDR (long and short), 3-exposure HDR (long, short, and very short), conversion gain programmable in each channel
- **maximum image transfer rate:**
  - 40X3 fps @ 1080p in 10-bit
  - 30X3 fps @ 1080p in 12-bit
- **sensitivity:** 32,000 e⁻/Lux-sec (green pixel response at 530 nm illumination)
- **dynamic range:** >120 dB 3-exposure staggered HDR
- **pixel size:** 2.9 µm x 2.9 µm
- **image area:** 5614.4 µm x 3178.4 µm
- **package dimensions:**
  - **fan-out:** 8903 µm x 7100 µm

Functional Block Diagram



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Version 1.2, October, 2018

OS02F10 2-megapixel product brief

available in a lead-free package

Backside Illumination 2-Megapixel 1080p Image Sensor is Cost-Effective, Ultra Compact, and High-Performance for Industrial and IoT Security Cameras

OmniVision's OS02F10 is a 2-micron image sensor built with OmniBSI™ pixel technology. It provides the industry's most cost-effective backside illumination (BSI) solution and is designed for capturing high definition (HD) images in entry-level IoT, industrial, commercial, and residential security and surveillance cameras. With the OS02F10, even security cameras designed for residential applications will no longer have to sacrifice performance for cost effectiveness. The compact OmniBSI architecture reduces pixel crosstalk, yielding excellent image quality.

The OS02F10, with superior low-light sensitivity, can produce high-quality digital images and HD video, even in poor lighting conditions. This capability is critical for security applications. Its wide chief ray angle (CRA) of 9 degrees enables thinner modules with wide-aperture lenses for accurate, unobtrusive surveillance. It supports 1080p (1920x1080) resolution streaming video at 30 frames per second (fps). This ultra-compact sensor features a 1/4-inch optical format and a 4.9 x 3.0-mm chip scale package (CSP). Its high quantum efficiency (QE) requires less IR illumination, thus enabling low power consumption for excellent camera battery life. The OS02F10 itself consumes less than 120 mW.

Find out more at www.ovt.com.

OmniVision

OS02F10

Applications

- Security Surveillance Systems
- IP Cameras
- HD Analog Cameras

Product Features

- supports 1080p (2-megapixel, 1920 x 1080) resolution
- supports windowing
- supports mirror and flip function
- supports auto black level calibration
- supports defective pixel correction
- supports black sun cancellation
- SCCB control interface for register programming
- supports 1k-bit OTP memory, 9 bytes for customer
- supports 2x2 binning function
- supports 10-bit / 8-bit RAW image data output
- supports MIPI 1-lane serial output interface
- supports DVP 10-bit / 8-bit output interface
- low power mode
- supports multi-camera synchronous function

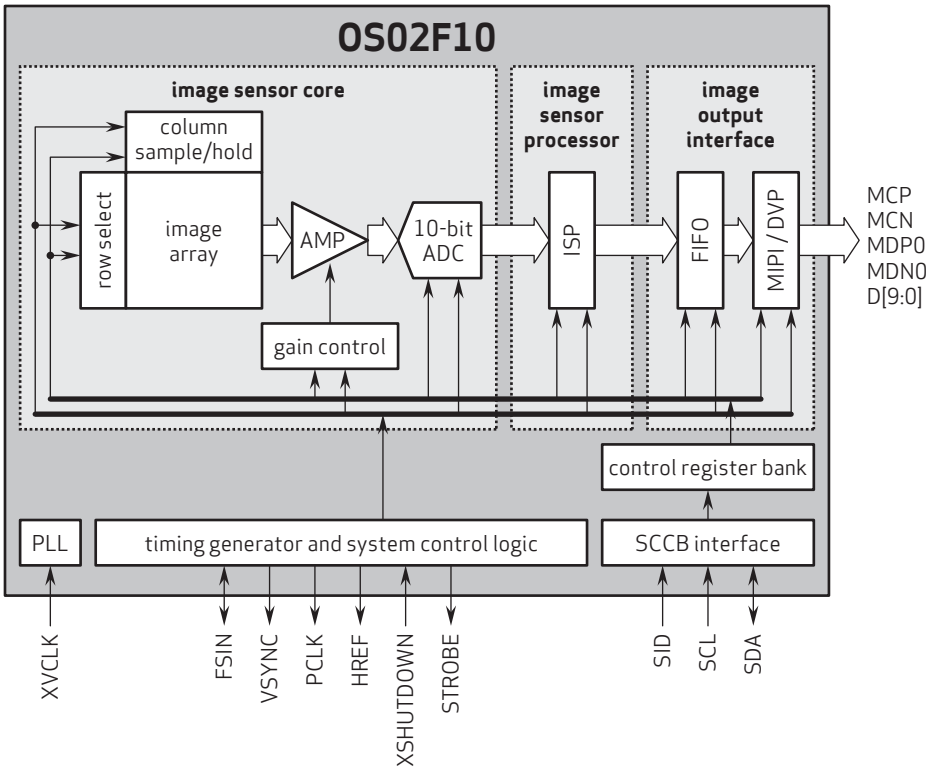
Ordering Information

- **OS02F10-A34A**
  (color, lead-free) 34-pin CSP

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.15V - 1.3V (1.2V nominal)
  - **analog:** 2.7V - 3.0V (2.8V nominal)
  - **I/O:** 1.7V - 1.9V
- **power requirements:**
  - **active:** <120 mW
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** -10°C to +60°C junction temperature
- **output interfaces:** one-lane MIPI / DVP 10-bit/8-bit
- **output formats:** RAW10/RAW8
- **lens size:** 1/4"
- **lens chief ray angle:** 9° linear
- **input clock frequency:** 6 - 27 MHz
- **maximum image transfer rate:**
  - **1080p:** 30 fps
  - **720p:** 45 fps
  - **VGA:** 60 fps
- **shutter:** rolling
- **pixel size:** 2 µm x 2 µm
- **image area:** 3868.128 µm x 2198.808 µm
- **package dimensions:**
  - **CSP:** 4920.6 µm x 2964 µm

Functional Block Diagram



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Version 1.0, October, 2018

OS04B10 3.6-megapixel product brief

available in a lead-free package

Backside Illumination 3.6-Megapixel 2K Image Sensor is Cost-Effective, Space Saving, and High-Performance for Industrial and IoT Security Cameras

OmniVision's OS04B10 is a 2-micron image sensor built with OmniBSI™ pixel technology, which reduces pixel crosstalk, yielding excellent image quality. This sensor provides the industry's most cost-effective backside illumination (BSI) solution and is designed for capturing high definition (HD) images in entry-level IoT, industrial, commercial, and residential security and surveillance cameras. With its superior low-light sensitivity, the OS04B10 can produce high-quality digital images and HD video, even in poor lighting conditions. This capability is critical for security applications.

The OS04B10 is designed for applications covering larger surveillance areas, with 3.6MP resolution that supports 2K (2560x1440) resolution streaming video at 30 frames per second (fps). It features a 1/3-inch optical format and a 6.3 x 3.7 mm chip scale package (CSP). The OS04B10's power consumption is less than 140 mW, and it has high QE for low system power. Its wide chief ray angle (CRA) of 9 degrees enables thinner modules with wide-aperture lenses for accurate, unobtrusive surveillance.

Find out more at www.ovt.com.

OmniVision

OS04B10

Applications

- Security Surveillance Systems
- IP Cameras
- HD Analog Cameras

Product Features

- supports 2K (3.6-megapixel, 2560 x 1440) resolution
- supports windowing
- supports mirror and flip function
- supports auto black level calibration
- supports defective pixel correction
- supports black sun cancellation
- SCCB control interface for register programming
- supports 2k-bit OTP memory, 9 bytes for customer
- supports 2x2 binning function
- supports 10-bit / 8-bit RAW image data output
- supports MIPI 1-lane or 2-lane serial output interface
- low power mode
- supports multi-camera synchronous function

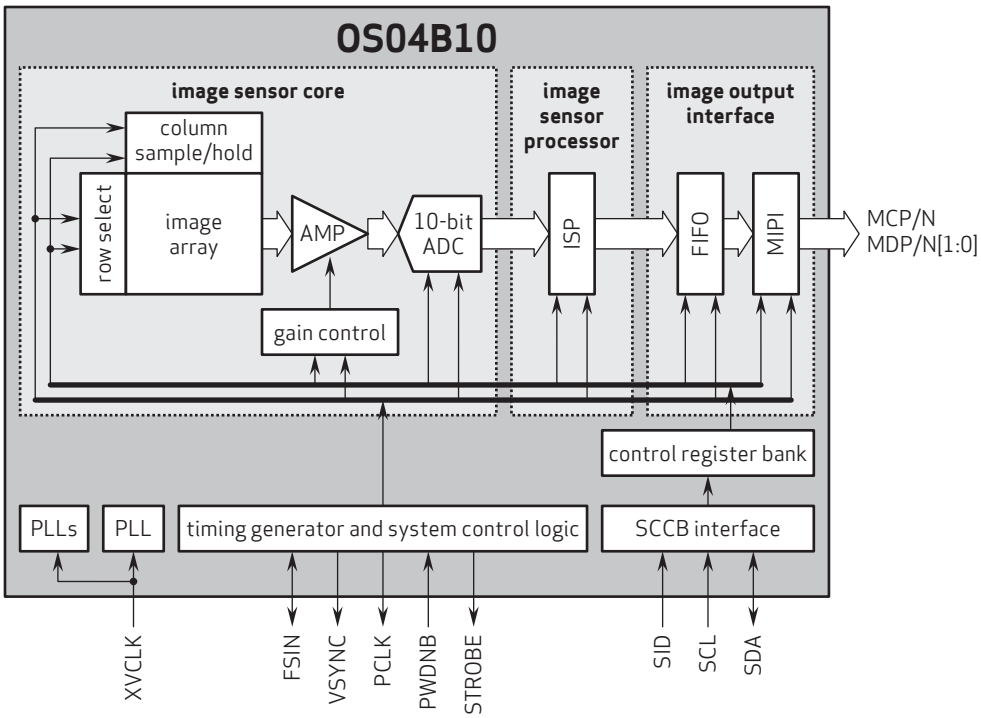
Ordering Information

- **OS04B10-A51A**
  (color, lead-free) 51-pin CSP

Product Specifications

- **active array size:** 2560 x 1440
- **power supply:**
  - **core:** 1.15 - 1.3V (1.2V nominal)
  - **analog:** 2.7 - 3.0V (2.8V nominal)
  - **I/O:** 1.7 - 1.9V (1.8V nominal)
- **power requirements:**
  - **active:** <140 mW
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** -10°C to +60°C junction temperature
- **output interfaces:** MIPI 2-lane
- **output formats:** RAW10/RAW8
- **lens size:** 1/3"
- **lens chief ray angle:** 9° linear
- **input clock frequency:** 6 - 27 MHz
- **max S/N ratio:** 39 dB
- **dynamic range:** 74 dB @ 16x gain
- **maximum image transfer rate:**
  - **2K:** 30 fps
  - **720p:** 60 fps
- **sensitivity:** 13,000 e⁻/Lux-sec
- **shutter:** rolling
- **SNR1(Lux):** 0.62
- **dynamic range:** 74 dB
- **pixel size:** 2 µm x 2 µm
- **image area:** 5146.848 µm x 2909.088 µm
- **package dimensions:**
  - **CSP:** 6330 µm x 3739.8 µm

Functional Block Diagram



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Version 1.0, October, 2018

OS05A10 5-megapixel product brief

available in a lead-free package

Versatile 5-Megapixel PureCel® Sensor with High Dynamic Range for a Wide Range of Commercial Security and Consumer Applications

OmniVision's low-power OS05A10 is a 5-megapixel image sensor that brings crisp 1080p high definition, 2K, and 5-megapixel video to a wide range of commercial security and consumer applications, including 360-degree full-view cameras. Built on OmniVision's advanced PureCel® pixel architecture, the OS05A10 utilizes backside illumination (BSI) technology to deliver enhanced low-light sensitivity and wide field of view (FOV).

Available in the popular 1/2.7-inch optical format, the OS05A10 enables video applications in widely used 4:3 and 16:9 aspect ratios. The sensor can capture 1080p full high definition slow-motion video at 120 frames per second (fps) and 2688 x 1944 resolution at 60 fps.

Additionally, the OS05A10 features a 11-degree chief ray angle (CRA) and a dual-exposure staggered high dynamic range (HDR) mode to enable excellent scene reproduction in difficult high-contrast lighting conditions.

The OS05A10 is compatible with MIPI and LVDS interfaces and comes in a chip scale package (CSP) of 6.6 mm x 5.9 mm.

Find out more at www.ovt.com.

OmniVision

OS05A10

Applications

- Security Cameras
- Action Cameras
- High Resolution Consumer Cameras

Product Features

- 2 µm x 2 µm pixel
- optical size of 1/2.7"
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports output formats:
  - 12-/10-bit RAW RGB
- supports image sizes:
  - 5MP (2688x1944)
  - 1080p (1920x1080)
  - 720p (1280x720)
- supports 2x2 binning
- standard serial SCCB interface
- 12/10-bit ADC
- up to 4-lane MIPI/LVDS serial output interface (supports maximum speed up to 1500 Mbps/lane)
- 2-exposure staggered HDR support
- programmable I/O drive capability
- light sensing mode (LSM)
- PLL with SCC support
- support for frame sync

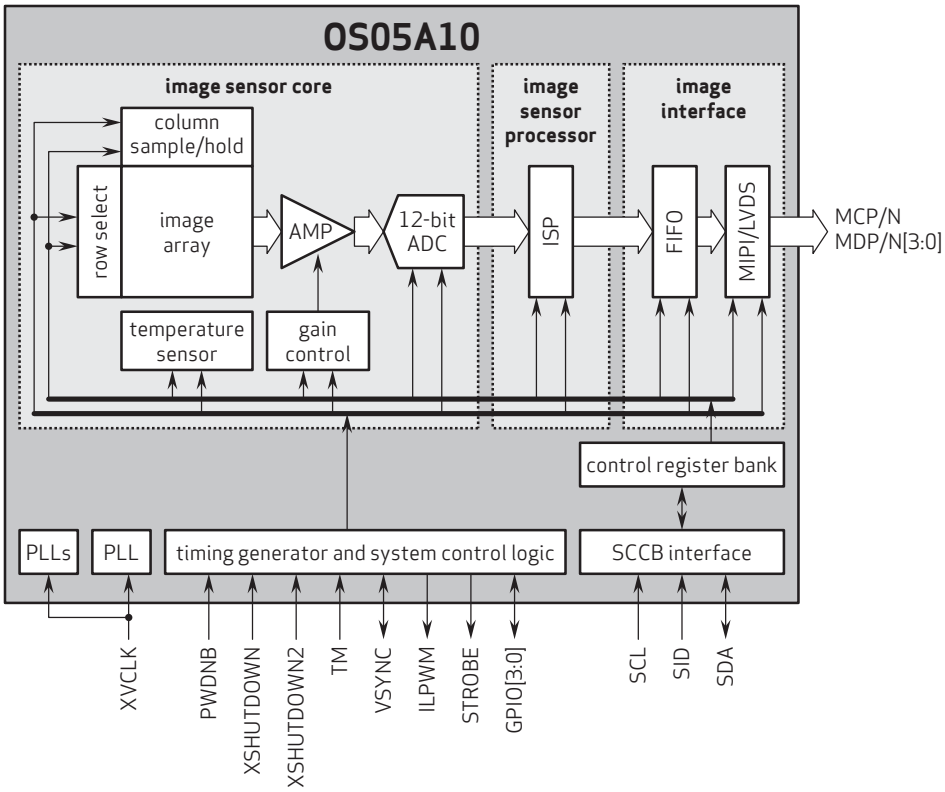
Ordering Information

- **OS05A10-H73A-1B**
  (color, lead-free) 73-pin CSP

Product Specifications

- **active array size:** 2688 x 1944
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 210 mW
  - **standby:** 2 mA
  - **XSHUTDOWN:** 2 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10/12-bit RGB RAW
- **lens size:** 1/2.7"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 11° linear
- **max S/N ratio:** 39 dB
- **dynamic range:** 74 dB @ 16x gain
- **maximum image transfer rate:**
  - **2688x1944:** 60 fps
  - **2688x1520:** 60 fps
- **sensitivity:** 13,000 e⁻/Lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** VTS - 8
- **minimum exposure interval:** 4 t_{ROW}
- **pixel size:** 2.0 µm x 2.0 µm
- **image area:** 5434.56 µm x 3948.05 µm
- **package dimensions:**
  - **CSP:** 6628 µm x 5925 µm

Functional Block Diagram



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Version 1.2, October, 2018

OS05A20 5-megapixel product brief

available in a lead-free package

New OS05A20 Uses Nyxel™ Technology to Bring Superior Image Quality to Video Surveillance Cameras Day or Night

The 5-megapixel OS05A20 is the world's first image sensor to implement Nyxel™ technology, OmniVision's breakthrough near-infrared (NIR) technology that allows image sensors to see better and farther under low- and no-light conditions. By using Nyxel technology and a 2 x 2 micron pixel, the OS05A20 PureCel® image sensor has the unique ability to capture high-quality, high-resolution day or night, making it ideally suited for professional surveillance systems.

Nyxel technology combines thick-silicon pixel architectures with extended deep trench isolation (DTI) to improve quantum efficiency (QE) up to 3x for 850 nm sensitivity and up to 5x for 940 nm sensitivity, while maintaining all other image-quality metrics. These improvements deliver unrivaled image quality, extended image-detection range and a reduced light-source requirement, leading to lower power consumption.

Available in a 1/2.7-inch optical format, the OS05A20 is capable of capturing full-resolution 2688 x 1944 video at 60 frames per second (fps), 1080p full high definition (HD) video at 120 fps, and 720p HD video at 180 fps. The sensor comes in a 6.6 x 5.9 mm chip scale package (CSP).

Find out more at www.ovt.com.

OmniVision

OS05A20

Applications

- Security Cameras
- Action Cameras
- High Resolution Consumer Cameras

Product Features

- 2 µm x 2 µm pixel
- optical size of 1/2.7"
- QE enhancement in 850 nm and 940 nm
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports output formats:
  - 12-/10-bit RAW RGB
- supports images sizes:
  - 2688 x 1944
  - 1080p (1920x1080)
  - 720p (1280x720)
- supports 2x2 binning
- standard serial SCCB interface
- 12/10-bit ADC
- up to 4-lane MIPI/LVDS serial output interface (supports maximum speed up to 1500 Mbps/lane)
- 2-exposure staggered HDR support
- programmable I/O drive capability
- light sensing mode (LSM)
- PLL with SCC support
- support for frame sync

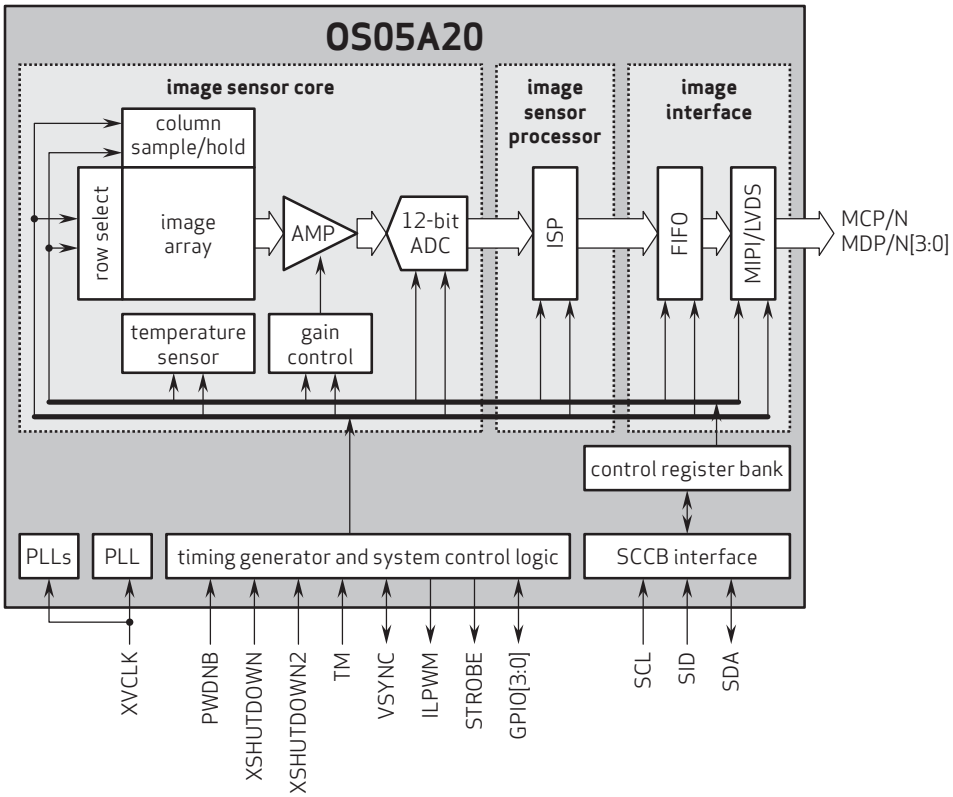
Ordering Information

- **OS05A20-H73A-1B**
  (color, lead-free) 73-pin CSP

Product Specifications

- **active array size:** 2688 x 1944
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 210 mW
  - **standby:** 2 mA
  - **XSHUTDOWN:** 2 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10/12-bit RGB RAW
- **lens size:** 1/2.7"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 11° linear
- **max S/N ratio:** 39 dB
- **dynamic range:** 74 dB @ 16x gain
- **maximum image transfer rate:**
  - **2688 x 1944:** 60 fps
  - **2688 x 1520:** 60 fps
- **sensitivity:** 14,000 e⁻/Lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** VTS - 8
- **minimum exposure interval:** 4 t_{ROW}
- **pixel size:** 2.0 µm x 2.0 µm
- **image area:** 5434.56 µm x 3948.05 µm
- **package dimensions:**
  - **CSP:** 6628 µm x 5925 µm

Functional Block Diagram



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Version 1.2, October, 2018

OV2281 1080p product brief

available in a lead-free package

Biometric Security for Next-Generation Smartphones, Tablets, and Notebooks

OmniVision's OV2281 is a PureCel® sensor that brings enhanced biometric security functionality to mobile devices. The low-power, ultra-compact OV2281 leverages a 1.12-micron pixel with PureCel technology to enable accurate, reliable iris recognition for smartphones, tablets, and notebooks.

The 1/7.5-inch OV2281 PureCel sensor can record 1080p high-definition (HD) video at 60 frames per second (fps) in both landscape and portrait modes to support apps with horizontal or vertical orientation.

When recording full-resolution 1944 x 1944 video at 30 fps, the sensor requires just 126 mW, and supports ultra-low power mode to reduce power consumption to approximately 25 mW. Additionally, the OV2281 features optimized IR sensitivity to produce a clear, fully stable image in difficult, low-light conditions.

The OV2281 sensor fits into a 5.5 x 5.5 mm module with a z-height of less than 4.5 mm.

Find out more at www.ovt.com.

OmniVision

OV2281

Applications

- Smartphones and Feature Phones
- Tablets
- PC Multimedia
- Wearables

Product Features

- 1.12 µm x 1.12 µm pixel
- 1920x1080 at 60 fps, 1080x1920 at 30 fps
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports images sizes:
  - 1944x1944
  - 1080p (1920x1080)
  - 1080x1920, and more
- 260 bytes of embedded one-time programmable (OTP) memory for customer use
- ultra low power mode (ULPM)
- support for output formats: 10-bit B&W RAW
- interleave row HDR output
- two-wire serial bus control (SCCB)
- MIPI serial output interface (1- or 2-lane)
- 2x binning support
- image quality control:
  - defect pixel correction
  - automatic black level calibration

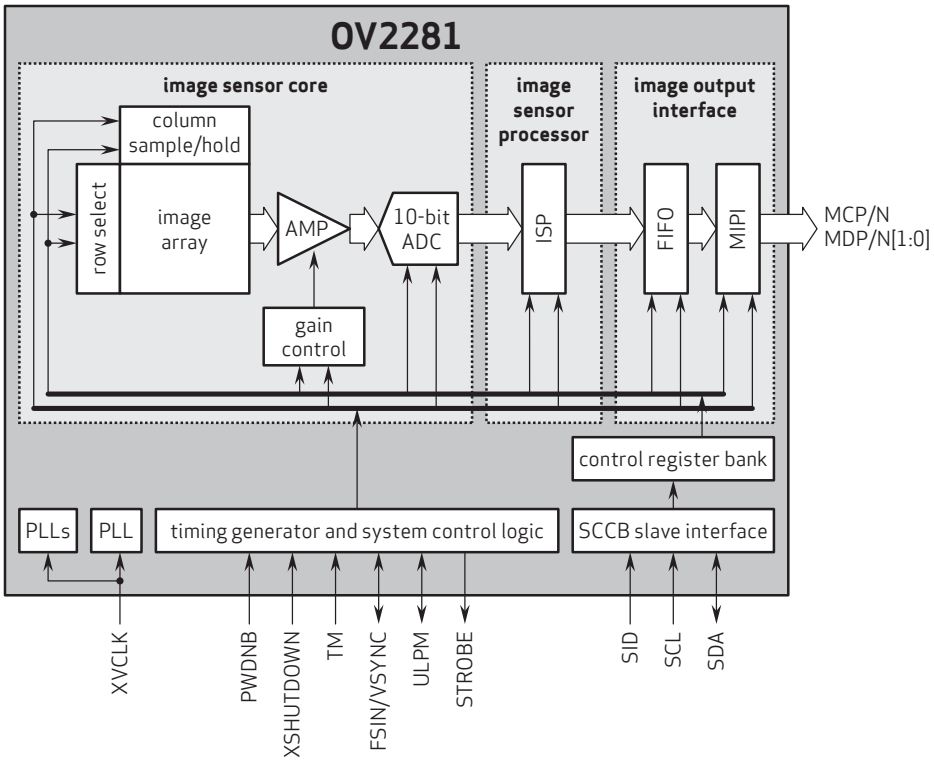
Ordering Information

- **OV02281-GA4A**
  (B&W, chip probing, 200 µm backgrinding, reconstructed wafer)

Product Specifications

- **active array size:** 1944 x 1944
- **power supply:**
  - **core:** 1.14 to 1.26V (1.2V nominal)
  - **analog:** 2.6 to 3.0V (2.8V nominal)
  - **I/O:** 1.7 to 1.9V (1.8V nominal)
- **power requirements:**
  - **active:** 126 mW
  - **standby:** 166 µW
  - **XSHUTDOWN:** 1 µW
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** -20°C to +60°C junction temperature
- **output interface:** 2-lane MIPI serial output
- **output formats:** 10-bit B&W RAW
- **lens size:** 1/7.5"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 30.9° non-linear
- **maximum image transfer rate:**
  - **1944x1944:** 30 fps
  - **1080p (1920x1080):** 60 fps
  - **1080x1920:** 30 fps
- **sensitivity:** 555 mV/lux-sec
- **max S/N ratio:** 35.6 dB
- **dynamic range:** 68.4 dB @ 16x gain
- **pixel size:** 1.12 µm x 1.12 µm
- **dark current:** 14 e-/sec @ 60°C junction temperature
- **image area:** 2214 µm x 2214 µm
- **die dimensions:**
  - **COB:** 4050 µm x 3400.2 µm
  - **RW:** 4100 µm x 3450.2 µm

Functional Block Diagram



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Version 1.2, September, 2017

OV2311 2-megapixel product brief

available in a lead-free package

Compact, Cost-Effective 2-Megapixel Global Shutter Sensor for Driver Monitoring Systems

OmniVision's OV2311 is the automotive industry's first 2-megapixel, 3-micron global shutter image sensor designed for driver monitoring applications. Leveraging proven OmniPixel®3-GS global shutter technology and near-infrared imaging capabilities, the OV2311 offers semi-autonomous vehicle manufacturers a high-performance, cost-effective, ASIL-B qualified imaging solution for driver monitoring systems.

The sensor captures high-quality video up to 60 frames per second (fps) in a 1600 x 1300 resolution format, which is designed to fit the driver's head box to ensure reliable monitoring regardless of driver height, seat position, or vehicle cockpit design. Due to the sensor's high resolution, the OV2311 offers exceptionally accurate gaze- and eye-tracking capabilities. The OV2311 achieves high near-infrared quantum efficiency to minimize active illumination power and reduce the system power requirements.

The OV2311 comes in an ultra-compact 7.2 x 6.2 mm automotive chip-scale package (a-CSP™), which allows it to be discreetly designed into the cockpit of the vehicle. The sensor supports a 4-lane MIPI and 12-bit double-data-rate digital video port (DVP) interface.

Find out more at www.ovt.com.

OmniVision

OV2311

Applications

- Driver Monitoring Systems
- Industrial Bar Code Scanning

Product Features

- 3 µm x 3 µm pixel with OmniPixel®3-GS technology
- automatic black level calibration (ABLC)
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- support output formats: 8/10-bit RAW
- fast mode switching
- supports 2x2 monochrome binning
- two-lane MIPI serial output interface
- DVP parallel output interface
- built-in strobe control
- supports horizontal and vertical 2:1 monochrome subsampling
- support for image sizes:
  - 1600 x 1300
  - 1280 x 720
  - 640 x 480
- embedded 128 bytes of one-time programmable (OTP) memory
- two on-chip phase lock loops (PLLs)
- temperature sensor
- LED PWM
- low power modes
- frame sync mode

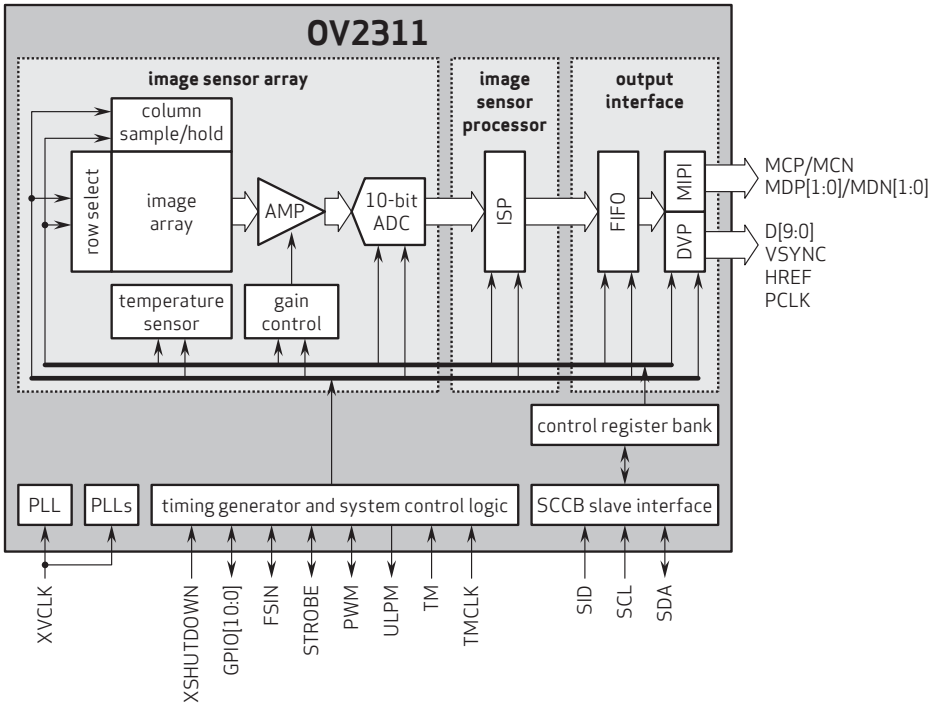
Ordering Information

- **OV02311-E74Y-1C-Z** (b&w, lead-free) 75-pin a-CSP™ with DAR, packed in tray without protective film
- **OV02311-E74Y-QC-Z** (b&w, lead-free) 75-pin a-CSP™ with DAR, packed in tray with protective film (tab at bottom left)
- **OV02311-E74Y-SC-Z** (b&w, lead-free) 75-pin a-CSP™ with DAR, packed in tape & reel with protective film (tab at bottom left)

Product Specifications

- **active array size:** 1600 x 1300
- **power supply:**
  - **analog:** 2.8V (nominal)
  - **core:** 1.2V (nominal)
  - **I/O:** 1.8V (nominal)
- **power requirements:**
  - **active:** 190 mW
  - **standby:** 130 µW
  - **XSHUTDOWN:** <10 µW
- **temperature range:**
  - **operating:** -40°C to +105°C sensor ambient temperature and -40°C to +125°C junction temperature
- **output interface:** 2-lane MIPI serial output and DVP parallel output
- **output formats:** 10-bit RAW
- **lens size:** 1/2.9"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 15° linear
- **maximum image transfer rate:**
  - **1600 x 1300:** 60 fps
- **maximum exposure interval:** 1 row period
- **maximum exposure time:** frame length - 12 row periods, where frame length is set by registers {0x380E, 0x380F}
- **pixel size:** 3 µm x 3 µm
- **image area:** 4857.7 µm x 3955.9 µm
- **package dimensions:**
  - **a-CSP™:** 7219 µm x 6157 µm

Functional Block Diagram



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Version 1.6, October, 2018

OV2680/OV2685 2MP product brief

available in a lead-free package

Cost-Effective, Low-Power 2-Megapixel Sensors for Feature Phones, Smartphones and Tablets

The OV2680 (RAW) and OV2685 (SoC) are cost-effective, low-power 2-megapixel CameraChip™ sensors for feature phones and front-facing camera applications in smartphones and tablets. The 1/5-inch sensors leverage a 1.75-micron OmniPixel3-HS™ pixel to deliver high quality 2-megapixel images and video at 30 frames per second (fps). The sensors' high sensitivity and low dark current deliver exceptional image and video quality, even in low-light conditions.

The OV2680 and OV2685 are cost-effective upgrade solutions to the OV2659 & OV2675 CameraChip sensors with a smaller footprint and smaller die size.

Compared to previous generations, the OV2680 and OV2685 offer improved image quality with the latest OmniPixel3-HS pixel architecture. Using OmniVision's proprietary sensor technology, both sensors reduce or eliminate common lighting and electrical sources of image contamination, such as fixed pattern noise, smearing, etc., to produce a clean, stable, color image.

The OV2680 and OV2685 both feature a single-lane MIPI interface, which allows for a simple design with modern basebands.

Find out more at www.ovt.com.

OmniVision

OV2680/OV2685

Applications

- Ultrabooks
- PC Multimedia
- Games
- Home Entertainment
- Cellular and Picture Phones
- Tablets
- Toys

Ordering Information

- **OV02680-H47A**
  (color, lead-free, 47-pin CSP5)
- **OV02685-H53A**
  (color, lead-free, 53-pin CSP5)

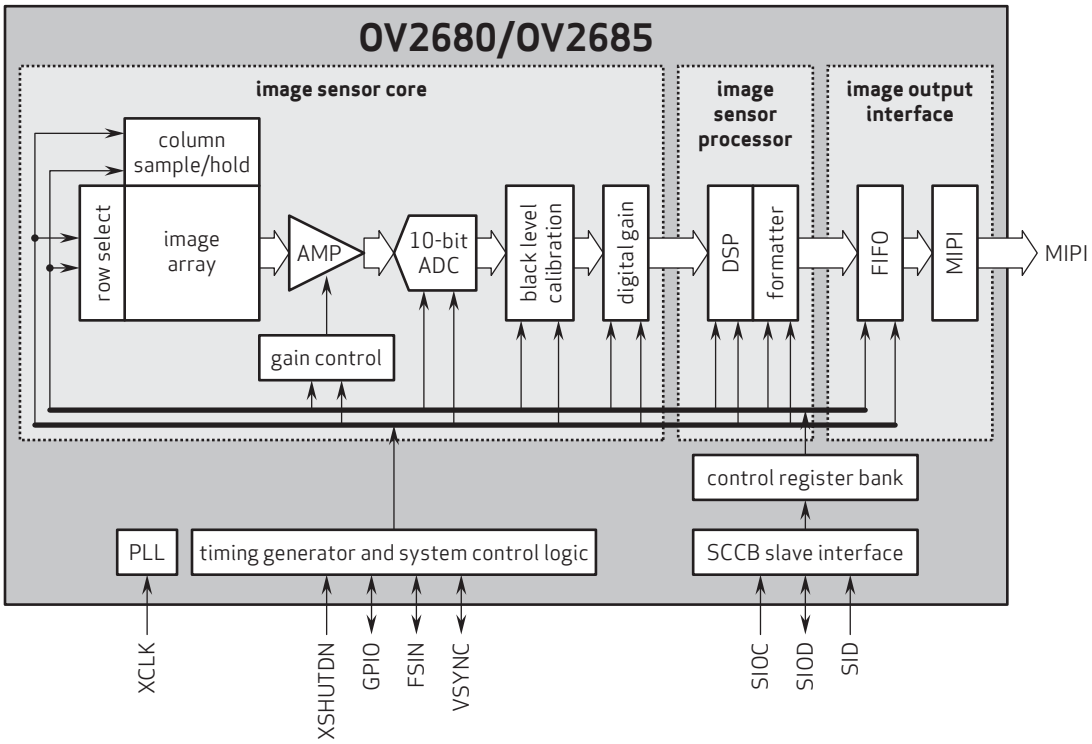
Product Features

- MIPI and D-PHY specification (contains one clock lane) with a maximum of 750 Mbps data transfer rate
- support for output formats:
  - OV2680: 10-bit RAW RGB
  - OV2685: 10-bit RAW RGB, 8-bit YUV
- programmable controls for frame rate, mirror and flip, cropping, and windowing
- low operating voltage and low power consumption for embedded portable applications
- supports global analog gain
- high sensitivity and low dark current for low-light conditions
- supports free-running clock and gated clock
- supports down-sampling and binning mode
- auto black level calibration
- defect correction capability
- supports horizontal and vertical subsampling

Product Specifications

- **active array size:** 1616 x 1216
- **power supply:**
  - **OV2680 core:** 1.58V ±3%
  - **OV2685 core:** 1.7 - 1.9V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **OV2680 active:** 123 mW
  - **OV2685 active:** 259 mW
  - **XSHUTDN:** <1 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +50°C junction temperature
- **output formats:** 10-bit RGB RAW, 8-bit YUV (OV2685)
- **lens size:** 1/5"
- **lens chief ray angle:** 28.5° non-linear
- **input clock frequency:** 6 - 27 MHz
- **maximum image transfer rate:** 30 fps
- **scan mode:** progressive
- **maximum exposure interval:** 1 frame - 4 t_{ROW}
- **pixel size:** 1.75 µm x 1.75 µm
- **image area:** 2840 µm x 2150 µm
- **package/die dimensions:**
  - **OV2680 CSP5:** 4180 µm x 3480 µm
  - **OV2685 CSP5:** 4454 µm x 4014 µm

Functional Block Diagram



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Version 1.2, July, 2017

OV2685 2MP product brief

available in a lead-free package

Cost-Effective, Low-Power 2-Megapixel Sensors for Feature Phones, Smartphones and Tablets

The OV2685 is a cost-effective, low-power 2-megapixel CameraChip™ sensor for feature phones and front-facing camera applications in smartphones and tablets. The 1/5-inch sensors leverage a 1.75-micron OmniPixel3-HS™ pixel to deliver high quality 2-megapixel images and video at 30 frames per second (fps). The sensor's high sensitivity and low dark current deliver exceptional image and video quality, even in low-light conditions.

The OV2685 is a cost-effective upgrade solution to the OV2659 & OV2675 CameraChip sensors with a smaller footprint and smaller die size.

Compared to previous generations, the OV2685 offers improved image quality with the latest OmniPixel3-HS pixel architecture. Using OmniVision's proprietary sensor technology, the sensor reduces or eliminates common lighting and electrical sources of image contamination, such as fixed pattern noise, smearing, etc., to produce a clean, stable, color image.

The OV2685 features a single-lane MIPI interface, which allows for a simple design with modern basebands.

Find out more at www.ovt.com.

OmniVision

OV2685

Applications

- Ultrabooks
- PC Multimedia
- Games
- Home Entertainment
- Cellular and Picture Phones
- Tablets
- Toys

Ordering Information

- **OV02685-H53A**
  (color, lead-free, 53-pin CSP5)

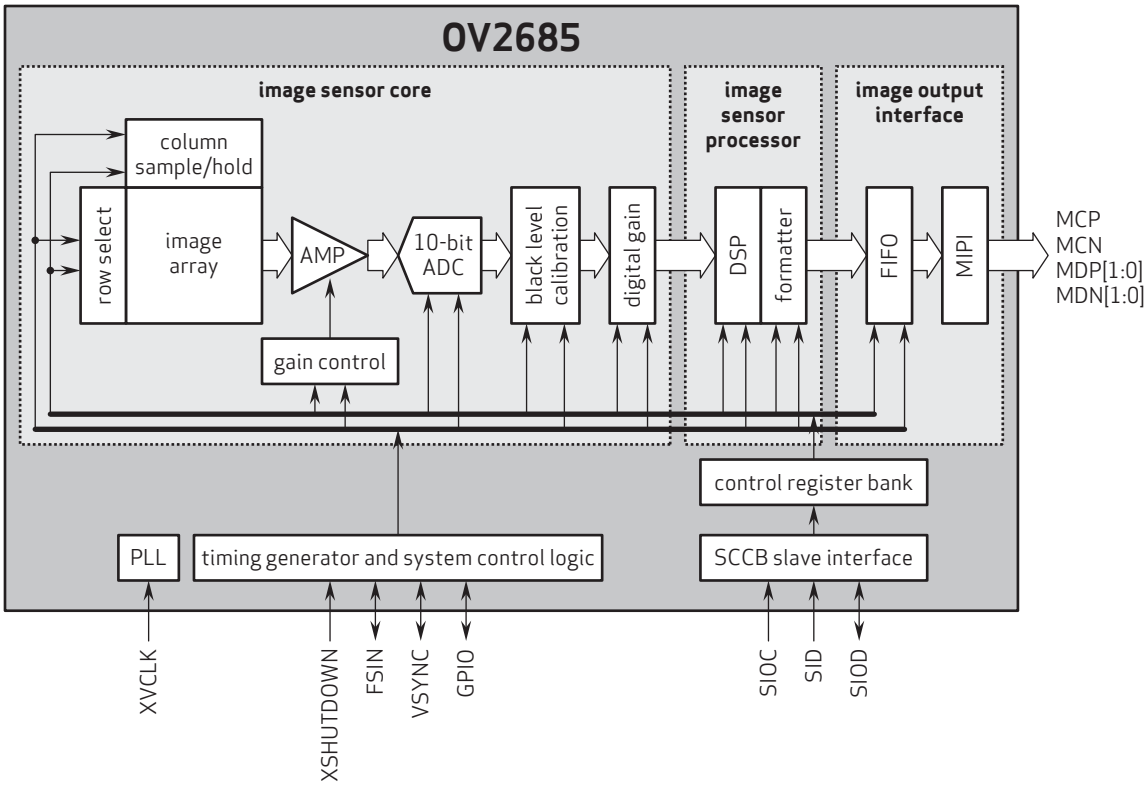
Product Features

- 1.75 µm x 1.75 µm pixel with OmniPixel3-HS™ technology
- optical size of 1/5"
- 28.0° CRA
- supports images sizes:
  - UXGA (1600Hx1200V)
  - 1600 HD+ (1600Hx900V)
  - SXGA (1280Hx960V)
  - 720p (1280Hx720V), and more
- support for output formats:
  - 10-bit RGB RAW
  - 8-bit YUV
- 2MP at 30 fps
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- two-wire serial bus control (SCCB)
- MIPI serial output interface (2-lane MIPI)
- automatic image control functions:
  - automatic exposure control (AEC)
  - automatic gain control (AGC)
  - auto white balance (AWB)
  - image de-noise
- on-chip phase lock loops (PLLs)
- image quality control:
  - defect pixel correction
  - saturation
  - hue
  - gamma
  - lens correction
  - automatic black level calibration
- suitable for module size of 6 x 6 x 4.43 mm

Product Specifications

- **active array size:** 1616 x 1216
- **power supply:**
  - **core:** 1.7 - 1.9V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 259 mW
  - **XSHUTDN:** <1 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +50°C junction temperature
- **output formats:** 10-bit RGB RAW, 8-bit YUV
- **lens size:** 1/5"
- **lens chief ray angle:** 28.5° non-linear
- **input clock frequency:** 6 - 27 MHz
- **max S/N ratio:** 36 dB
- **dynamic range:** 66 dB @ 8x gain
- **maximum image transfer rate:** 30 fps
- **sensitivity:** 7 ke-/lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** 1 frame - 4 t_{ROW}
- **pixel size:** 1.75 µm x 1.75 µm
- **dark current:** 6.5 e-/sec @ 50°C junction temperature
- **image area:** 2840 µm x 2150 µm
- **package dimensions:** 4454 µm x 4014 µm

Functional Block Diagram



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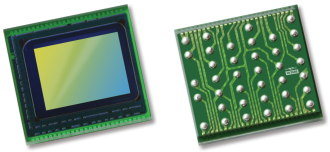
Version 1.1, July, 2017



OV2686 2MP product brief

lead free

available in a lead-free package

Cost-Effective, Low-Power 2-Megapixel Sensors for Feature Phones, Smartphones and Tablets

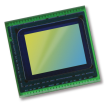
The OV2686 (SoC) is a low-power 2-megapixel CameraChip™ sensor for feature phones and front-facing camera applications in smartphones and tablets. The 1/5-inch sensor leverages a 1.75-micron OmniPixel3-HS™ pixel to deliver high quality 2-megapixel images and video at 15 frames per second (fps). The sensor's high sensitivity and low dark current deliver exceptional image and video quality, even in low-light conditions.

The OV2686 is a cost-effective sensor with a smaller footprint and smaller die size. Compared to previous generations, the OV2686 offers improved image quality with the latest OmniPixel3-HS pixel architecture. Using OmniVision's proprietary sensor technology, the sensor reduces or eliminates common lighting and electrical sources of image contamination, such as fixed pattern noise, smearing, etc., to produce a clean, stable, color image.

Find out more at www.ovt.com.

OmniVision

OV2686



Applications

- Cellular and Picture Phones
- Home Entertainment
- PC Multimedia
- Toys

Product Features

- 1.75 µm x 1.75 µm pixel with OmniPixel3-HS™ technology
- 2MP at 15 fps
- optical size of 1/5"
- supports images sizes:
  - UXGA (1600x1200)
  - HD+ (1600x900)
  - SXGA (1280x960)
  - 720p (1280x720), and more
- support for output formats: 10-bit RGB RAW, 8-bit YUV
- programmable controls for frame rate, mirror and flip, cropping, and windowing
- two-wire serial bus control (SCCB)
- 28.5° CRA
- digital video port (DVP) parallel output interface
- automatic image control functions:
  - automatic exposure control (AEC)
  - automatic gain control (AGC)
  - auto white balance (AWB)
- on-chip phase lock loops (PLLs)
- image quality control:
  - defect pixel correction (DPC)
  - denoise
  - lens shading

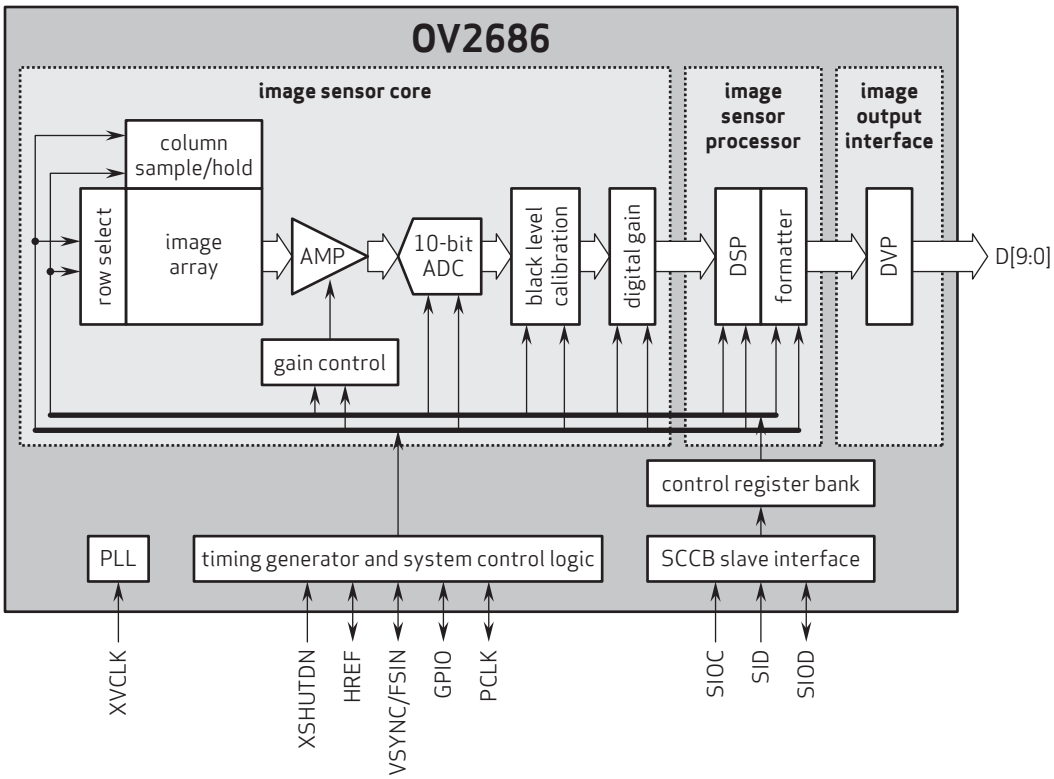
Ordering Information

- **OV02686-H38A**
  (color, lead-free, 38-pin CSP5)

Product Specifications

- **active array size:** 1616 x 1216
- **power supply:**
  - **core:** 1.8V
  - **analog:** 2.8V
  - **I/O:** 1.8V/2.8V
- **power requirements:**
  - **active:** 137 mW
  - **XSHUTDN:** <1 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +50°C junction temperature
- **output interfaces:** 10-bit DVP parallel output
- **output formats:** 10-bit RGB RAW, 8-bit YUV422
- **lens size:** 1/5"
- **lens chief ray angle:** 28.5° non-linear
- **input clock frequency:** 6 - 27 MHz
- **maximum image transfer rate:** 15 fps
- **scan mode:** progressive
- **pixel size:** 1.75 µm x 1.75 µm
- **image area:** 2840 µm x 2150 µm
- **package/die dimensions:**
  - **CSP5:** 4254 µm x 3984 µm

Functional Block Diagram



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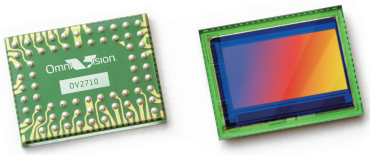
Version 1.1, December, 2014



OV2710-1E full HD (1080p) product brief

OmniVision's True 1080p High Definition (HD) Video Image Sensor

lead free

available in a lead-free package

The OV2710-1E is a true full HD (1080p) CMOS image sensor designed specifically to deliver high-end HD video to digital video camcorders, notebooks, PC webcam, security and other mobile applications. The 1/2.7-inch OV2710-1E addresses the fast growing demand for affordable, HD-quality digital video solutions for video conferencing and recording.

The OV2710-1E is among the very first no-compromise full HD (1080p) sensors available on the market, meaning it offers HD video format with a display resolution of 1920 x 1080 pixels, operating at 30 frames per second. Built with OmniVision's proprietary 3 µm OmniPixel3-HS™ high sensitivity pixel technology, the OV2710-1E delivers low-light sensitivity of 3700 mV/lux-sec, S/N ratio of 40 dB, and a peak dynamic range of 69 dB, enabling cameras to operate in virtually every lighting condition from bright daylight to nearly complete darkness below 15 lux.

The OV2710-1E supports multiple platform architectures and controllers with both parallel and MIPI interfaces. By allowing system designers to leverage the same opto-electrical design across various products and multiple market segments, the OV2710-1E significantly reduces product development time. OmniVision's OmniPixel3-HS pixel technology has already been proven in high quality webcam/video applications and is now available in 1080p full HD in the OV2710-1E.

Find out more at www.ovt.com.

OmniVision

OV2710-1E

Applications

- Notebooks
- PC Webcams
- Camcorders
- Security
- Digital Still Cameras
- Telepresence
- Portable Media Players

Ordering Information

- **OV02710-A68A-1E**
  (color, lead-free, 68-pin CSP3)

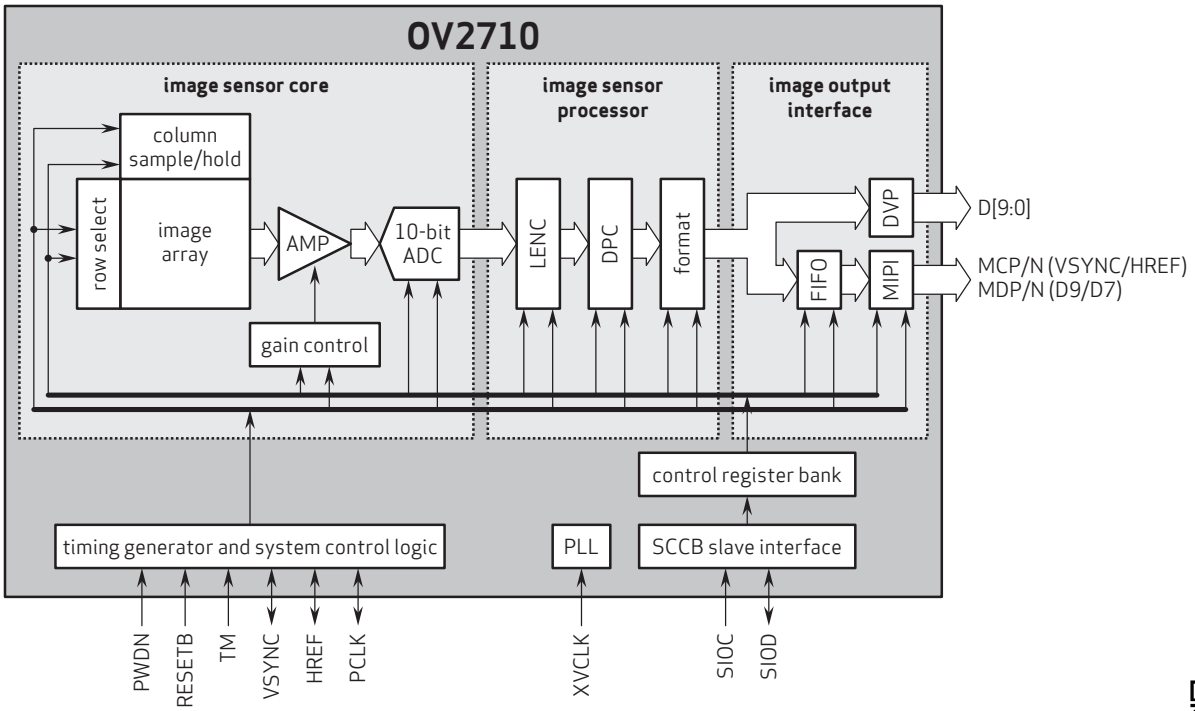
Product Features

- programmable controls: gain, exposure, frame rate, image size, horizontal mirror, vertical flip, cropping, windowing, and panning
- automatic image control functions:
  - automatic exposure (AEC)
  - automatic gain control (AGC)
  - automatic white balance (AWB)
  - automatic black level calibration (ABLC)
- serial camera control bus (SCCB)
- lens correction (LENC)
- defect pixel correction (DPC)
- support for digital video port (DVP) parallel output interface
- integrated auto focus filter
- support for one lane MIPI interface (up to 800 Mbps)
- support for 8-/10-bit RAW RGB output format
- support for image sizes:
  - 1080p at 30 fps
  - cropped 720p at 60 fps
  - VGA at 120 fps
- support for black sun cancellation
- embedded one-time programmable (OTP) memory
- on-chip phase lock loop (PLL)
- built-in 1.5V regulator for core

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **analog:** 3.0 - 3.6V (3.3V typical)
  - **core:** 1.425 - 1.575V (1.5V typical)
  - **I/O:** 1.7 - 3.6V (1.8V typical)
- **power requirements:**
  - **active:** 350 mW
  - **power down:** 70 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +65°C junction temperature
- **output interfaces:** 10-bit parallel/ one lane MIPI
- **output formats:** 10-bit RAW RGB
- **lens size:** 1/2.7"
- **lens chief ray angle:** 23.6°
- **input clock frequency:** 6 - 27 MHz
- **scan mode:** progressive
- **maximum image transfer rate:**
  - **1080p:** 30 fps
  - **cropped 720p:** 60 fps
  - **VGA:** 120 fps
  - **QVGA:** 240 fps
- **sensitivity:** 3700 mV/lux-sec
- **shutter:** rolling
- **max S/N ratio:** 40 dB
- **dynamic range:** 69 dB @ 8x gain
- **maximum exposure interval:** 1096 tline
- **pixel size:** 3 µm x 3 µm
- **dark current:** 20 mV/sec @ 60°C junction temperature
- **image area:** 5856 µm x 3276 µm
- **package dimensions:** 7465 µm x 5865 µm

Functional Block Diagram



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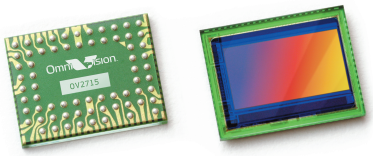
Version 1.1, October, 2015



OV2715-1E full HD (1080p) product brief

OmniVision's True 1080p High Definition (HD) Video Image Sensor

lead free

available in a lead-free package

The OV2715-1E is a native 1080p high definition (HD) CMOS image sensor designed specifically to deliver HD video to security/surveillance applications. Built with OmniVision's proprietary OmniPixel3-HS™ technology, the 1/2.7-inch OV2715-1E addresses the low-light performance requirements of both IP cameras and HDcctv.

The OV2715-1E is one of the first no-compromise full 1080p HD sensors available on the market with a display resolution of 1920 x 1080 pixels while operating at 30 frames per second. The sensor delivers low-light sensitivity of 3700 mV/lux-sec and a peak dynamic range of 69 dB. This enables cameras to operate in virtually every lighting condition from bright daylight to nearly complete darkness, a critical capability for security and surveillance cameras.

The sensor provides full frame, sub-sampled or windowed 10-bit images in RAW RGB format via the digital video port with complete user control over image quality. It incorporates advanced image processing functions, including exposure control, gain control, white balance, lens correction and defective pixel correction, and is fully programmable through the serial camera control bus (SCCB) interface.

Offering a zero degree chief ray angle, the OV2715-1E allows for the clearest possible picture and best-in-class image quality. The OV2715-1E is capable of operating within a temperature range of -30°C to +85°C, enabling its implementation in indoor and outdoor security and surveillance applications.

Find out more at www.ovt.com.

OmniVision

OV2715-1E

Applications

- Security and Surveillance Cameras

Product Features

- support for image sizes:
  - 1080p @ 30 fps
  - cropped 720p @ 60 fps
  - VGA @ 120 fps
- programmable controls: gain, exposure, frame rate, image size, horizontal mirror, vertical flip, cropping, windowing, and panning
- automatic image control functions:
  - automatic exposure (AEC)
  - automatic gain control (AGC)
  - automatic white balance (AWB)
  - automatic black level calibration (ABLC)
- serial camera control bus (SCCB)
- lens correction (LENC)
- defect pixel correction (DPC)
- support for digital video port (DVP) parallel output interface
- integrated auto focus filter
- support for 10-bit RAW RGB output format
- support for black sun cancellation
- embedded one-time programmable (OTP) memory
- on-chip phase lock loop (PLL)
- built-in 1.5 V regulator for core

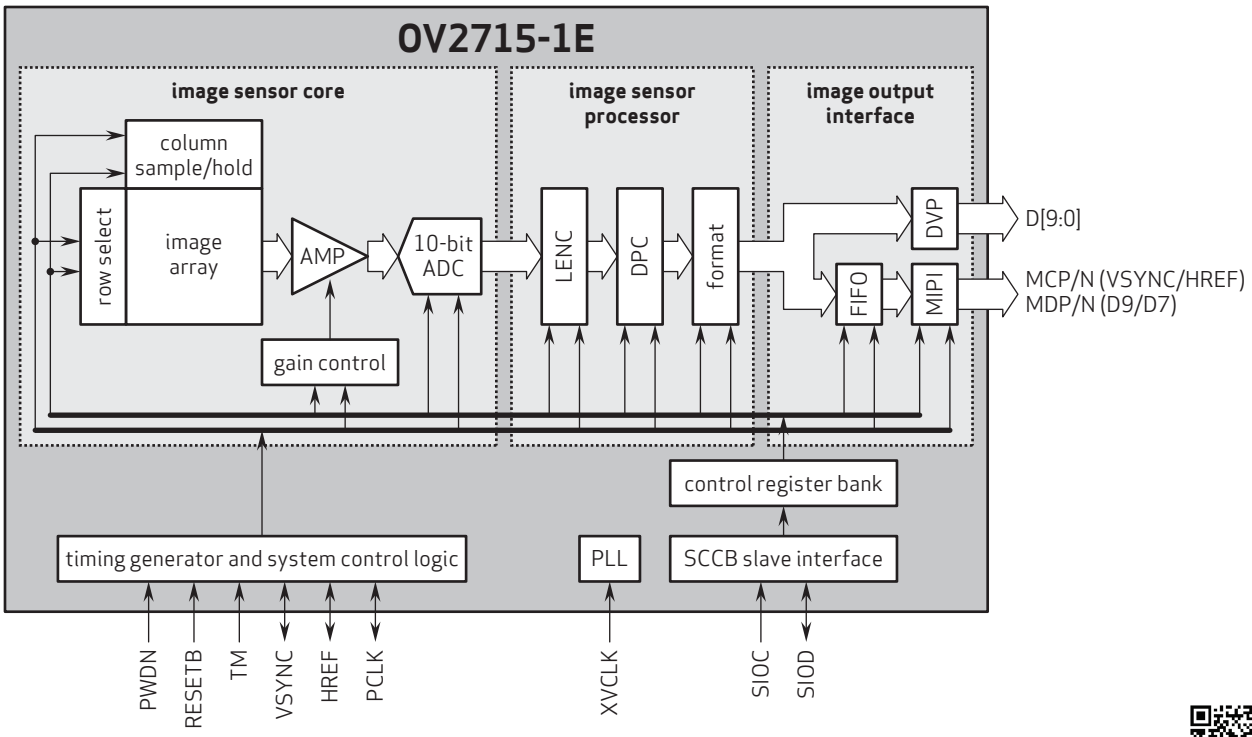
Ordering Information

- **OV02715-1E-A68A**
  (color, lead-free, 68-pin CSP3)

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **analog:** 3.0 - 3.6V (3.3V typical)
  - **core:** 1.425 - 1.575V (1.5V typical)
  - **I/O:** 1.7 - 3.6V (1.8V typical)
- **power requirements:**
  - **active:** 350 mW
  - **power down:** 70 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +65°C junction temperature
- **output interfaces:** 10-bit parallel / one-lane MIPI
- **output formats:** 10-bit RAW RGB data
- **lens size:** 1/2.7"
- **lens chief ray angle:** 0°
- **input clock frequency:** 6 - 27 MHz
- **scan mode:** progressive
- **maximum image transfer rate:**
  - **1080p:** 30 fps
  - **cropped 720p:** 60 fps
  - **VGA:** 120 fps
  - **QVGA:** 240 fps
- **sensitivity:** 3700 mV/lux-sec
- **shutter:** rolling shutter
- **max S/N ratio:** 40 dB
- **dynamic range:** 69 dB @ 8x gain
- **maximum exposure interval:** 1096 tline
- **pixel size:** 3 µm x 3 µm
- **dark current:** 20 mV/s @ 60°C junction temperature
- **image area:** 5856 µm x 3276 µm
- **package dimensions:** 7465 µm x 5865 µm

Functional Block Diagram



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Version 1.2, October, 2014

OV2718 full HD (1080p) product brief

available in a lead-free package

Best-In-Class Low-Light Sensitivity and 1080p High Definition Video for Mainstream Security Applications

OmniVision's OV2718 is a native 16:9 high definition (HD) CameraChip™ sensor that delivers best-in-class low-light sensitivity, high dynamic range (HDR), and 1080p HD video. These capabilities make the OV2718 an ideal camera solution for mainstream security and surveillance systems.

Built on advanced 2.8-micron OmniBSI™-2 pixel architecture, the sensor can record 1080p HD video at 30 frames per second (fps) in HDR mode. The 1/2.9-inch OV2718 leverages OmniVision's in-pixel HDR technology to capture exceptional images and video when recording in high- and low-light environments, a critical benefit for security and surveillance cameras.

The OV2718 is available in a 6.5 x 5.7 mm chip scale package (CSP).

Find out more at www.ovt.com.

OmniVision

OV2718

Applications

- Security and Surveillance Cameras
- Video Applications
- Smart Home

Product Features

- support for image size:
  - 1920 x 1080
  - VGA
  - QVGA, and any cropped size
- high dynamic range
- high sensitivity
- low power consumption
- image sensor processor functions:
  - lens correction
  - defective pixel cancelation
  - automatic black level correction
- supported output formats: RAW
- horizontal and vertical sub-sampling
- SCCB for register programming
- high speed serial data transfer with MIPI CSI-2/LVDS
- parallel 12-bit DVP output
- external frame synchronization capability
- one time programmable (OTP) memory

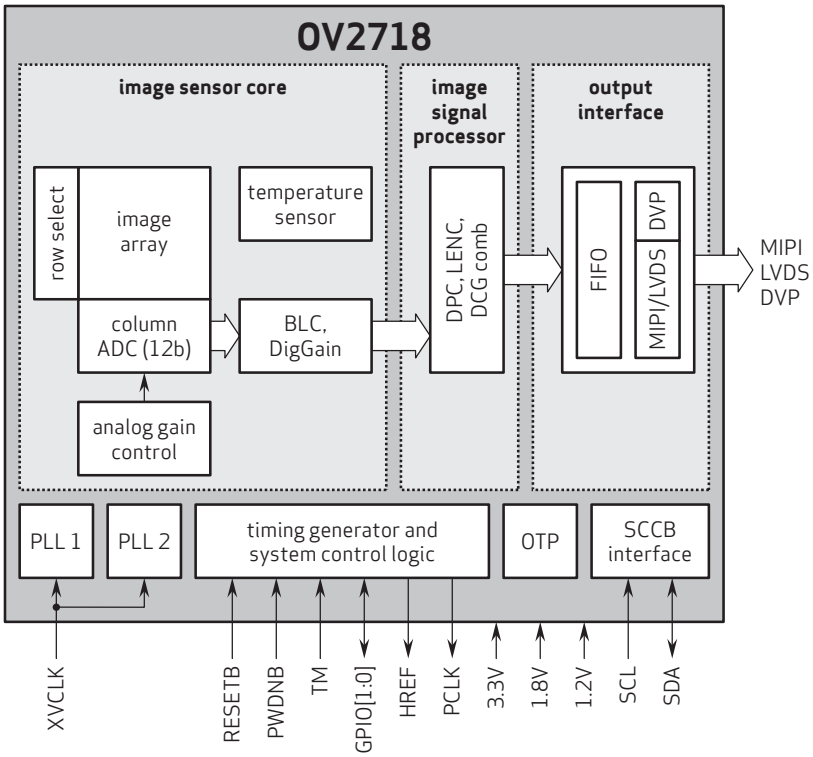
Ordering Information

- **OV02718-H77A-2B** (color, lead-free) 77-pin CSP
- **OV02718-H77A-PE** (color, lead-free) 77-pin CSP with protective film

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **analog:** 3.14 - 3.47V
  - **digital:** 1.2 - 1.4V
  - **DOVDD:** 1.7 - 1.9V
  - **AVDD:** 1.7 - 1.9V
- **power requirements:**
  - **active:** 350 mW
  - **software standby:** 1.14 mW
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable:** 0°C to +60°C junction temperature
- **output interfaces:** up to 4-lane MIPI CSI-2/LVDS, 12-bit DVP
- **input clock frequency:** 6 - 36 MHz
- **lens size:** 1/2.9"
- **lens chief ray angle:** 9°
- **output formats:** linear - 12-bit RAW; HDR - 2x12-bit DCG RAW, 16-bit combined DCG, 12-bit compressed combined DCG
- **scan mode:** progressive
- **shutter:** rolling shutter
- **maximum image transfer rate:** 30 fps
- **sensitivity:** 26,200 e⁻/Lux-sec @ 530 nm
- **max S/N ratio:** 42.6 dB
- **dynamic range:** 86 dB
- **pixel size:** 2.8 µm x 2.8 µm
- **image area:** 5482.35 µm x 3202 µm
- **package dimensions:**
  - **CSP:** 6544 µm x 5734 µm

Functional Block Diagram



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Version 1.3, October 2018

OV2732 1080p product brief

available in a lead-free package

Low-Power 1080p High Definition PureCel® Sensor for Security Applications

OmniVision's OV2732 is a compact and power-efficient PureCel® image sensor designed for IoT-based residential and commercial monitoring systems. The OV2732 captures quality images and videos with staggered high dynamic range (HDR), ensuring excellent scene reproduction in all lighting environments. The sensor features frame sync for use in multi-camera or 360-degree camera systems and supports ultra-low power mode (ULPM) and an ambient light sensor (ALS), making it particularly well-suited for battery-powered security applications.

Built on OmniVision's PureCel® technology, the 1/4-inch OV2732 captures 1080p high definition (HD) video at 60 frames per second (fps), 720p HD video at 90 fps, and VGA resolution video at 120 fps. The OV2732 delivers crisp images and video, even in challenging low-light conditions.

Find out more at www.ovt.com.

OmniVision

OV2732

Applications

- Internet of Things (IoT)
- High-end Video Conferencing
- Security
- Lifestyle Camera
- Home Monitoring

Ordering Information

- **OV02732-H57A**
  (color, lead-free, 57-pin CSP4)

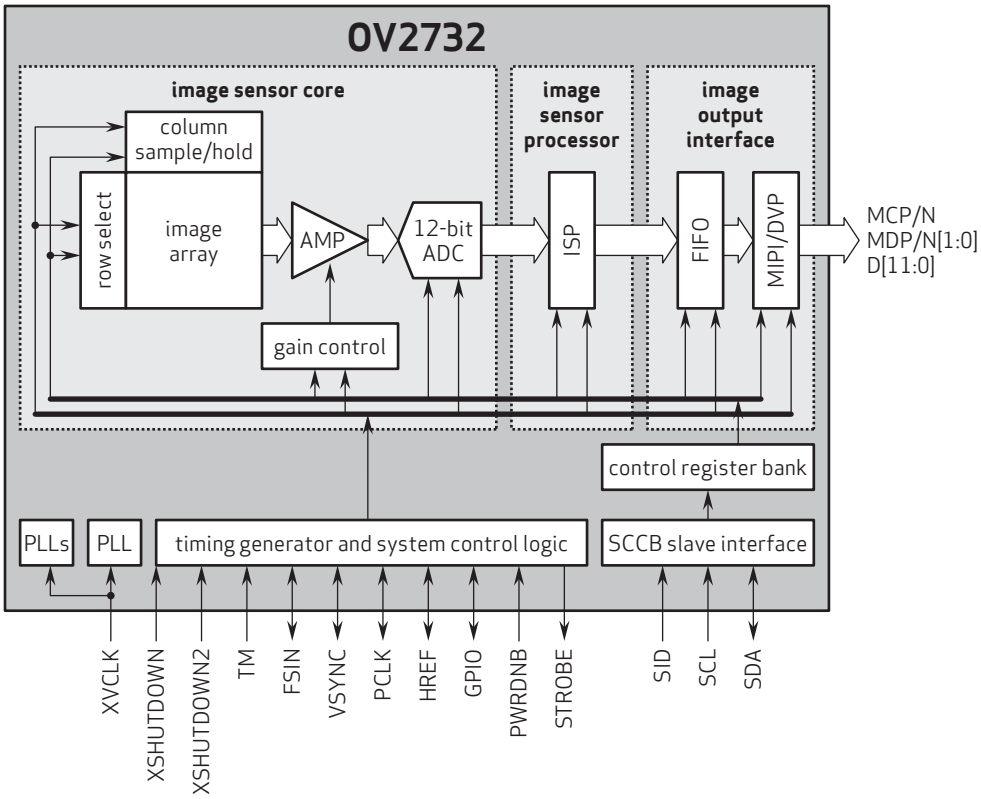
Product Features

- programmable controls:
  - gain
  - exposure
  - frame rate
  - image size
  - horizontal mirror
  - vertical flip
  - cropping
  - windowing
- automatic image control functions:
  - black level calibration (BLC)
- serial camera control bus (SCCB)
- defective pixel correction (DPC)
- digital video port (DVP) parallel output interface
- support for two lane MIPI interface (up to 800 Mbps)
- support for image sizes:
  - 1080p @ 60 fps
  - 720p @ 90 fps
  - VGA @ 120 fps
  - QVGA @ 240 fps, and more
- support for light sensing mode (LSM)
- support for staggered 2 frame HDR
- support for black sun cancellation
- on-chip phase lock loop (PLL)

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 110 mW
- **temperature range:**
  - **operating:** -40°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output interfaces:**
  two-lane MIPI / DVP parallel
- **output formats:** 10/12-bit RAW RGB
- **lens size:** 1/4"
- **lens chief ray angle:** 12° linear
- **input clock frequency:** 6 - 27 MHz
- **scan mode:** progressive
- **maximum image transfer rate:**
  - **1080p:** 60 fps
  - **720p:** 90 fps
  - **VGA:** 120 fps
  - **QVGA:** 240 fps
- **shutter:** rolling shutter
- **maximum exposure interval:**
  1184 × t_{ROW}
- **pixel size:** 2 µm x 2 µm
- **image area:**
  3868 µm x 2190 µm
- **package dimensions:**
  5174 µm x 3680 µm

Functional Block Diagram



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Version 1.1, October, 2016

OV2735 1080p product brief

available in a lead-free package

High-Sensitivity 1080p HD OmniPixel3-HS™ Sensor for Mainstream Security Applications

OmniVision's OV2735 is a high-performance image sensor that brings 1080p high-definition (HD) video capture to mainstream security and surveillance cameras. The OV2735 offers technical advancements such as support for low-power mode, stable image quality within operating temperatures ranging from 0°C to 60°C, and dramatically reduced power consumption. As such, the OV2735 offers security and surveillance camera OEMs an easy upgrade camera solution in the popular 1/2.7-inch optical format.

Built on OmniVision's proven OmniPixel3-HS™ pixel technology, the OV2735 captures full-resolution 1080p HD video at 30 frames per second (fps) and 720p video at 60 fps. The OV2735 also offers MIPI with parallel support and frame synchronization in a compact and power-efficient package.

Find out more at www.ovt.com.

OmniVision

OV2735

Applications

- Security IPC
- Analog HD Video Cameras

Product Features

- programmable controls:
  - gain
  - exposure
  - frame rate
  - image size
  - horizontal mirror
  - vertical flip
  - cropping
  - windowing
- automatic image control functions:
  - black level calibration (BLC)
- defective pixel correction (DPC)
- supports binning function
- digital video port (DVP) parallel output interface
- I2C control interface for register programming
- support for two lane MIPI interface (up to 420 Mbps)
- support for image sizes:
  - 1080p @ 30 fps
  - 720p @ 60 fps
  - VGA @ 60 fps
- support for black sun cancellation
- on-chip phase lock loop (PLL)
- support for low power mode

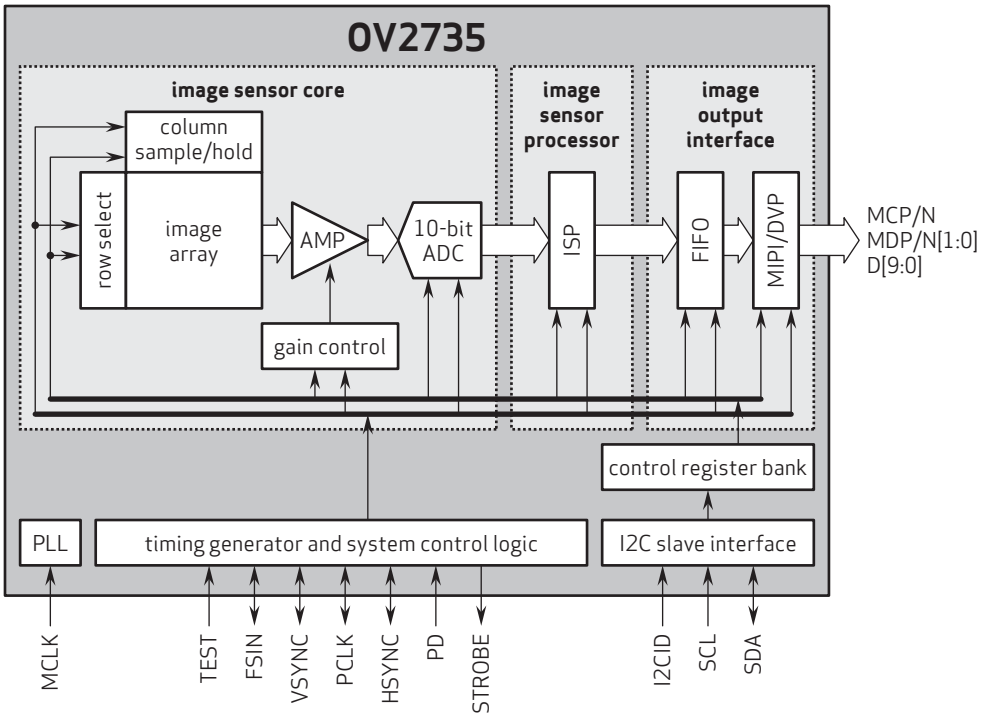
Ordering Information

- **OV02735-H66A-1B**
  (color, lead-free) 66-pin CSP
- **OV02735-H66H-1B**
  (color, lead-free) 66-pin CSP

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.7 - 1.9V (1.8V nominal)
  - **analog:** 2.6 - 3.0V (2.8V nominal)
  - **I/O:** 1.7 - 3.0V (1.8V nominal)
- **power requirements:**
  - **active:** 176 mW
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output interfaces:**
  two-lane MIPI / DVP parallel
- **output formats:** RAW10
- **lens size:** 1/2.7"
- **lens chief ray angle:** 12° linear
- **input clock frequency:** 6 - 27 MHz
- **scan mode:** progressive
- **maximum image transfer rate:**
  - **1080p:** 30 fps
  - **720p:** 60 fps
- **sensitivity:** 23 Ke-/Lux.sec
- **shutter:** rolling shutter
- **max S/N ratio:** 38.6 dB
- **dynamic range:** 72 dB @ 8x gain
- **maximum exposure interval:** 1328 t_{row}
- **pixel size:** 3 µm x 3 µm
- **image area:** 5808 µm x 3288 µm
- **package dimensions:**
  - **CSP:** 6956 µm x 4765 µm

Functional Block Diagram



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Version 1.3, March, 2018

OV2736 1080p product brief

available in a lead-free package

Low-Power, Compact RGB-Ir Image Sensor for Consumer Applications

The OV2736 is a 1/4-inch PureCel® image sensor that uses OmniVision's industry-leading RGB-Ir technology to enable high-end image quality, low power consumption and advanced functionality. These capabilities make the OV2736 suitable for a wide range of battery-powered camera applications, including home security and monitoring, high-end video conferencing, and action or lifestyle cameras.

Using a 4x4 RGB-Ir pixel pattern, the OV2736 eliminates the need for two-camera solutions for devices that require both RGB and infrared imaging.

Using this technology, the sensor delivers unprecedented performance in near-total darkness, capturing high-quality 1080p full high definition (HD) video at 60 frames per second (fps) with high dynamic range (HDR), or 720p HD video at 90 fps.

Rather than a traditional mechanical infrared filter, the OV2736 utilizes dual-band color filters to deliver superior image quality in near-total darkness. The sensor's small optical format and minimal 110 mW power consumption ensure that it is easily integrated into mainstream industrial designs.

Find out more at www.ovt.com.

OV2736

Applications

- Internet of Things (IoT)
- High-end Video Conferencing
- Security
- Lifestyle Camera
- Home Monitoring

Ordering Information

- **OV02736-H46A-1B**
  (RGB-Ir, lead-free) 46-pin CSP

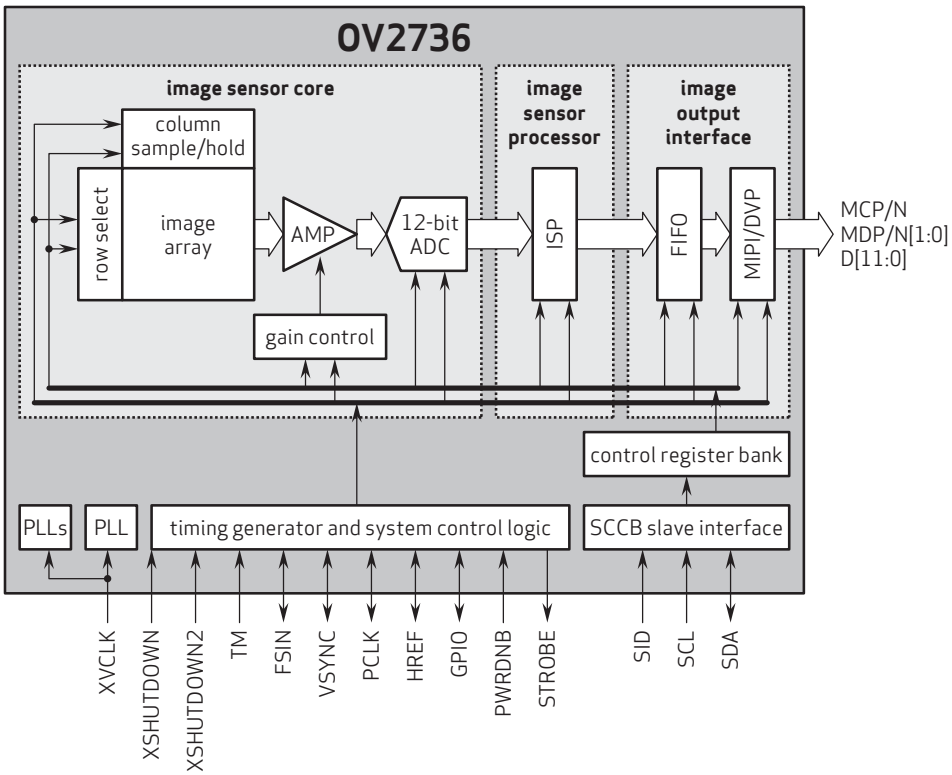
Product Features

- 4x4 RGB-Ir pattern
- programmable controls:
  - gain
  - exposure
  - frame rate
  - image size
  - horizontal mirror
  - vertical flip
  - cropping
  - windowing
- automatic image control functions:
  - black level calibration (BLC)
- serial camera control bus (SCCB)
- digital video port (DVP) parallel output interface
- support for two lane MIPI interface (up to 800 Mbps)
- support for image sizes:
  - 1080p @ 60 fps
  - 720p @ 90 fps
- support for light sensing mode (LSM)
- support for staggered 2 frame HDR
- support for black sun cancellation
- on-chip phase lock loop (PLL)

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 110 mW
- **temperature range:**
  - **operating:** -40°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output interfaces:** two-lane MIPI / DVP parallel
- **output formats:** 10/12-bit RAW RGB-Ir
- **lens size:** 1/4"
- **lens chief ray angle:** 12° linear
- **input clock frequency:** 6 - 27 MHz
- **scan mode:** progressive
- **maximum image transfer rate:**
  - **1080p:** 60 fps
  - **720p:** 90 fps
- **sensitivity:** 12.5 Ke-/Lux-sec
- **shutter:** rolling shutter
- **max S/N ratio:** 38.2 dB
- **dynamic range:** 74.5 dB @ 16x gain
- **maximum exposure interval:** 1184 x t_{ROW}
- **pixel size:** 2 µm x 2 µm
- **image area:** 3868 µm x 2190 µm
- **package dimensions:** 5134 µm x 3640 µm

Functional Block Diagram



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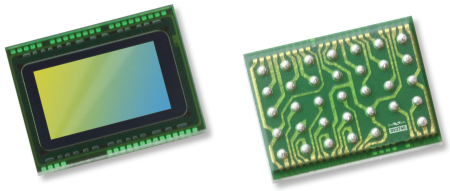
Version 1.3, April, 2018



OV2740 1080p product brief

World's Most Power-Efficient 1080p/60 High Definition Image Sensor for Front-Facing Camera Applications

lead free

available in a lead-free package

OmniVision's OV2740 PureCel™ is an ultra-low power, full high-definition (FHD) image sensor for front-facing camera applications in smartphones, tablets, notebooks and Ultrabooks. By consuming under 90 mW when recording 1080p HD video at 60 frames per second (fps), the OV2740 is the lowest power 1080p/60 image sensor currently on the market.

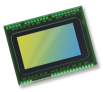
Built on a 1.4-micron pixel, the OV2740 PureCel image sensor boasts a signal-to-noise ratio of less than 50 lux, with improvements in full-well capacity (FWC) and sensitivity. The sensor records best-in-class 1080p HD video at 60 fps and 720p HD video at 90 fps, and uses staggered high dynamic range (HDR) to minimize motion artifacts to capture crisp, clear video in difficult lighting conditions.

The OV2740 is the only 1080p HD image sensor to feature light-sensing mode (LSM) and ultra-low power mode (ULPM), enabling advanced features such as motion detection or gesture control. Additionally, the sensor is stereo ready with frame synchronization to support a host of depth perception applications. The OV2740 fits into a compact 5.5 x 5.5 x 3 mm module.

Find out more at www.ovt.com.

OmniVision

OV2740



Applications

- Smartphones
- Ultrabooks and Notebooks
- Tablets
- Digital Still Cameras (DSC)
- Digital Video Camcorders (DVC)
- PC Multimedia

Product Features

- 1.4 µm x 1.4 µm pixel
- optical size of 1/6"
- programmable controls for frame rate, mirror and flip, cropping, and windowing
- supports output formats: 10-bit RAW RGB
- supports images sizes:
  - 1080p (1920x1080)
  - 720p (1280x720)
  - VGA (640x480)
  - QVGA (320x240)
  - QQVGA (160x120)
- supports 2x2 binning
- standard serial SCCB interface
- up to 2-lane MIPI serial output interface (supports maximum speed up to 1000 Mbps/lane)
- embedded 4 kilobits of one-time programmable (OTP) memory for customer use
- add staggered HDR raw data output
- interleave row high dynamic range (iHDR) output
- programmable I/O drive capability
- power saving (PSV) mode
- support for LENC color shading correction

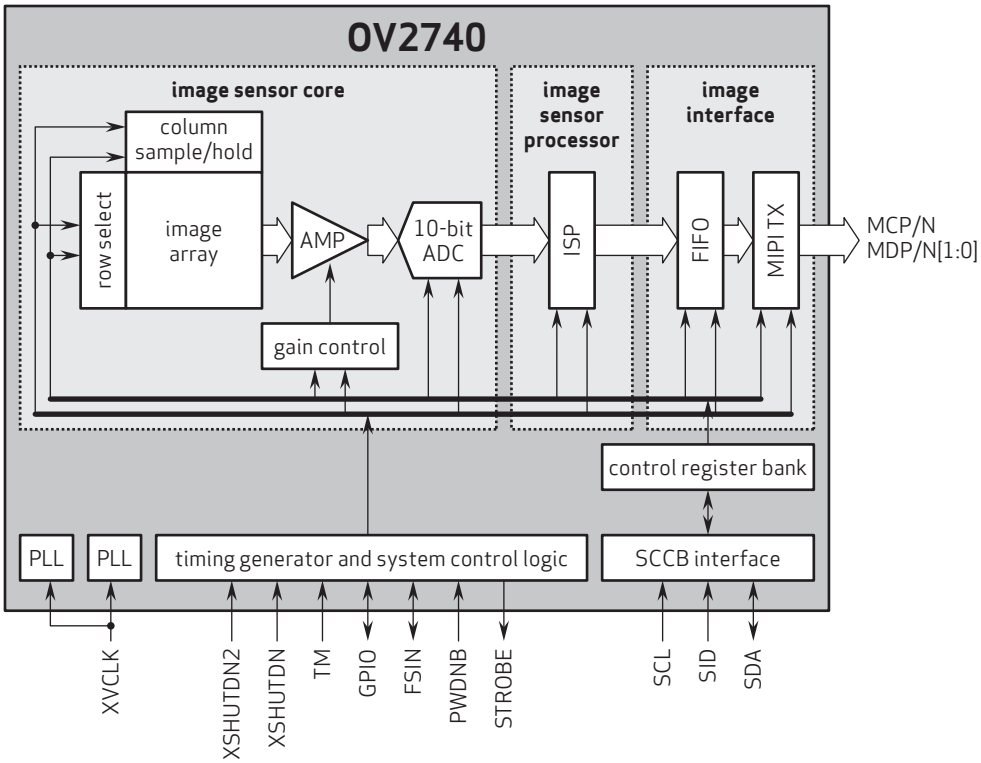
Ordering Information

- **OV02740-H34A-Z**
  (color, lead-free, 34-pin CSP5)

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 86.7 mW
  - **standby:** 250 µA
  - **XSHUTDN:** 0.15 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10-bit RAW RGB data
- **lens size:** 1/6"
- **lens chief ray angle:** 33° non-linear
- **input clock frequency:** 6 - 27 MHz
- **maximum image transfer rate:**
  - **1080p:** 60 fps
  - **720p:** 90 fps
- **scan mode:** progressive
- **pixel size:** 1.4 µm x 1.4 µm
- **image area:** 2728.8 µm x 1549.8 µm
- **package dimensions:**
  - **CSP5:** 3855 µm x 2919 µm

Functional Block Diagram



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Version 1.3, October, 2014

OV2741 1080p product brief

available in a lead-free package

Best-In-Class Image Quality and High Frame Rate 1080p High Definition Video Capture for Endoscopic Applications

OmniVision's OV2741 image sensor leverages 1.4-micron PureCel® pixel architecture to deliver best-in-class image quality and fast-frame-rate full 1080p high definition (HD) video to endoscopic applications, such as urology, laparoscopy, gynecology, cardiology and surgery.

By using PureCel pixel architecture, the OV2741 offers the highest-quality imaging capabilities with improved sensitivity and quantum efficiency, high full-well capacity, low color crosstalk, and minimal blooming and noise. The OV2741's broadband double anti-reflective coating reduces flare in the visible and near-infrared spectrums, which is typically caused by strong ancillary illumination during surgical operations.

The compact OV2741 is capable of recording full 1080p HD video at 60 frames per second (fps), or 720p HD video at 90 fps to ensure clear scene reproduction with minimal motion artifacts. The sensor supports interlaced high dynamic range (HDR), which enables clear image capture with less saturation and excellent low light sensitivity in difficult high- and low-lighting situations. The OV2741 is also stereo-ready with frame synchronization for 3D surgical applications.

OmniVision's OV2741 consumes just 90 mW when recording 1080p HD video at 60 fps, which helps reduce heat generation at the distal tip of the endoscope to improve patient comfort and simplify design.

The OV2741 is available in an 1/6-inch optical format and a compact 3.8 x 2.9 mm chip scale package (CSP). This sensor can be autoclaved and sterilized for reusable and single-use applications respectively.

Find out more at www.ovt.com.

OmniVision

OV2741

Applications

- Veterinarian Endoscopes
- Industrial Endoscopes

Product Features

- 1.4 µm x 1.4 µm pixel
- optical size of 1/6"
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports output formats:
  - 10-bit RAW data
- supports images sizes:
  - 1080p (1920x1080)
  - 720p (1280x720)
  - VGA (640x480)
  - QVGA (320x240)
  - QQVGA (160x120)
- supports 2x2 binning
- standard serial SCCB interface
- up to 2-lane MIPI serial output interface (supports maximum speed up to 1000 Mbps/lane)
- embedded 2 kilobits of one-time programmable (OTP) memory for customer use
- add staggered HDR raw data output
- interleave row high dynamic range (iHDR) output
- programmable I/O drive capability
- support for LENC color shading correction

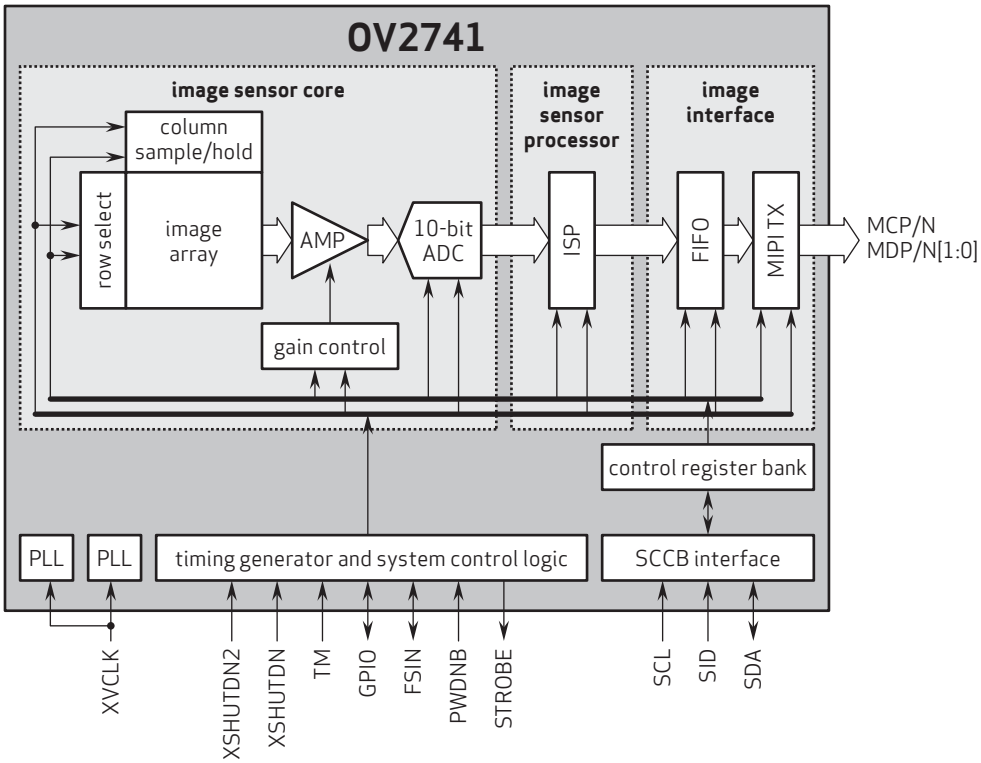
Ordering Information

- **OV02741-H34A-Z**
  (color, lead-free) 34-pin CSP with dual anti-reflective coating cover glass

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 90 mW
  - **standby:** 210 µA
  - **XSHUTDN:** 0.6 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output format:** 10-bit RAW data
- **lens size:** 1/6"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 33° non-linear
- **max S/N ratio:** 38.3 dB
- **dynamic range:** 73.3 dB @ 15.5x gain
- **maximum image transfer rate:**
  - **1080p:** 60 fps
  - **720p:** 90 fps
- **sensitivity:** 553 mV/Lux-sec (6750 e⁻/Lux.sec)
- **scan mode:** progressive
- **maximum exposure interval:** 1112 × t_{ROW}
- **pixel size:** 1.4 µm x 1.4 µm
- **dark current:** 10 e⁻/sec @ 50°C junction temperature
- **image area:** 2728.8 µm x 1549.8 µm
- **package dimensions:**
  - **CSP:** 3855 µm x 2919 µm

Functional Block Diagram



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Version 1.0, May, 2018

OV2744 1080p product brief

available in a lead-free package

Second-Generation RBG-Ir PureCel® Sensor Brings Biometric Functionality to Notebooks and Mobile Devices

The OV2744 is a 1.4-micron PureCel® image sensor that utilizes OmniVision's second-generation, industry-leading RGB-Ir technology to bring biometric capabilities such as facial recognition to the next generation of notebooks, tablets, and front-facing cameras in smartphones.

Using OmniVision's groundbreaking RGB-Ir technology, the OV2744 delivers high quality IR output without compromising its premium RGB images. This solution eliminates the need to have two-camera solutions for devices that require both IR and RGB imaging.

Compared to other RBG-IR sensors in the market right now, the OV2744's best-in-class color reproduction shows less color aliasing, and requires the lowest power consumption of any 1080p sensor currently available.

The 1/6-inch OV2744 captures full resolution 1080p high definition (HD) video at 60 frames per second (fps) with support for full frame staggered high dynamic range (HDR). The sensor also features ultra-low power mode (ULPM), which reduces the resolution and frame rates to conserve additional power. The sensor fits into a 5 x 5 x 3 mm module.

Find out more at www.ovt.com.

OmniVision

OV2744

Applications

- Smartphones
- Ultrabooks and Notebooks
- Tablets
- Digital Still Cameras (DSC)
- Digital Video Camcorders (DVC)
- PC Multimedia

Product Features

- 1.4 µm x 1.4 µm pixel
- optical size of 1/6"
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports output formats:
  - 10-bit RAW RGB-Ir
- supports images sizes:
  - 1080p (1920x1080)
  - 720p (1280x720)
- standard serial SCCB interface
- up to 2-lane MIPI serial output interface (supports maximum speed up to 1000 Mbps/lane)
- embedded 2 kilobits of one-time programmable (OTP) memory for customer use
- programmable I/O drive capability
- light sensing mode (LSM)
- RGB-Ir in a 4x4 pattern

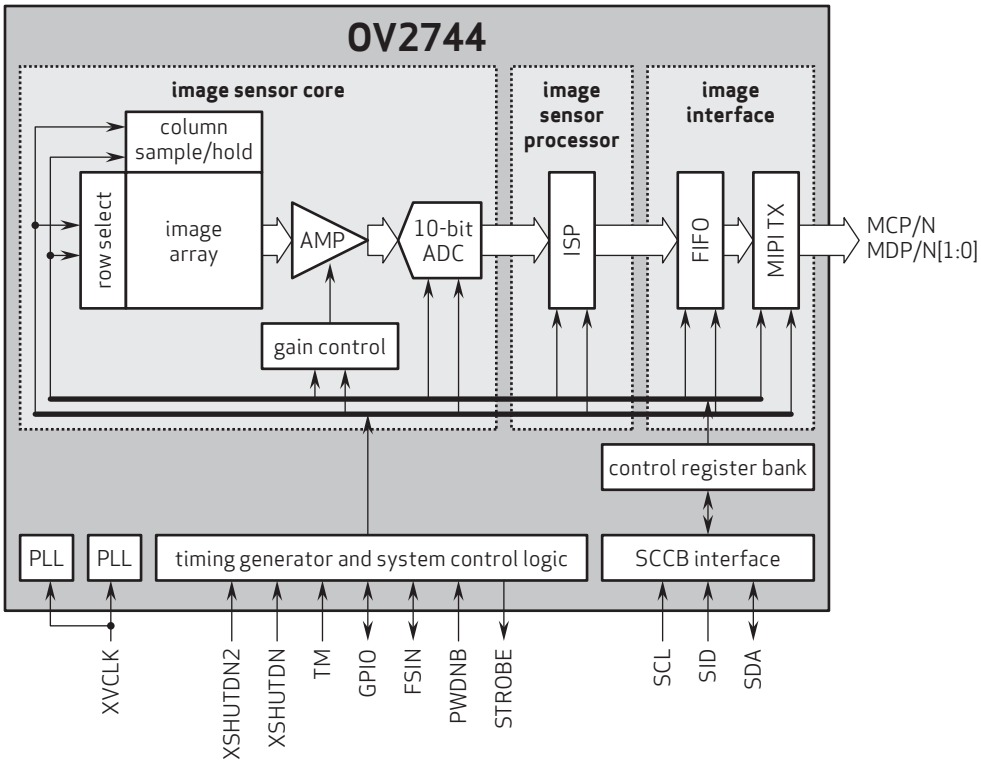
Ordering Information

- **OV02744-GA5A**
  (RGB-Ir, chip probing, 150 µm backgrinding, reconstructed wafer with good die)

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **core:** 1.2V
  - **analog:** 2.8V
  - **I/O:** 1.8V
- **power requirements:**
  - **active:** 90 mW
  - **standby:** 210 µA
  - **XSHUTDN:** 0.6 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output format:** 10-bit RAW RGB-Ir
- **lens size:** 1/6"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 33° non-linear
- **max S/N ratio:** 38.3 dB
- **dynamic range:** 73.3 dB @ 15.5x gain
- **maximum image transfer rate:**
  - **1080p:** 60 fps
  - **720p:** 90 fps
- **sensitivity:** 553 mV/Lux-sec (6750 e⁻/Lux.sec)
- **scan mode:** progressive
- **maximum exposure interval:** 1112 × t_{ROW}
- **pixel size:** 1.4 µm x 1.4 µm
- **image area:** 2728.8 µm x 1549.8 µm
- **package dimensions:**
  - **COB:** 3825 µm x 2889 µm

Functional Block Diagram



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Version 1.3, October, 2018

OV2770 full HD (1080p) product brief

available in a lead-free package

Exceptional Low-Light Sensitivity and 1080p High Definition Video for Mainstream Security Applications

OmniVision's OV2770 is a native 16:9 high definition (HD) CameraChip™ sensor that delivers exceptional low-light sensitivity, high dynamic range (HDR), and 1080p HD video. These capabilities make the OV2770 an ideal camera solution for mainstream security and surveillance systems.

Built on advanced 2.8-micron OmniBSI-2™ pixel architecture, the sensor can record 1080p HD video at 30 frames per second (fps) in HDR mode. The 1/2.9-inch OV2770 leverages OmniVision's in-pixel HDR technology to capture exceptional images and video when recording in high- and low-light environments, a critical benefit for security and surveillance cameras.

The OV2770 is available in a 6.5 x 5.7 mm chip scale package (CSP).

Find out more at www.ovt.com.

OmniVision

OV2770

Applications

- Security and Surveillance Cameras
- Video Applications
- Smart Home

Product Features

- support for image size:
  - 1920 x 1080
  - VGA
  - QVGA, and any cropped size
- high dynamic range
- high sensitivity
- low power consumption
- image sensor processor functions:
  - lens correction
  - defective pixel cancelation
  - HDR combination
  - automatic black level correction
- supported output formats: RAW
- horizontal and vertical sub-sampling
- SCCB for register programming
- high speed serial data transfer with MIPI CSI-2/LVDS
- parallel 12-bit DVP output
- external frame synchronization capability
- embedded temperature sensor
- one time programmable (OTP) memory

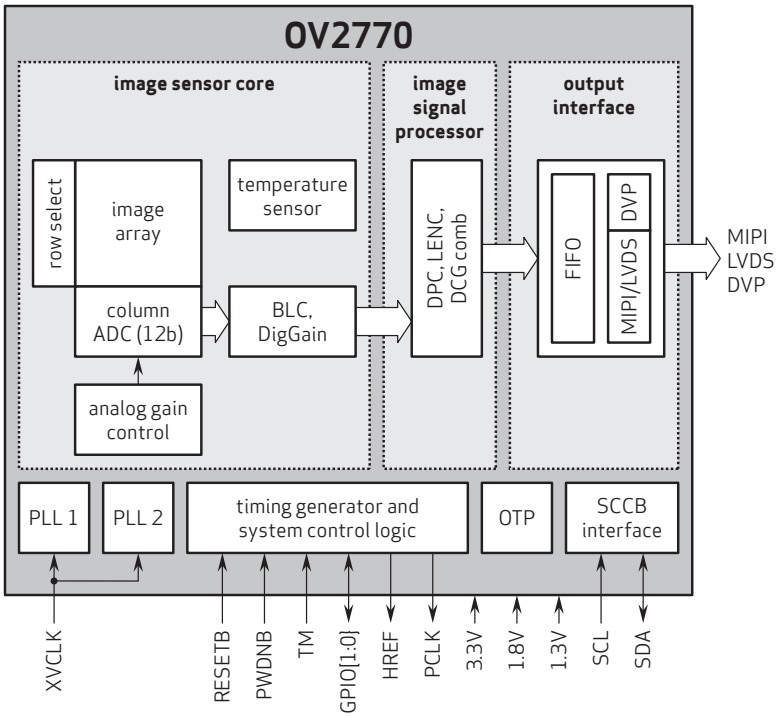
Ordering Information

- **OV02770-H77A-1C**
  (color, lead-free, 77-pin CSP)
- **OV02770-H77A-MC**
  (color, lead-free, 77-pin CSP packed in tray with protective film)

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **analog:** 3.14 - 3.47V
  - **digital:** 1.2 - 1.4V
  - **DOVDD:** 1.7 - 1.9V
  - **AVDD:** 1.7 - 1.9V
- **power requirements:**
  - **active:** 395 mW
  - **software standby:** 20 mW
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
- **output interfaces:** up to 4-lane MIPI CSI-2/LVDS, 12-bit DVP
- **input clock frequency:** 6 - 36 MHz
- **lens size:** 1/2.9"
- **lens chief ray angle:** 15°
- **scan mode:** progressive
- **shutter:** rolling shutter
- **output formats:** linear - 12-bit RAW, 10-bit compressed RAW; single exposure HDR - 16-bit combined RAW, 12-bit compressed combined RAW, 2x12 bit RAW; dual exposure HDR - 16-bit combined RAW + 12-bit VS RAW, 12-bit compressed combined RAW + 12-bit VS RAW, 3x12 bit RAW, 3x10 bit combined RAW, 12-bit (10-bit) RAW (HCG or LCG) + 12-bit (10-bit) VS
- **maximum image transfer rate:** 30 fps
- **sensitivity:** 26200 e⁻/lux.sec @ 530 nm
- **max S/N ratio:** 42.6 dB
- **dynamic range:** 120 dB
- **pixel size:** 2.8 µm x 2.8 µm
- **image area:** 5482.35 µm x 3202 µm
- **package dimensions:** 6544 µm x 5734 µm

Functional Block Diagram



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Version 1.0, October, 2017

OV2775 ARDS product brief

available in
a lead-free
package

OmniVision's New Automotive Reference Design System (ARDS) for Optimized Automotive Imaging System Development

With OmniVision's Reference Design System, Automotive Customers Can Create User-Friendly Demo Kits for Faster Time-to-Market

OV2775 ARDS

OmniVision's automotive reference design system (ARDS) provides automotive imaging-system and software developers a plug-and-play platform to easily design next-generation advanced driver assistance systems (ADAS). The modular approach of OmniVision's ARDS allows developers to quickly mix and match image sensors, image signal processors (ISPs) and long-distance serializer modules, enabling streamlined system development and accelerated time-to-market.

With its compact form factor, OmniVision's ARDS is ideally suited for a wide range of ADAS applications, including rear video mirrors, camera monitor systems (CMS) and dash cameras. OmniVision's ARDS demo kit features the high-performance OV2775 image sensor, the optional OV495 image signal processor and a serializer camera module.

The OV2775 is built on 2.8-micron OmniBSI-2™ Deep Well™ pixel technology, which offers a 16-bit linear output from a single exposure with best-in-class low-light sensitivity. The sensor is capable of recording 1920 x 1080 resolution videos with a dynamic range exceeding 120 dB. OmniVision's ARDS is available in two configurations, with or without the OV495 ISP.

For more technical details on the OV2775 and OV495 please visit www.ovt.com.

OV2775

OV495

Ordering Information

- **OV02775-EXAE-BA0B**
  2.5MP HDR RAW automotive CMOS evaluation kit, TI953+OV2775
- **OV02775-EXAE-BC0B**
  2.5MP HDR RAW automotive CMOS evaluation kit, TI953+OV495+OV2775
- **OV02775-EXAE-AA0A**
  2.5MP HDR RAW automotive CMOS evaluation kit, OV2775 ARDS w/o serializer

Features

- ready to use camera solution
- compact form factor
- modular interchangeable building blocks

Benefits

- faster development cycles
- fewer technical resources required
- lower development costs
- no redundant work

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Version 1.3, July, 2018

OV2775 full HD (1080p) product brief

available in a lead-free package

High Performance 2-Megapixel OmniBSI™-2 Sensor for Advanced Automotive Applications

OmniVision's OV2775 is a 2.8-micron OmniBSI™-2 image sensor designed for a wide range of automotive imaging applications. The OV2775 features 1920 x 1080 resolution and Deep Well™ pixel technology, delivering 16-bit linear output to achieve 94 dB of dynamic range from a single exposure for best-in-class low-light performance. The OV2775's advanced high dynamic range (HDR) capabilities make it ideally suited for automotive applications such as front-view machine vision advanced driver assistance systems (ADAS), rear video mirrors, camera monitor systems (CMS), and dash cameras.

Built on OmniVision's OmniBSI™-2 Deep Well™ pixel technology, the OV2775 enables 94 dB of dynamic range from a single exposure without any drop in signal-to-noise ratio or HDR combination artifacts. The OV2775 also features a dual exposure mode that can expand the sensor's dynamic range to more than 120 dB, using a second "very short" exposure to minimize motion artifacts.

The OV2775 comes in an AEC-Q100 Grade 2-qualified 6.5 x 5.7 mm chip scale package and contains an advanced set of safety mechanisms to enable ISO 26262 ASIL B-rated camera systems.

Find out more at www.ovt.com.

OmniVision

OV2775

Applications

- Automotive
  - 360° surround view system
  - lane departure warning/ lane keep assist
  - blind spot detection
  - pedestrian detection
  - traffic sign recognition
  - occupant sensor
  - camera monitoring system
  - autonomous driving

Product Features

- support for image size:
  - 1920 x 1080
  - VGA
  - QVGA, any cropped size
- high dynamic range
- high sensitivity
- low power consumption
- image sensor processor functions:
  - lens correction
  - defective pixel cancelation
  - HDR combination
  - automatic black level correction
- supported output formats: RAW
- horizontal and vertical sub-sampling
- SCCB for register programming
- high speed serial data transfer with MIPI CSI-2/LVDS
- parallel 12-bit DVP output
- external frame synchronization capability
- embedded temperature sensor
- one time programmable (OTP) memory

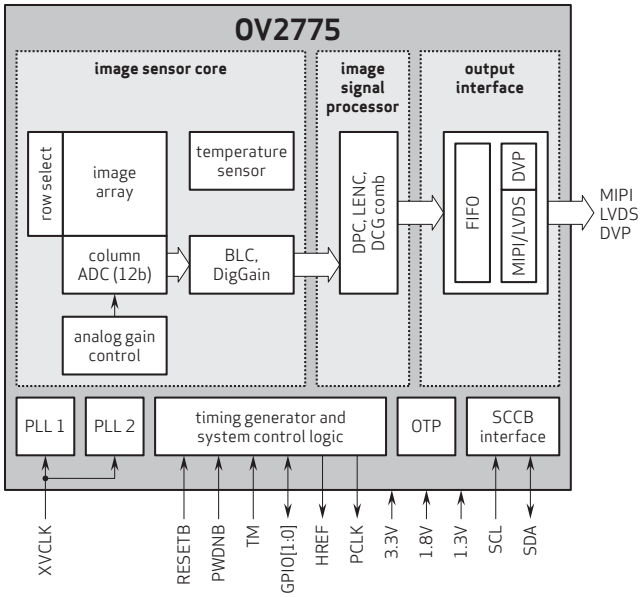
Ordering Information

- **OV02775-E77Y-1E** (color, lead-free)
  77-pin a-CSP™, with DAR coating, packed in tray without protective film
- **OV02775-E77Y-LE** (color, lead-free)
  77-pin a-CSP™, with DAR coating, packed in tray with protective film
- **OV02775-E77Y-OE** (color, lead-free)
  77-pin a-CSP™, with DAR coating, packed in tape & reel with protective film

Product Specifications

- **active array size:** 1920 x 1080
- **power supply:**
  - **analog:** 3.14 - 3.47V
  - **digital:** 1.2 - 1.4V
  - **DOVDD:** 1.7 - 1.9V
  - **AVDD:** 1.7 - 1.9V
- **power requirements:**
  - **active:** 395 mW
  - **standby:** 10 mW
- **temperature range:**
  - **operating:** -40°C to +105°C sensor ambient temperature and -40°C to +125°C junction temperature
- **output interfaces:** up to 4-lane MIPI CSI-2/LVDS, 12-bit DVP
- **input clock frequency:** 6 - 36 MHz
- **lens size:** 1/2.9"
- **lens chief ray angle:** 15°
- **scan mode:** progressive
- **shutter:** rolling shutter
- **output formats:** linear - 12-bit RAW, 10-bit compressed RAW; single exposure HDR - 16-bit combined RAW, 12-bit compressed combined RAW, 2x12 bit RAW; dual exposure HDR - 16-bit combined RAW + 12-bit VS RAW, 12-bit compressed combined RAW + 12-bit VS RAW, 3x12 bit RAW, 3x10 bit combined RAW, 12-bit (10-bit) RAW (HCG or LCG) + 12-bit (10-bit) VS
- **maximum image transfer rate:** 30 fps full resolution
- **sensitivity:** 26,200 e⁻/lux.sec @ 530 nm
- **max S/N ratio:** 42.6 dB
- **dynamic range:** 120 dB
- **pixel size:** 2.8 µm x 2.8 µm
- **image area:** 5482.35 µm x 3202 µm
- **package dimensions:**
  - **a-CSP™:** 6544 µm x 5734 µm

Functional Block Diagram



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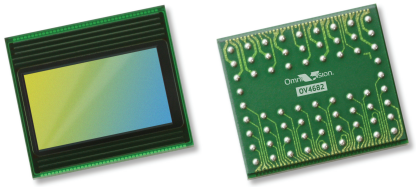
Version 1.4, October 2018



OV4682 4MP product brief

Dual-Purpose RGB IR CameraChip™ Sensor Brings High Sensitivity and High Frame Rates to Mobile and Machine Vision Applications

lead free

available in a lead-free package

OmniVision's OV4682 is a 4-megapixel RGB infrared (IR) single sensor that captures high-resolution images and video as well as IR information. Its dual RGB and IR capabilities allow it to bring a host of additional features to mobile and machine vision applications, including gesture sensing, depth analysis, iris detection and eye tracking. By combining two capabilities into a single sensor, the OV4682 reduces the total cost for the system while also reducing the space required for multiple sensors.

The sensor's 2-micron OmniBSI-2™ pixel delivers excellent signal-to-noise ratio and IR sensitivity, and offers best-in-class low-light sensitivity with a 40 percent increase in sensitivity compared to the 1.75-micron OmniBSI-2 pixel. The OV4682's unique architecture and pixel optimization bring not only the best IR performance but also best-in-class image quality. Additionally, the sensor reduces system-level power consumption by optimizing RGB and IR timing.

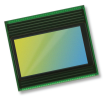
The OV4682 records full-resolution 4-megapixel video in a native 16:9 format at 90 frames per second (fps), with a quarter of the pixels dedicated to capturing IR. The 1/3-inch sensor can also record 1080p high definition (HD) video at 120 fps with electronic image stabilization (EIS), or 720p HD at 180 fps.

The OV4682 features a high-speed 4-lane MIPI serial output interface to facilitate the required high data transfer rate. It fits into an 8.5 x 8.5 mm module with a z-height of less than 6 mm.

Find out more at www.ovt.com.

OmniVision

OV4682



Applications

- Cellular Phones
- Tablets
- Digital Still Cameras (DSC)
- Digital Video Camcorders (DVC)
- PC Multimedia
- Security
- Gaming
- Gesture Detection

Ordering Information

- **OV04682-G04A-1D**
  (RGB-IR, chip probing, 200 µm backgrinding, reconstructed wafer with good die)

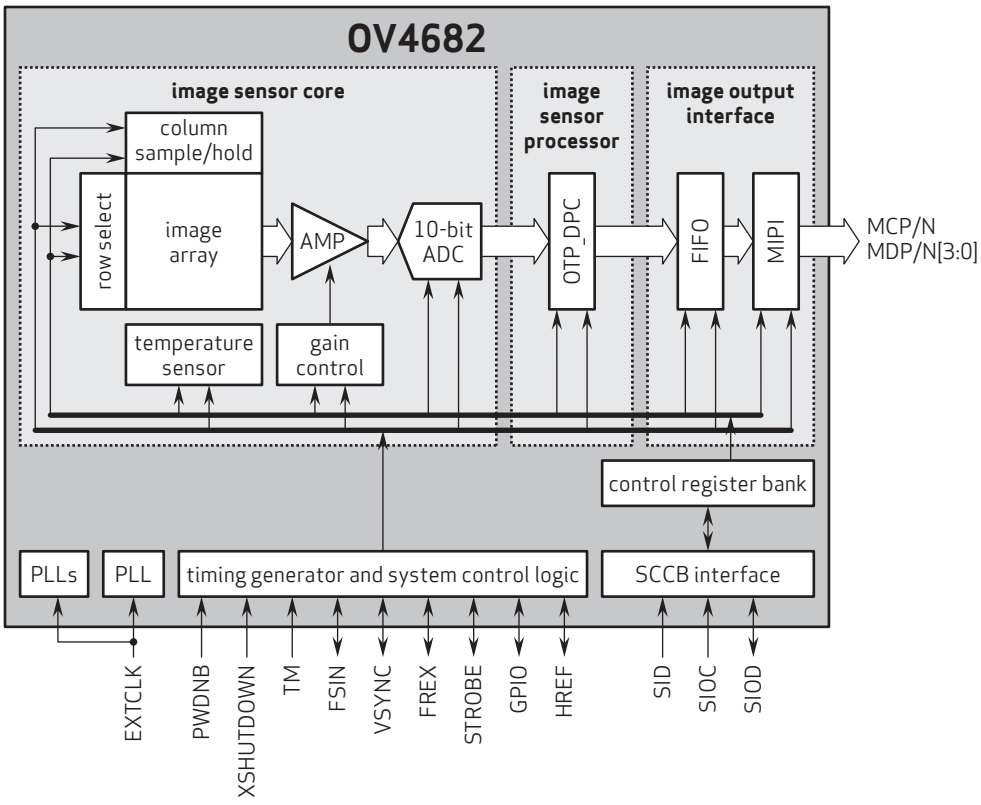
Product Features

- automatic black level calibration (ABLC)
- programmable controls for frame rate, mirror and flip, cropping, and windowing
- static defective pixel canceling
- supports output formats: 10-bit RAW RGB-IR (MIPI)
- supports horizontal and vertical subsampling
- supports images sizes: 4MP, 3MP, EIS1080p, 1080p, EIS720p
- fast mode switching
- support 2x2 binning, 4x4 binning, re-sampling filter
- standard serial SCCB interface
- up to 4-lane MIPI serial output interface
- embedded 4K bits one-time programmable (OTP) memory for part identification, etc.
- two on-chip phase lock loops (PLLs)
- programmable I/O drive capability
- built-in temperature sensor

Product Specifications

- **active array size:** 2688 x 1520
- **power supply:**
  - **core:** 1.1 - 1.3V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 163 mA (261 mW)
  - **standby:** 1 mA
  - **XSHUTDOWN:** <10 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10-bit RAW RGB data
- **lens size:** 1/3"
- **input clock frequency:** 6 - 64 MHz
- **lens chief ray angle:** 21° non-linear
- **maximum image transfer rate:**
  - **2688x1520:** 90 fps
  - **1920x1080:** 120 fps
  - **1280x720:** 180 fps
  - **672x380:** 330 fps
- **scan mode:** progressive
- **maximum exposure interval:** 1548 x T_{ROW}
- **pixel size:** 2 µm x 2 µm
- **dark current:** 4 mV/sec @ 60°C junction temperature
- **image area:** 5440 µm x 3072 µm
- **die dimensions:**
  - **COB:** 6600 µm x 5800 µm
  - **RW:** 6650 µm x 5850 µm

Functional Block Diagram



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Version 2.2, October, 2014

OV4685 4MP product brief

lead free

available in a lead-free package

High Frame Rate 4-Megapixel Sensor with Excellent Low-Light Sensitivity and OmniHDR-F™ Technology for Security Applications

The OV4685 is a high performance 4-megapixel CameraChip™ sensor in a native high definition (HD) 16:9 format designed for next-generation surveillance and security systems. The sensor is built on a 2-micron OmniBSI-2™ pixel that provides best-in-class sensitivity, and uses advanced OmniHDR-F™ technology to provide industry leading staggered high dynamic range (HDR).

The 1/3-inch OV4685 can capture full-resolution 4-megapixel HD video at 90 frames per second (fps), 1080p HD at 120 fps, and binned 720p HD at 180 fps. The sensor's high frame rates enable crisp, clean image and video capture of fast moving objects.

The OV4685's advanced OmniHDR-F technology provides staggered HDR timing, increasing dynamic range to 64.6 dB while recording high-quality images and video under extreme variations of bright and dark conditions.

The sensor features a high-speed 4-lane MIPI serial output interface to facilitate the required high data transfer rate. The OV4685 is available in a chip scale package (CSP).

Find out more at www.ovt.com.

OmniVision

OV4685

Applications

- Security and Surveillance

Product Features

- automatic black level calibration (ABLC)
- programmable controls for frame rate, mirror and flip, cropping, and windowing
- static defective pixel canceling
- supports output formats: 10-bit RAW RGB (MIPI)
- supports horizontal and vertical subsampling
- supports images sizes: 4MP, 3MP, EIS1080p, 1080p, EIS720p
- fast mode switching
- support 2x2 binning, 4x4 binning, re-sampling filter
- standard serial SCCB interface
- up to 4-lane MIPI serial output interface
- embedded 4K bits one-time programmable (OTP) memory for part identification, etc
- two on-chip phase lock loops (PLLs)
- programmable I/O drive capability
- built-in temperature sensor
- supports staggered, sequential and alternative row HDR timing
- supports staggered 3-exposure HDR mode

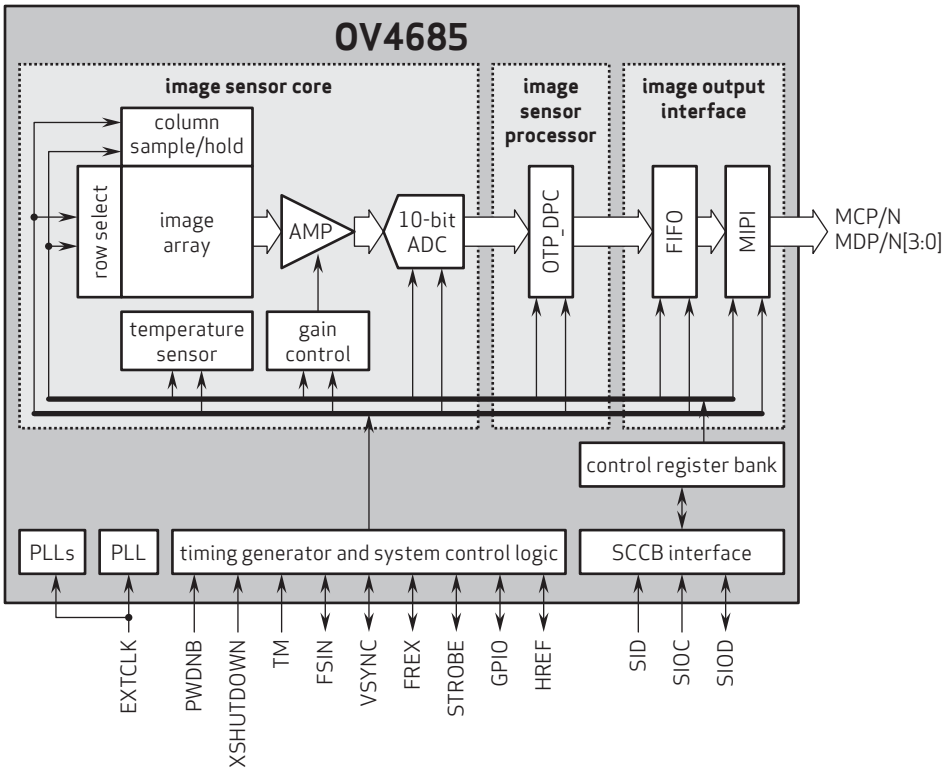
Ordering Information

- **OV04685-H67A**
  (color, lead-free, 67-pin CSP5)

Product Specifications

- **active array size:** 2688 x 1520
- **power supply:**
  - **core:** 1.1 - 1.3V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 163 mA (261 mW)
  - **standby:** 1 mA
  - **XSHUTDOWN:** <10 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10-bit RAW RGB data
- **lens size:** 1/3"
- **input clock frequency:** 6 - 64 MHz
- **lens chief ray angle:** 0°
- **max S/N ratio:** 37.8 dB
- **dynamic range:** 64.6 dB @ 1x gain
- **maximum image transfer rate:**
  - **2688x1520:** 90 fps
  - **1920x1080:** 120 fps
  - **1280x720:** 180 fps
- **sensitivity:** 1900 mV/lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** 1548 x T_{ROW}
- **pixel size:** 2 µm x 2 µm
- **dark current:** 4 mV/sec @ 60°C junction temperature
- **image area:** 5440 µm x 3072 µm
- **package dimensions:** 6630 µm x 5830 µm

Functional Block Diagram



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Version 1.2, December, 2015

OV4686 4MP product brief

available in a lead-free package

High Sensitivity CameraChip™ Sensor with Second-Generation RGB-Ir Color Array Pattern for Security Applications

OmniVision's OV4686 is a high sensitivity CameraChip™ sensor built on a second-generation RGB-Ir color array pattern that brings clear, high quality images and video to security and smart home applications.

Built on a 2-micron OmniBSI-2™ pixel, the OV4686 delivers best-in-class low-light and infrared performance, recording color-accurate scene reproduction even in challenging lighting environments. The 1/3-inch OV4686 enables full resolution 1080p high definition (HD) images and video at 120 frames per second (fps).

The sensor's advanced color array pattern supports dual band color filters instead of traditional mechanical rotary IR filters to capture infrared images and video with minimal color aliasing.

Find out more at www.ovt.com.

OmniVision

OV4686

Applications

- Surveillance
- Home Automation
- Sports Cameras

Product Features

- automatic black level calibration (ABLC)
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- static defective pixel canceling
- supports output formats:
  - 10-bit RAW RGB-Ir (MIPI)
- supports images sizes:
  - 4MP
  - 3MP
  - EIS1080p
  - 1080p
- fast mode switching
- standard serial SCCB interface
- up to 4-lane MIPI serial output interface
- embedded 4K bits one-time programmable (OTP) memory for part identification, etc.
- two on-chip phase lock loops (PLLs)
- programmable I/O drive capability
- built-in temperature sensor
- supports staggered 3-exposure HDR mode

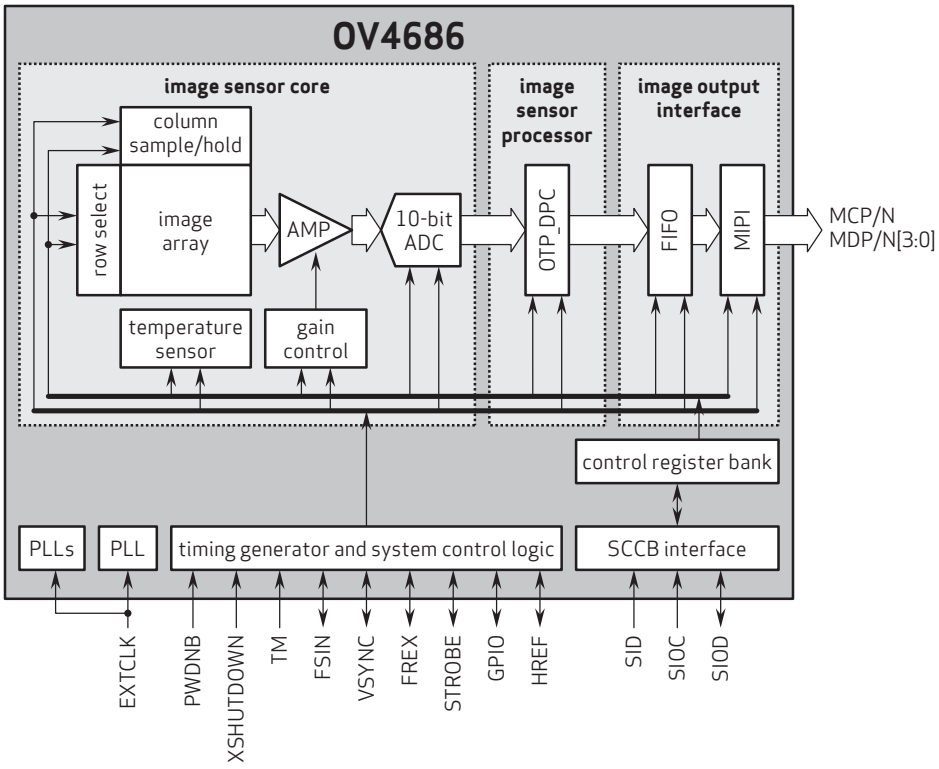
Ordering Information

- **OV04686-H67A**
  (RGB-Ir, lead-free, 67-pin CSP)

Product Specifications

- **active array size:** 2688 x 1520
- **power supply:**
  - **core:** 1.1 - 1.3V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 163 mA (261 mW)
  - **standby:** 1 mA
  - **XSHUTDOWN:** <10 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10-bit RAW RGB-Ir
- **lens size:** 1/3"
- **input clock frequency:** 6 - 64 MHz
- **lens chief ray angle:** 9°
- **max S/N ratio:** 37.8 dB
- **dynamic range:** 64.6 dB @ 1x gain
- **maximum image transfer rate:**
  - **2688x1520:** 90 fps
  - **1920x1080:** 120 fps
- **maximum exposure:** 4 T_{ROW}
- **minimum exposure:** VTS-8 T_{ROW}
- **sensitivity:** 1900 mV/lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** 1548 x T_{ROW}
- **pixel size:** 2 µm x 2 µm
- **image area:** 5440 µm x 3072 µm
- **package dimensions:** 6630 µm x 5830 µm

Functional Block Diagram



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Version 1.3, October, 2017

OV4688 4MP product brief

lead free

available in a lead-free package

Native 16:9 HD 4-Megapixel CameraChip™ Sensor with High Frame Rate and Excellent Low Light Sensitivity for Next-Generation Video Applications

The OV4688 is a high-performance 4-megapixel CameraChip sensor in a native 16:9 high definition (HD) format designed to deliver ultra-high quality fast frame rate HD video for mobile devices. Built on a new 2-micron OmniBSI-2™ pixel, the OV4688 offers best-in-class low-light performance with a 40 percent increase in sensitivity compared to the 1.75-micron OmniBSI-2 pixel.

The OV4688 supports timing for two High Dynamic Range (HDR) modes, frame-based sequential HDR and line-based staggered HDR. A major advantage of staggered mode over sequential mode is a significant reduction of motion artifacts in the captured images. The sensor's enhanced performance, along with its ability to record full resolution 4MP @ 90 frames per second (fps), allows it to capture best-in-class video and high-speed photography with zero shutter lag, and video HDR at 30 fps.

The 1/3-inch OV4688 can also capture 1080p HD at 120 fps with electronic image stabilization (EIS), or 720p HD at 180 fps. The OV4688's high frame rates enable additional key benefits, including full-resolution continuous frame capture or burst photography and recording of high-quality slow-motion video.

The OV4688 features a high-speed 4-lane MIPI serial output interface to facilitate the required high data transfer rate and fits into an 8.5 x 8.5 mm module with a z-height of about 5 mm.

Find out more at www.ovt.com.

OmniVision

OV4688

Applications

- Cellular Phones
- Digital Still Cameras (DSC)
- Digital Video Camcorders (DVC)
- PC Multimedia

Product Features

- supports staggered, sequential HDR timing
- automatic black level calibration (ABLC)
- programmable controls for frame rate, mirror and flip, cropping, and windowing
- static defective pixel canceling
- supports output formats: 10-bit RAW RGB (MIPI)
- supports horizontal and vertical subsampling
- supports images sizes: 4MP, 3MP, EIS1080p, 1080p, EIS720p
- fast mode switching
- support 2x2 binning, 4x4 binning, re-sampling filter
- standard serial SCCB interface
- up to 4-lane MIPI serial output interface
- embedded 1.5K bits one-time programmable (OTP) memory for part identification, etc
- two on-chip phase lock loops (PLLs)
- programmable I/O drive capability
- built-in temperature sensor

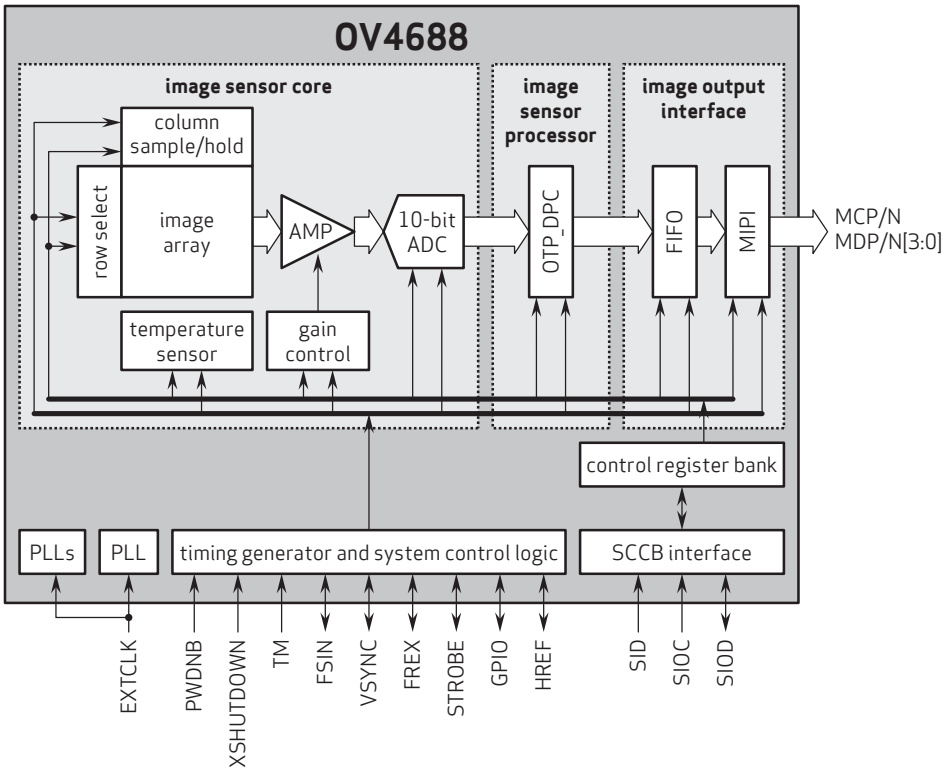
Ordering Information

- **OV04688-G04A-Z**
  (color, chip probing, 200 µm backgrinding, reconstructed wafer with good die)

Product Specifications

- **active array size:** 2688 x 1520
- **power supply:**
  - **core:** 1.1 - 1.3V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 163 mA (261 mW)
  - **standby:** 1 mA
  - **XSHUTDOWN:** <10 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10-bit RAW RGB data
- **lens size:** 1/3"
- **input clock frequency:** 6 - 64 MHz
- **lens chief ray angle:** 31.5° non-linear
- **max S/N ratio:** 38.3 dB
- **dynamic range:** 64.6 dB @ 1x gain
- **maximum image transfer rate:**
  - **2688x1520:** 90 fps
  - **1920x1080:** 120 fps
  - **1280x720:** 180 fps
  - **672x380:** 330 fps
- **sensitivity:** 1900 mV/lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** 1548 x T_{ROW}
- **pixel size:** 2 µm x 2 µm
- **dark current:** 4 mV/sec @ 60°C junction temperature
- **image area:** 5440 µm x 3072 µm
- **die dimensions:**
  - **COB:** 6600 µm x 5800 µm

Functional Block Diagram



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Version 1.3, October, 2014

OV4689 4MP product brief

available in a lead-free package

High Frame Rate 4-Megapixel CameraChip™ Sensor with Excellent Low-Light Sensitivity and High Dynamic Range for Security Applications

The OV4689 is a high performance 4-megapixel CameraChip sensor in a native 16:9 format designed for next-generation surveillance and security systems. The sensor utilizes an advanced 2-micron OmniBSI™-2 pixel to provide best-in-class low-light sensitivity and high dynamic range (HDR).

The 1/3-inch OV4689 can capture full-resolution 4-megapixel high definition (HD) video at 90 frames per second (fps), 1080p HD at 120 fps, and binned 720p HD at 180 fps. The sensor's high frame rates enable crisp, clean image and video capture of fast moving objects.

The OV4689 provides timing to capture full-resolution HDR using frame-based "sequential HDR" or line-based "staggered HDR", and quarter resolution HDR using "alternate row HDR". The benefits of using "staggered HDR" compared to "sequential HDR" are significant reduction in motion artifacts and lower memory requirement for host processing. These modes produce high quality full-resolution 4-megapixel HDR video under extreme variations of bright and dark conditions, ensuring high contrast and excellent scene reproduction.

The OV4689 features a high-speed 4-lane MIPI serial output interface to facilitate the required high data transfer rate. The OV4689 is available in a chip scale package (CSP).

Find out more at www.ovt.com.

OmniVision

OV4689

Applications

- IP Cameras
- Sports Cameras
- Home Monitoring
- Security Cameras

Product Features

- automatic black level calibration (ABLC)
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- static defective pixel canceling
- supports output formats:
  - 10-bit RAW RGB (MIPI)
- supports horizontal and vertical subsampling
- supports image sizes:
  - 4MP
  - 3MP
  - EIS1080p
  - 1080p
  - EIS720p
- fast mode switching
- support 2x2 binning, 4x4 binning, re-sampling filter
- standard serial SCCB interface
- up to 4-lane MIPI serial output interface
- embedded 4K bits one-time programmable (OTP) memory for part identification, etc.
- two on-chip phase lock loops (PLLs)
- programmable I/O drive capability
- built-in temperature sensor

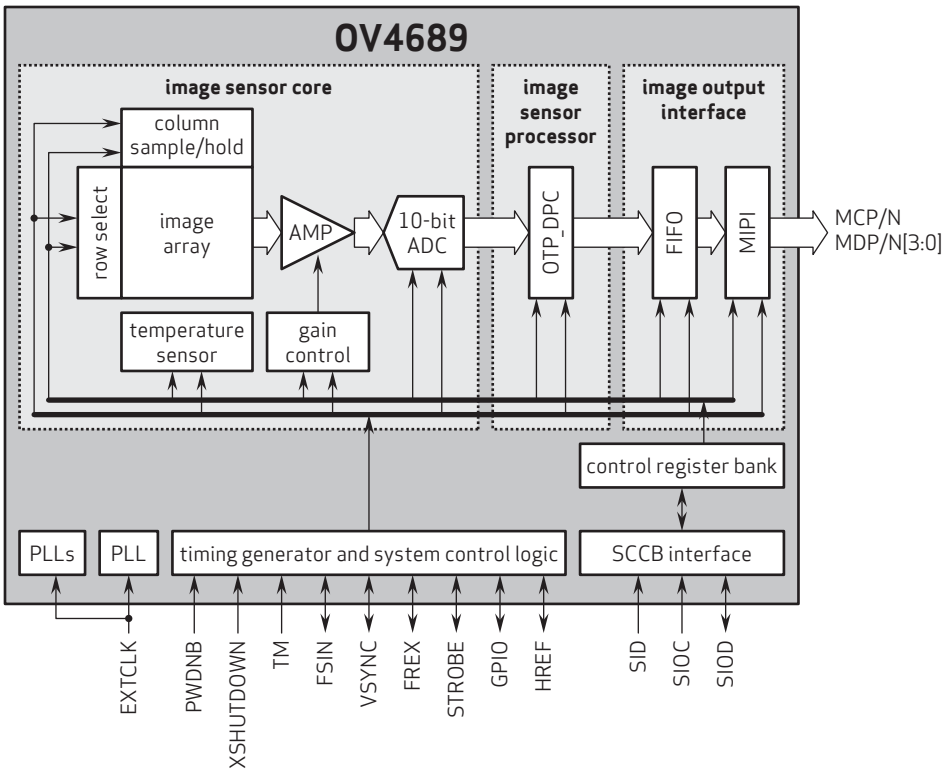
Ordering Information

- **OV04689-H67A**
  (color, lead-free) 67-pin CSP

Product Specifications

- **active array size:** 2688 x 1520
- **power supply:**
  - **core:** 1.1 - 1.3V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 163 mA (261 mW)
  - **standby:** 1 mA
  - **XSHUTDOWN:** <10 µA
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** 0°C to +60°C junction temperature
- **output formats:** 10-bit RAW RGB
- **lens size:** 1/3"
- **input clock frequency:** 6 - 64 MHz
- **lens chief ray angle:** 0°
- **max S/N ratio:** 38.3 dB
- **dynamic range:** 64.6 dB @ 1x gain
- **maximum image transfer rate:**
  - **2688 x 1520:** 90 fps
  - **1920 x 1080:** 120 fps
  - **1280 x 720:** 180 fps
  - **672 x 380:** 330 fps
- **sensitivity:** 1900 mV/lux-sec
- **scan mode:** progressive
- **maximum exposure interval:** 1548 x T_{ROW}
- **pixel size:** 2 µm x 2 µm
- **image area:** 5440 µm x 3072 µm
- **package dimensions:**
  - **CSP:** 6630 µm x 5830 µm

Functional Block Diagram



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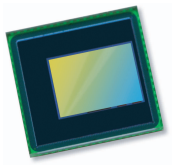
Version 1.6, October, 2018



OV5645 5-megapixel product brief

High Quality 5-Megapixel Photography and HD Video for Low-Cost Mobile Devices

lead free

available in a lead-free package

OmniVision's OV5645 is a high performance, 5-megapixel system-on-chip (SOC) ideally suited for the cost-sensitive segment of the mobile handset market. The CameraChip™ sensor's single MIPI port replaces both a bandwidth-limited DVP interface and a costly embedded JPEG compressor, allowing the new OV5645 sensor to save significant silicon area and cost. An embedded autofocus control with voice coil motor driver offers further cost savings for the end user, making the OV5645 a highly attractive alternative to other 5-megapixel sensors currently on the market.

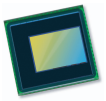
The OV5645 also features a new picture-in-picture (PIP) architecture that offers an easy-to-implement, low-cost dual camera system solution for mobile handsets and smartphones. The feature is based on a master/slave configuration where a front-facing camera (OV7965) can be connected through the OV5645 master camera, enabling a two-camera system with PIP functionality without the need for an additional MIPI interface into the baseband processor.

Built on OmniVision's 1.4-micron OmniBSI™ pixel architecture, the OV5645 offers high performance 5-megapixel photography and 720p HD video at 60 frames per second (FPS) and 1080p HD video at 30 FPS with complete user control over formatting and output data transfer. The sensor's 720p HD video is captured in full field-of-view with 2 x 2 binning, which doubles the sensitivity and improves the signal-to-noise ratio (SNR). A unique post-binning, re-sampling filter function removes zigzag artifacts around slant edges and minimizes spatial artifacts to deliver even sharper, crisper color images.

Find out more at www.ovt.com.

OmniVision

OV5645



Applications

- Cellular Phones
- Toys
- PC Multimedia
- Digital Still Cameras

Product Features

- 1.4 µm x 1.4 µm pixel with OmniBSI+™ technology for high performance (high sensitivity, low crosstalk, low noise, improved quantum efficiency)
- optical size of 1/4"
- automatic image control functions: automatic exposure control (AEC), automatic white balance (AWB), automatic band filter (ABF), automatic 50/60 Hz luminance detection, and automatic blacklevel calibration (ABLC)
- image quality controls: color saturation, hue, gamma, sharpness (edge enhancement), lens correction, defective pixel canceling, and noise canceling
- support for output formats: RAW RGB, RGB565/555/444, YUV422/420, YCbCr422
- support for video or snapshot operations
- support for internal and external frame synchronization for frame exposure mode
- support for LED and flash strobe mode
- support for horizontal and vertical sub-sampling, binning
- support for minimizing artifacts on binned image
- support for data compression output
- support for anti-shake
- standard serial SCCB interface
- dual lane MIPI output interface
- embedded 1.5V regulator for core power
- programmable I/O drive capability, I/O tri-state configurability
- support for black sun cancellation
- support for images sizes: 5 megapixel, and any arbitrary size scaling down from 5 megapixel
- support for auto focus control (AFC) with embedded AF VCM driver
- embedded microcontroller
- suitable for module size of 8.5 x 8.5 x <6mm with both CSP and RW packaging

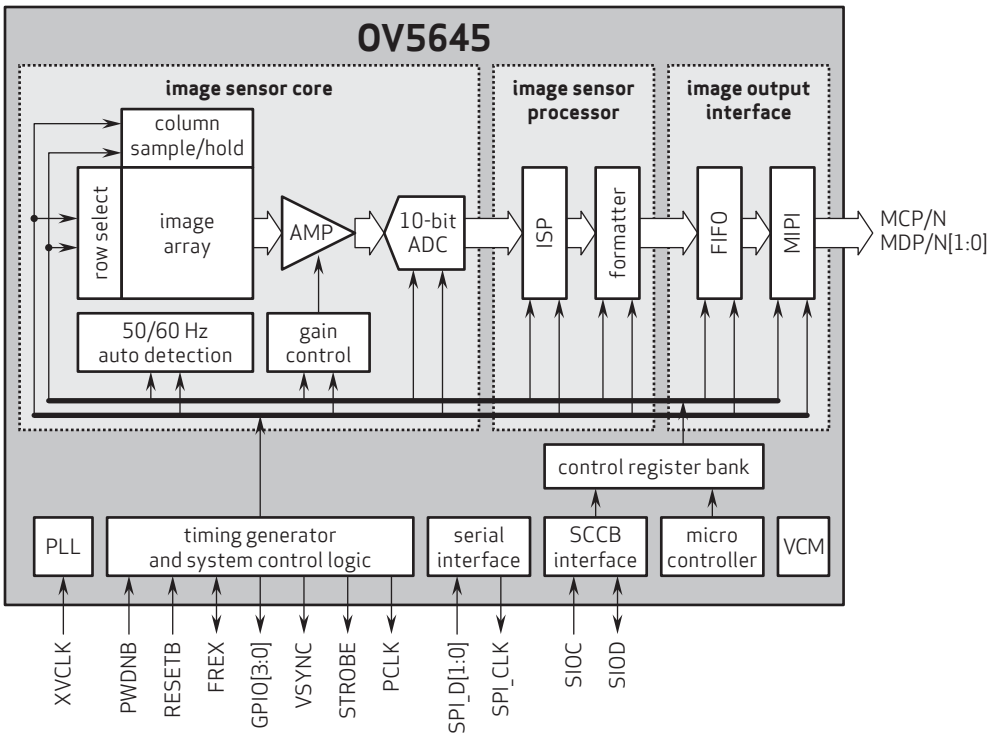
Ordering Information

- **OV05645-A66A** (color, lead-free, 66-pin CSP3)
- **OV05645-G04A** (color, chip probing, 200 µm backgrinding, reconstructed wafer)

Product Specifications

- **active array size:** 2592 x 1944
- **power supply:**
  - **core:** 1.5V ±5% (with embedded 1.5 regulator)
  - **analog:** 2.6 - 3.0V (2.8V typical)
  - **I/O:** 1.8V / 2.8V
- **temperature range:**
  - **operating:** -30°C to 70°C junction temperature
  - **stable image:** 0°C to 50°C junction temperature
- **output formats:** 8-/10-bit RGB RAW, RGB565/555/444, YUV422/420, YCbCr422 output
- **lens size:** 1/4"
- **lens chief ray angle:** 29.1°
- **input clock frequency:** 6 - 27 MHz
- **max S/N ratio:** 36 dB
- **maximum image transfer rate:**
  - **QSXGA (2592X1944):** 15 fps
  - **1080p:** 30 fps
  - **1280x960:** 45 fps
  - **720p:** 60 fps
- **shutter:** rolling shutter / frame exposure
- **maximum exposure interval:** 1964 x t_{ROW}
- **pixel size:** 1.4 µm x 1.4 µm
- **image area:** 3673.6 µm x 2738.4 µm
- **package/die dimensions:**
  - **CSP3**: 6200 µm x 4860 µm
  - **COB**: 6190 µm x 4850 µm

Functional Block Diagram



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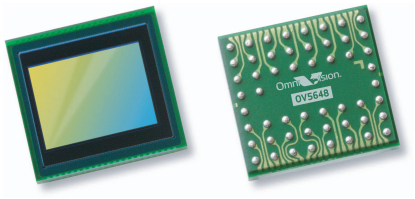
Version 1.0, October, 2012



OV5648 5-megapixel product brief

Cost-Efficient 5-Megapixel Camera Solution for Mainstream Mobile Devices

lead free

available in a lead-free package

The OV5648 is a cost-efficient, high performance 5-megapixel CameraChip™ sensor for smartphones and tablets. Utilizing OmniVision's latest 1.4-micron OmniBSI+™ pixel architecture, the OV5648 combines a reduced die size with improved quality photography and high-definition (HD) video, making it ideally suited for mainstream mobile applications.

OmniVision's powerful new OmniBSI+ pixel architecture offers significant performance improvements over our original OmniBSI™ architecture, including a 60 percent increase in full-well capacity and a significant improvement in low-light sensitivity. With OmniBSI+, the 1/4-inch OV5648 is capable of capturing high quality still images as well as 720p HD video at 60 frames per second (fps) and 1080p HD video at 30 fps.

The sensor supports a two-lane MIPI interface, and provides full-frame, windowed or binned 10-bit images in RAW RGB format with complete user control over formatting and output transfer. It offers defective pixel canceling and all required automatic image control functions, including automatic exposure control, automatic gain control, automatic white balance, and automatic black level calibration.

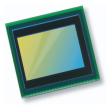
A secondary image sensor may be connected to the OV5648 enabling a Video-in-Video (ViV) feature in which the secondary image is overlaid to the OV5648 output video. The combined video is streamed out over the MIPI interface. A bypass mode allows a secondary sensor to utilize the OV5648 MIPI interfaced baseband.

The OV5648 can fit into a 6 x 6 mm fixed focus camera module with a z-height of less than 4.5 mm.

Find out more at www.ovt.com.

OmniVision

OV5648



Applications

- Cellular and Picture Phones
- PC Multimedia
- Toys
- Digital Still Cameras

Product Features

- 1.4 µm x 1.4 µm pixel with OmniBSI+™ technology for high performance (high sensitivity, low crosstalk, low noise)
- optical size of 1/4"
- automatic image control functions:
  - automatic exposure control (AEC)
  - automatic gain control (AGC)
  - automatic white balance (AWB)
  - automatic black level calibration (ABLC)
- programmable controls for frame rate, AEC/AGC 16-zone size/position/ weight control, mirror and flip, cropping, windowing, and panning
- defective pixel canceling
- support for output formats: 8-/10-bit raw RGB data
- support for video or snapshot operations
- support for LED and flash strobe mode
- support for internal and external frame synchronization for frame exposure mode
- support for horizontal and vertical sub-sampling
- standard serial SCCB interface
- MIPI interface (two lanes)
- Video-in-Video (ViV) and bypass support for secondary sensor
- 32 bytes of embedded one-time programmable (OTP) memory
- on-chip phase lock loop (PLL)
- embedded 1.5V regulator for core power
- programmable I/O drive capability, I/O tri-state configurability
- support for black sun cancellation

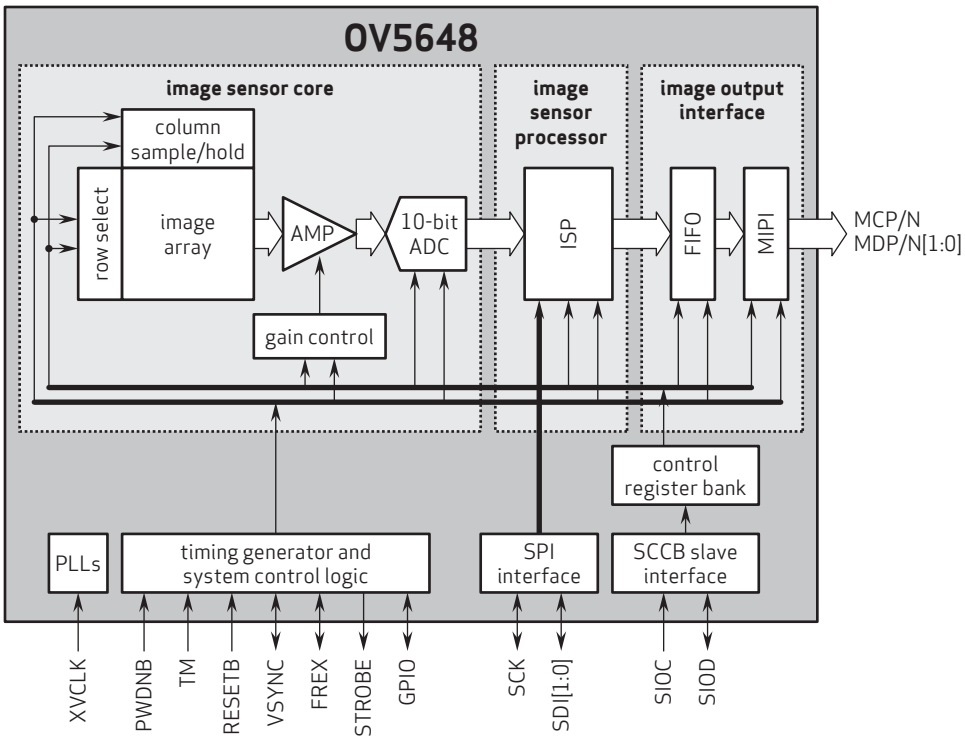
Ordering Information

- **OV05648-A53A**
  (color, lead-free, 53-pin CSP3)
- **OV05648-G04A**
  (color, chip-probing, 200 µm backgrinding, reconstructed wafer)

Product Specifications

- **active array size:** 2592 x 1944
- **power supply:**
  - **core:** 1.5V ±5%
    (with embedded 1.5V regulator)
  - **analog:** 2.6 - 3.0V (2.8V typical)
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 219 mW
  - **standby:** 36 µW
- **temperature range:**
  - **operating:** -30°C to 70°C junction temperature
  - **stable image:** 0°C to 50°C junction temperature
- **output formats:**
  8-/10-bit RGB RAW output
- **lens size:** 1/4"
- **lens chief ray angle:** 29.1°
- **input clock frequency:** 6 - 27 MHz
- **max S/N ratio:** 36 dB
- **dynamic range:** 72 dB @ 8x gain
- **maximum image transfer rate:**
  - **QSXGA (2592x1944):** 15 fps
  - **1080p:** 30 fps
  - **960p:** 45 fps
  - **720p:** 60 fps
  - **VGA (640x480):** 90 fps
- **sensitivity:** 690 mV/lux-sec
- **shutter:** rolling shutter
- **pixel size:** 1.4 µm x 1.4 µm
- **dark current:** 0.7 mV/s @ 50°C junction temperature
- **image area:** 3673.6 µm x 2738.4 µm
- **package/die dimensions:**
  - **CSP3:** 5010 µm x 4810 µm
  - **COB:** 5000 µm x 4800 µm

Functional Block Diagram



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Version 1.3, March, 2014

OV5658 5-megapixel product brief

available in a lead-free package

Full Resolution 5-Megapixel HD Video with High Dynamic Range for High-End Security and Surveillance Systems

The OV5658 is a 5-megapixel CameraChip™ sensor designed specifically for high-end security and surveillance applications. The high performance OV5658 leverages a 1.75-micron OmniBSI+™ pixel to deliver industry-leading sensitivity and high dynamic range (HDR) while maintaining the standard form factor for security applications.

The sensor's industry-leading image and video quality ensure crisp and clear scene reproduction, even when recording in difficult lighting conditions. Additionally, the OV5658's resolution (up to 2592 x 1944 pixels) enables advanced features such as video analytics, biometrics and facial recognition.

The OV5658 is the world's first security targeted, 1/3.2-inch sensor capable of capturing full-resolution 5-megapixel video at 30 frames per second (fps). The sensor is also capable of recording both 1080p or 720p HD video at 60 fps, or at 30 fps with extra pixels for electronic image stabilization (EIS).

Find out more at www.ovt.com.

OmniVision

OV5658

Applications

- Security and Surveillance
- Digital Video Camcorders (DVC)
- Digital Still Cameras (DSC)
- PC Multimedia
- 3D Cameras

Ordering Information

- **OV05658-G04A**
  (color, chip probing, 200 µm backgrinding, recontructed wafer with good die)
- **OV05658-A66A**
  (color, lead-free, 66-pin CSP)

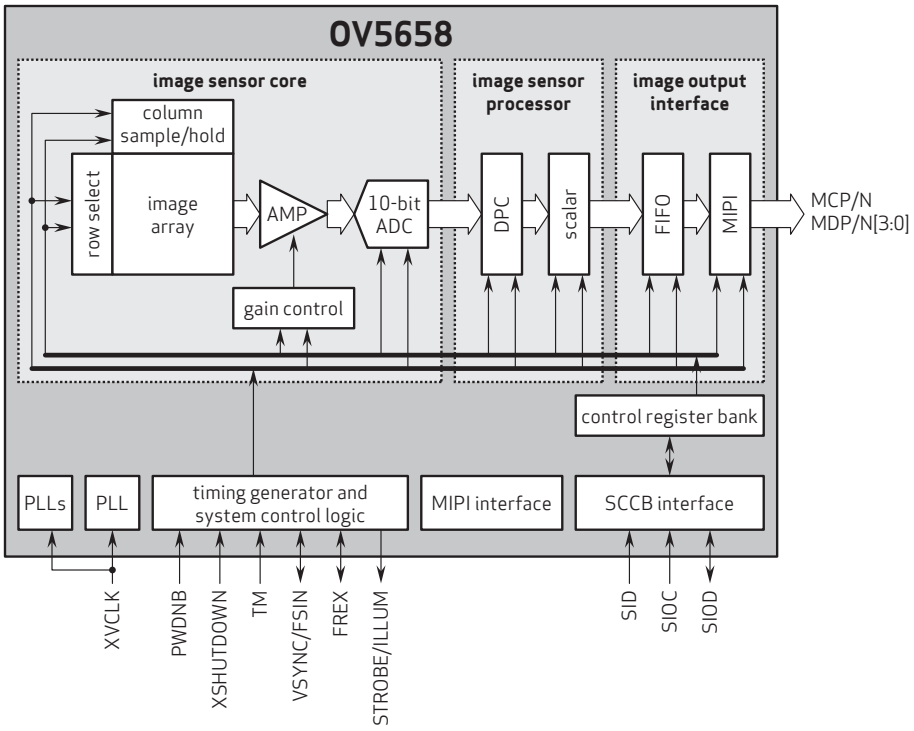
Product Features

- 1.75 µm x 1.75 µm pixel with OmniBSI+™ technology for high performance (high sensitivity, low crosstalk, low noise)
- support for image sizes:
  - 5MP (2592x1944)
  - EIS 1080p (2112x1188)
  - 1080p (1920x1080)
  - EIS 720p (1536x864)
  - 720p (1280x720)
  - VGA (640x480)
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
  - scaling
- image quality controls:
  - defect pixel correction
  - lens shading correction
  - black level calibration
- support for output formats:
  - 10-bit RAW RGB
- supports horizontal and vertical subsampling
- fast mode switching
- supports 2x2 binning, re-sampling filter
- supports 3D applications
- EIS 1080p scalar (allows scale down to EIS 1080p or any size below)
- standard serial SCCB interface
- up to 4-lane MIPI/LVDS serial output interface
- embedded 64 bytes of one-time programmable (OTP) memory for part identification, etc.
- two on-chip phase lock loop (PLL)
- programmable I/O drive capability
- built-in 1.5V regulator for core
- supports alternate row HDR timing

Product Specifications

- **active array size:** 2592 x 1944
- **power supply:**
  - **core:** 1.5V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 150 mA (325 mW)
  - **standby:** 300 µA
  - **XSHUTDOWN:** 2 µA
- **temperature range:**
  - **operating:** -30°C to +70°C junction temperature
  - **stable image:** 0°C to +50°C junction temperature
- **output interfaces:**
  4-lane MIPI/LVDS serial
- **output formats:** RAW RGB data
- **lens size:** 1/3.2"
- **lens chief ray angle:** 11° non-linear
- **input clock frequency:** 6 - 27 MHz
- **scan mode:** progressive
- **maximum image transfer rate:**
  - **5MP (2592x1944):** 30 fps
  - **EIS 1080p (2112x1188):** 30 fps
  - **1080p (1920x1080):** 30 fps
  - **EIS 720p (1536x864):** 30 fps
  - **720p (1280x720):** 60 fps
  - **VGA (640x480):** 90 fps
- **sensitivity:** 1200 mV/lux-sec
- **max S/N ratio:** 37 dB
- **dynamic range:** 73.7 dB @ 8x gain
- **pixel size:** 1.75 µm x 1.75 µm
- **image area:** 4592 µm x 3423 µm
- **package/die dimensions:**
  - **CSP:** 6360 µm x 5670 µm
  - **COB:** 6350 µm x 5660 µm

Functional Block Diagram



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Version 1.5, October, 2017

OV5675 5-megapixel product brief

available in a lead-free package

The Industry's Smallest 5-Megapixel PureCel® Sensor for Smartphones and Tablets

OmniVision's high performance OV5675 is a 5-megapixel PureCel sensor designed to bring high quality imaging capabilities to front- and rear-facing cameras in smartphones and tablets. The industry's smallest 5-megapixel currently available, the cost-effective OV5675 offers dramatically improved image and video quality in a compact and power-efficient package.

The 1/5-inch sensor can capture full resolution 5-megapixel images in a native 4:3 aspect ratio at 30 frames per second (fps), or 720p high definition (HD) and 1080p video at 60 fps. Additionally, the OV5675 supports ultra-low power mode, which enables QVGA video recording at 30 fps while requiring less than 25 mW.

The OV5675 fits into a compact 5.5 x 5.5 x 3.5 mm module.

Find out more at www.ovt.com.

OmniVision

OV5675

Applications

- Smartphones and Feature Phones
- Tablets
- PC Multimedia
- Wearables

Product Features

- 1.12 µm x 1.12 µm pixel
- 5MP at 30 fps
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports images sizes:
  - 5MP (2592x1944)
  - quad HD (2560x1440)
  - 1080p (1920x1080)
  - 720p (1280x720)
  - VGA (640x480), and more
- 260 bytes of embedded one-time programmable (OTP) memory for customer use
- support for output formats:
  - 10-bit RGB RAW
- interleave row HDR output
- two-wire serial bus control (SCCB)
- MIPI serial output interface (1- or 2-lane)
- 2x binning support
- image quality control:
  - defect pixel correction
  - automatic black level calibration

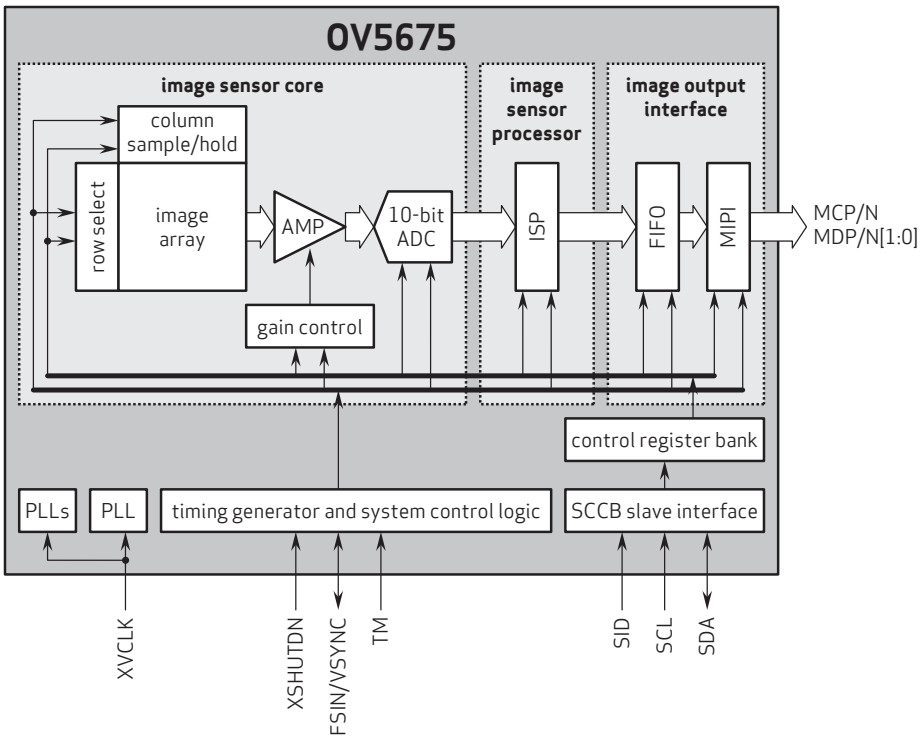
Ordering Information

- **OV05675-GA4A**
  (color, chip probing, 200 µm backgrinding, reconstructed wafer)

Product Specifications

- **active array size:** 2592 x 1944
- **power supply:**
  - **core:** 1.14 - 1.26V (1.2V nominal)
  - **analog:** 2.6 - 3.0V (2.8V nominal)
  - **I/O:** 1.7 - 1.9V (1.8V nominal)
- **power requirements:**
  - **active:** 96 mW
  - **standby:** 165 µW
  - **XSHUTDN:** 1 µW
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
  - **stable image:** -20°C to +60°C junction temperature
- **output interface:** 2-lane MIPI serial output
- **output formats:** 10-bit RGB RAW
- **lens size:** 1/5"
- **lens chief ray angle:** 31.24° non-linear
- **input clock frequency:** 6 - 27 MHz
- **maximum image transfer rate:**
  - **5MP (2592x1944):** 30 fps
  - **quad HD (2560x1440):** 30 fps
  - **1080p (1920x1080):** 60 fps
  - **720p (1280x720):** 60 fps
  - **VGA (640x480):** 120 fps
- **sensitivity:** 530 mV/lux-sec
- **max S/N ratio:** 35.7 dB
- **dynamic range:** 69.7 dB @ 16x gain
- **pixel size:** 1.12 µm x 1.12 µm
- **dark current:** 6 e⁻/sec @ 60°C junction temperature
- **image area:** 2928.384 µm x 2205.216 µm
- **dimensions:**
  - **COB:** 3771 µm x 3226.5 µm
  - **RW:** 3821 µm x 3276.5 µm

Functional Block Diagram



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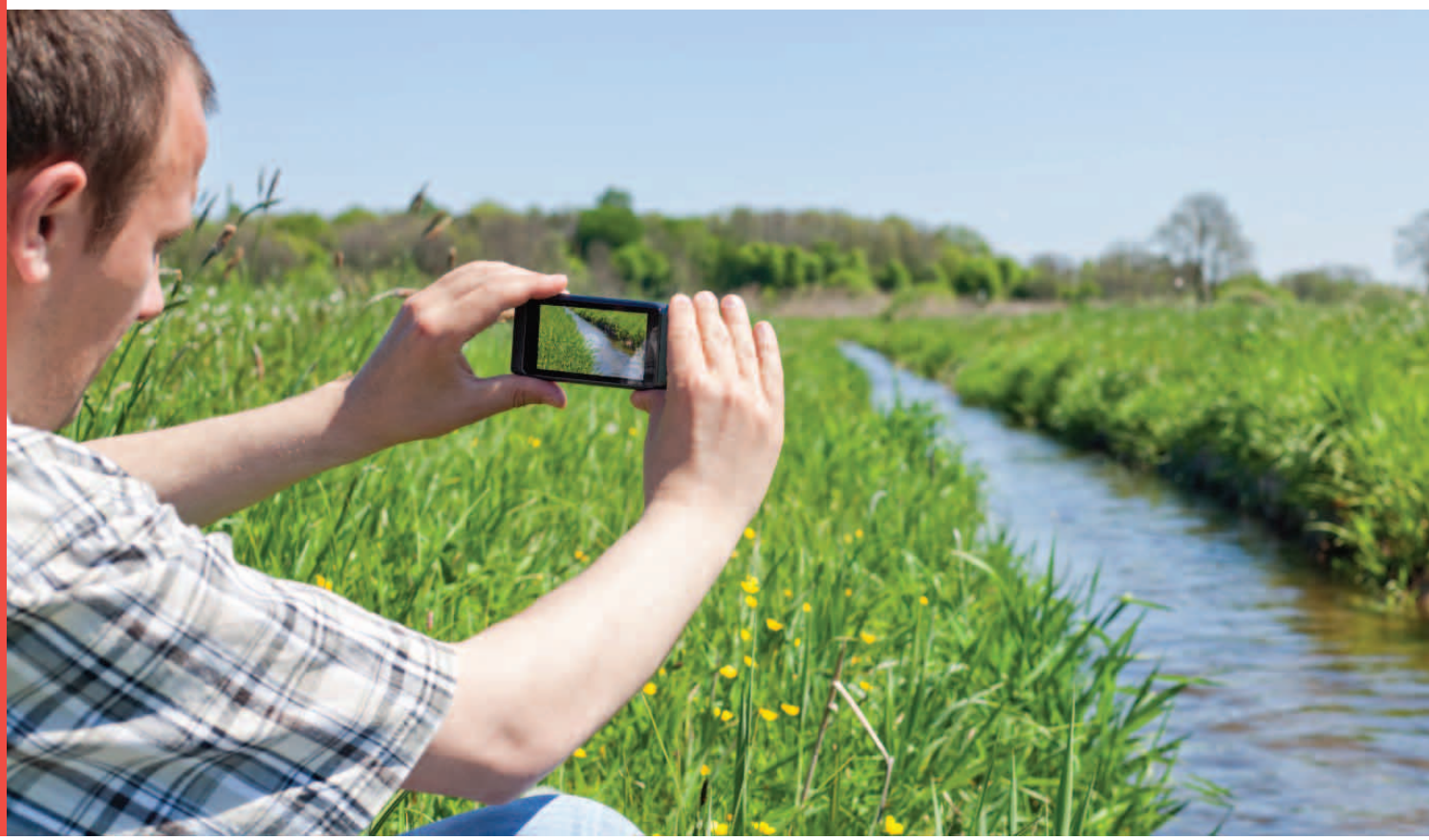
Version 1.2, July, 2017

OV5680 5-megapixel product brief



5-Megapixel Image Sensor with OmniBSI-2™ Technology for Video-Centric Smartphones

lead free

available in a lead-free package

The 5-megapixel OV5680 features OmniVision's advanced 1.75-micron OmniBSI-2 pixel architecture, designed to further narrow the performance gap between smartphones and dedicated digital video cameras. The 1/3.2-inch CMOS image sensor offers best-in-class image quality while capturing 1080p high-definition (HD) video at 30 frames per second (fps) for mobile applications.

The OV5680 utilizes an integrated scaler to provide 1080p HD video capture at 30 fps for continuous shooting and shutterless designs without any lag. The scaler enables electronic image stabilization, while maintaining full field of view in 1080p HD video mode. The sensor's 2x2 binning functionality with post-binning re-sampling filter enables 720p video capture at 60 fps, minimizes spatial artifacts and removes image artifacts around edges, delivering clean and crisp color images for best-in-class HD video.

The OV5680 can synchronize exposure and frame for stereo cameras to meet 3D video capture requirements. The new 1.75-micron OmniBSI-2 pixel is built using a 300 mm copper process with 65 nm design rules, offering optimized die size, lower power consumption, and significant performance and image quality improvements over the first-generation OmniBSI™ pixel.

The OV5680 comes with a standard 2-lane MIPI serial output interface and fits into the industry standard 8.5 x 8.5 x ≤6 mm module size.

Find out more at www.ovt.com.

OmniVision

OV5680

Applications

- Cellular and Mobile Phones
- Digital Still Cameras (DSC)
- 3D Cameras
- Digital Video Camcorders (DVC)
- PC Multimedia

Product Features

- 1.75 µm OmniBSI-2™ pixel technology
- support for image sizes:
  - 5 Mpixel (2592x1944)
  - EIS 1080p (2112x1188)
  - 1080p (1920x1080)
  - EIS 720p (1536x864)
  - 720p (1280x720)
  - VGA (640x480)
  - QVGA (320x240)
- programmable controls for frame rate, mirror and flip, cropping, windowing, and scaling
- image quality controls: defect pixel correction, lens shading correction, and black level calibration
- support for output formats: 10-bit RAW RGB and DPCM 10-8 compression
- supports horizontal and vertical subsampling
- fast mode switching
- support 2x2 binning, re-sampling filter
- supports 3D applications
- on chip scalar
- standard serial SCCB interface
- up to 2-lane MIPI serial output interface
- embedded 4K bits one-time programmable (OTP) memory for part identification, etc.
- two on-chip phase lock loop (PLL)
- programmable I/O drive capability
- built-in 1.2V regulator for core
- built-in temperature sensor
- supports alternate row HDR timing

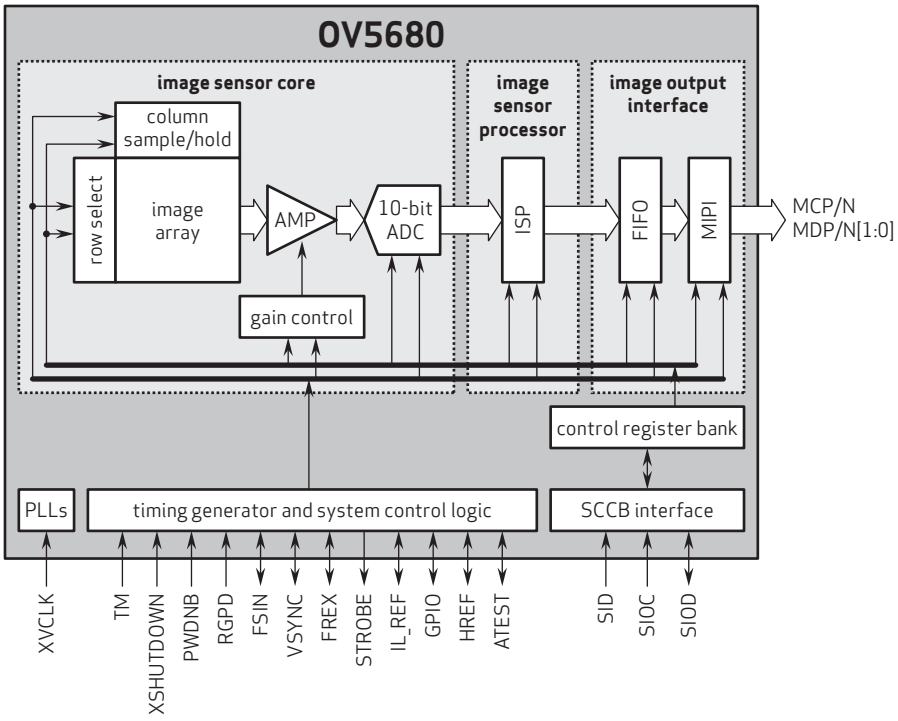
Ordering Information

- **OV05680-G04A-2A**
  (color, chip probing, 200 µm backgrinding, reconstructed wafer with good die)
- **OV05680-G14A-2A**
  (color, chip probing, 200 µm backgrinding, uncut die, cut into four quarters)
- **OV05680-G20A-2A**
  (color, chip probing, no backgrinding, no die-saw, whole wafer)

Product Specifications

- **active array size:** 2592 x 1944
- **power supply:**
  - **core:** 1.16 - 1.32V
  - **analog:** 2.6 - 3.0V
  - **I/O:** 1.7 - 3.0V
- **power requirements:**
  - **active:** 250 mW
  - **standby:** 560 µW
  - **XSHUTDOWN:** 5 µW
- **temperature range:**
  - **operating:** -30°C to 70°C junction temperature
  - **stable image:** 0°C to 50°C junction temperature
- **output formats:** RAW RGB data
- **lens size:** 1/3.2"
- **lens chief ray angle:** 27° non-linear
- **input clock frequency:** 6 - 27 MHz
- **max S/N ratio:** 38 dB
- **dynamic range:** 73 dB @ 8x gain
- **maximum image transfer rate:**
  - **5MP:** 30 fps
  - **EIS1080p:** 30 fps
  - **EIS720p:** 30 fps
  - **1080p:** 60 fps (crop)
  - **720p:** 60 fps
- **sensitivity:** 1380 mV/lux-sec
- **scan mode:** progressive
- **pixel size:** 1.75 µm x 1.75 µm
- **image area:** 4592 µm x 3423 µm
- **die dimensions:** 5750 µm x 5700 µm

Functional Block Diagram



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Version 1.4, December, 2013

OV5695 5-megapixel product brief

available in a lead-free package

High Quality 1/4-inch 5-Megapixel Selfies for Next-Generation Smartphones and Tablets

OmniVision's new 1/4-inch OV5695 is a high performance and cost-effective 5-megapixel OmniBSI+™ sensor designed to be a cost-competitive camera solution for both front- and rear-facing camera applications in smartphones and tablets. The OV5695 features an improved design that offers superior image and video quality in a more compact, power-efficient package.

The OV5695 utilizes 1.4-micron OmniBSI+ pixel architecture to capture full resolution video in a native 4:3 aspect ratio at 30 fps or 1080p video at 60 fps with support for interleave row high dynamic range (iHDR).

The sensor's exceptional low-light sensitivity enhances image and video quality when recording in low-light conditions, and reduces user dependence on the device's front-facing flash functionality.

The OV5695 fits into an 8.5 x 8.5 mm module with a z-height of approximately 4.4 mm.

Find out more at www.ovt.com.

OmniVision

OV5695

Applications

- Smartphones and Feature Phones
- Tablets
- PC Multimedia
- Wearables

Product Features

- 1.4 µm x 1.4 µm pixel
- 5MP at 30 fps
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- supports images sizes:
  - 5MP (2592x1944)
  - quad HD (2560x1440)
  - 1080p (1920x1080)
  - 720p (1280x720)
  - VGA (640 x 480), and more
- 16 bytes of embedded one-time programmable (OTP) memory for customer use
- ultra low power mode (ULPM)
- support for output formats: 10-bit RGB RAW
- interleave row HDR output
- two-wire serial bus control (SCCB)
- MIPI serial output interface (1- or 2-lane)
- 2x binning support
- image quality control:
  - defect pixel correction
  - automatic black level calibration

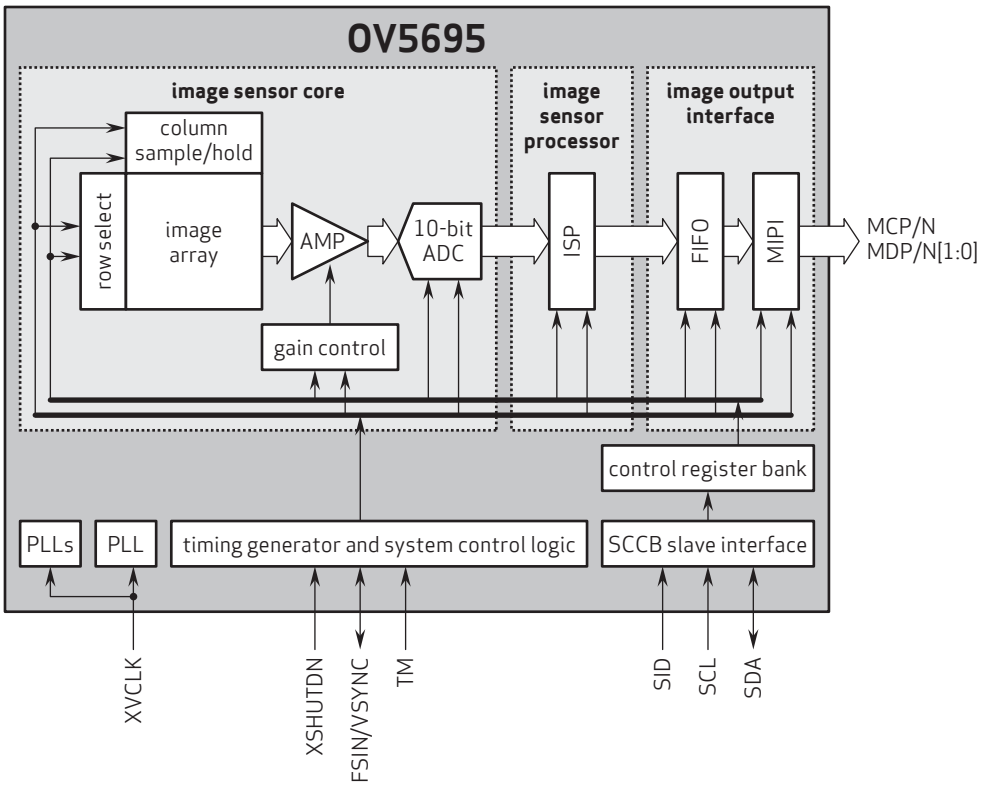
Ordering Information

- **OV05695-GA4A-1B**
  (color, chip probing, 200 µm backgrinding, rev 1B, reconstructed wafer)

Product Specifications

- **active array size:** 2592 x 1944
- **power supply:**
  - **core:** 1.14 - 1.26V (1.2V nominal)
  - **analog:** 2.7 - 3.0V (2.8V nominal)
  - **I/O:** 1.7 - 1.9V (1.8V nominal)
- **power requirements:**
  - **active:** 155 mW
  - **standby:** 61 µW
  - **XSHUTDN:** 36 µW
- **temperature range:**
  - **operating:** -30°C to +70°C junction temperature
  - **stable image:** -20°C to +60°C junction temperature
- **output interface:**
  2-lane MIPI serial output
- **output formats:** 10-bit RGB RAW
- **lens size:** 1/4"
- **lens chief ray angle:** 31.08° non-linear
- **input clock frequency:** 6 - 27 MHz
- **maximum image transfer rate:**
  - **5MP (2592x1944):** 30 fps
  - **quad HD (2560x1440):** 30 fps
  - **1080p (1920x1080):** 60 fps
  - **720p (1280x720):** 60 fps
  - **VGA (640x480):** 120 fps
- **pixel size:** 1.4 µm x 1.4 µm
- **dark current:** 15 e⁻/sec @ 60°C junction temperature
- **image area:** 3684 µm x 2763 µm
- **dimensions:**
  - **COB:** 5022 µm x 3933 µm
  - **RW:** 5072 µm x 3983 µm

Functional Block Diagram



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Version 1.2, October, 2016

OX02A10 1.7MP product brief

available in a lead-free package

High Dynamic Range and LED Flicker Reduction for Display-Based Automotive Vision Systems

OmniVision's OX02A10 is a high-performance image sensor that is designed for the next-generation display-based camera monitoring systems for automotive applications. Built on OmniVision's 4.2-micron OmniBSI™ split-pixel technology for exceptional high dynamic range (HDR), the OX02A10 offers best-in-class low-light performance and represents the automotive industry's leading LED flicker-reduction solution.

The OX02A10 achieves 110 dB HDR while guaranteeing LED pulse capture. This allows the automotive cameras to simultaneously capture bright and dark scenes, providing excellent performance in the most demanding lighting conditions. The OX02A10 supports 1820 x 940 resolution in a 1:2 aspect ratio at 60 frames per second (fps), making it ideally suited for wider aspect ratio e-Mirror applications.

Additionally, the sensor's on-chip combination algorithm reduces the output data rate for easier data transition and back-end processing. The OX02A10 comes in a 9.5 x 6.8 mm AEC Q-100 Grade 2 qualified automotive chip-scale package (a-CSP™).

Find out more at www.ovt.com.

OmniVision

OX02A10

Applications

- Automotive
  - 360° Surround View System
  - Rear View Camera
  - Lane Departure Warning / Lane Keep Assist
  - Blind Spot Detection
  - Night Vision
  - Pedestrian Detection
  - Traffic Sign Recognition
  - Camera Monitoring System
  - Autonomous Driving
  - e-Mirror

Product Features

- support for image size:
  - 1824 x 940
  - VGA
  - QVGA and any cropped size
- OmniHDR-S™ technology
- high sensitivity
- safety features
- low power consumption
- image sensor processor functions:
  - lens correction
  - defective pixel cancelation
  - HDR combination and tone mapping
  - automatic black level correction
- supported output formats: RAW
- horizontal and vertical sub-sampling
- serial camera control bus (SCCB) for register programming
- high speed serial data transfer with MIPI CSI-2, parallel 12-bit DVP output
- external frame synchronization capability
- embedded temperature sensor
- one time programmable (OTP) memory
- support for LED flicker reduction (LFR) function

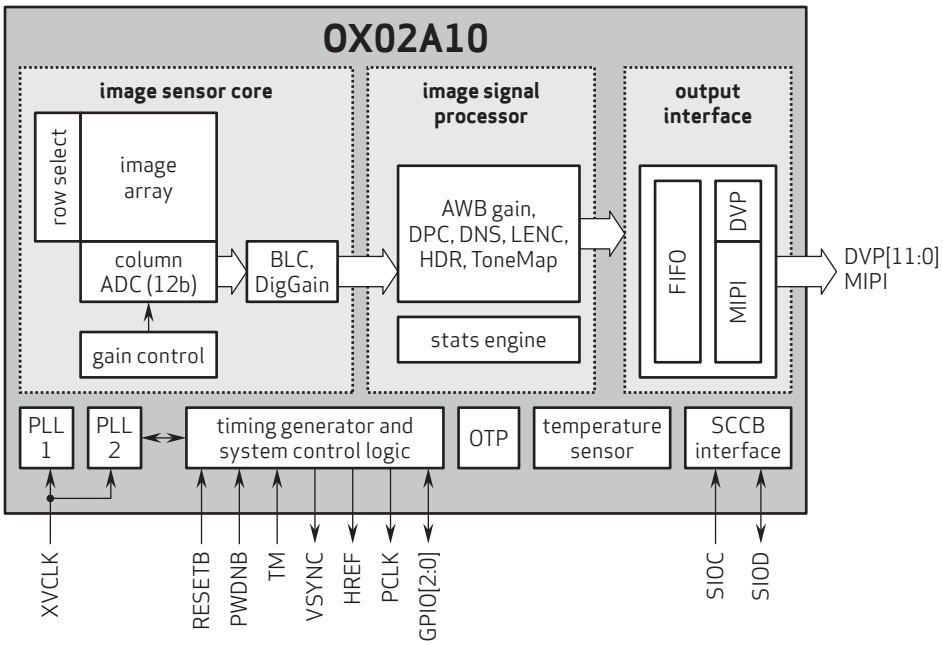
Ordering Information

- **OX02A10-E85Y-PA-Z**
  (color, lead-free) 85-pin a-CSP™ with dual coated AR glass, packed in tray with protective film
- **OX02A10-E85Y-RA-Z**
  (color, lead-free) 85-pin a-CSP™ with dual coated AR glass, packed in tape & reel with protective film

Product Specifications

- **active array size:** 1824 x 940
- **power supply:**
  - **analog:** 3.14 - 3.47V
  - **digital:** 1.425 - 1.575V
  - **DOVDD:** 1.7 - 1.9V
  - **AVDD:** 1.7 - 1.9V
- **power requirements:**
  - **active:** 450 mW
  - **standby:** 100 µW
- **temperature range:**
  - **operating:** -40°C to +105°C sensor ambient temperature and -40°C to +125°C junction temperature
- **output interfaces:** 12-bit DVP, MIPI CSI-2
- **input clock frequency:** 6 - 36 MHz
- **lens size:** 1/2.09"
- **lens chief ray angle:** 19°
- **output formats:**
  - 20-bit combined RAW
  - 12-bit compressed combined RAW
  - separated 12-bit RAW
  - 2x12 bit compressed RAW
  - 16-bit log domain combined RAW
- **scan mode:** progressive
- **shutter:** rolling shutter
- **maximum image transfer rate:** 60 fps
- **sensitivity:** 8.5 V/Lux-sec
- **max S/N ratio:** 41.7 dB
- **dynamic range:** 110 dB
- **pixel size:** 4.2 µm x 4.2 µm
- **image area:** 7711.2 µm x 3998.4 µm
- **package dimensions:** 9510 µm x 6860 µm

Functional Block Diagram



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Version 1.5, March, 2018

OX03A10 2.46MP product brief

available in a lead-free package

Industry-Leading Low-Light Performance and High Dynamic Range for a Wide Range of Automotive Applications

OmniVision's OX03A10 is a high-performance, low-power 3.2 micron OmniBSI™-2 image sensor designed for a wide range of advanced automotive imaging applications, including 360-degree surround view, rear view, blind-spot detection, e-mirror, and lane departure warning.

The 2.46 megapixel sensor uses OmniVision's proprietary Deep Well™ pixel technology to deliver industry-leading low-light sensitivity, and enables up to 90 dB of high dynamic range (HDR) from a single exposure without any decrease in signal-to-noise ratio and without motion artifacts. The OX03A10 also features dual-exposure HDR mode that can extend the sensor's dynamic range to more than 120 dB.

The OX03A10 can output multiple resolution formats, including 1920 x 1280 resolution video at 50 frames per second (fps) and 1920 x 1080 resolution video at 60 fps.

The sensor comes in an AEC-Q100 Grade 2-qualified 8.0 x 7.2 mm chip-scale package or 10.0 x 9.0 mm ball grid array package and has been developed according to ISO 26262 ASIL B requirements.

Find out more at www.ovt.com.

OmniVision

OX03A10

Applications

- Automotive
  - 360° Surround View System
  - Rear View Camera
  - Lane Departure Warning / Lane Keep Assist
  - Camera Monitoring System/e-mirror
  - Autonomous Driving

Product Specifications

- **active array size:** 1920 x 1280
- **power supply:**
  - **analog:** 3.3V
  - **digital:** 1.2V
  - **I/O pads:** 1.8V
- **power requirements:**
  - **active:** streaming @ 1280p50: 370 mW (with FuSa/ASIL off)
- **temperature range:**
  - **operating:** -40°C to +105°C sensor ambient temperature and -40°C to +125°C junction temperature
- **output interfaces:** up to 4-lane MIPI CSI-2
- **input clock frequency:** 6 - 36 MHz
- **lens size:** 1/2.44"
- **lens chief ray angle:** 19.7°
- **SCCB speed:** up to 1 MHz
- **scan mode:** progressive
- **shutter:** rolling shutter
- **max S/N ratio:** 45.4 dB
- **output formats:** single exposure HDR - 16-bit combined RAW, 12-bit (PWL) compressed combined RAW; dual exposure HDR - 16-bit combined RAW + 12-bit VS RAW, 12-bit (PWL) compressed combined RAW + 12-bit VS RAW
- **maximum image transfer rate:**
  - **1280p:** 50 fps
  - **1080p:** 60 fps
  - **1280p (with FuSa/ASIL on):** 40 fps
  - **1080p (with FuSa/ASIL on):** 45 fps
- **sensitivity:** 35,000 e⁻/Lux-sec (green pixel response at 530 nm illumination)
- **dynamic range:**
  - 90 dB single exposure HDR
  - >120 dB dual exposure staggered HDR
- **pixel size:** 3.2 µm x 3.2 µm
- **image area:** 6195.2 µm x 4147.2 µm
- **package cover glass type:** double sided anti-reflective (AR/AR) coating (without IRCF)
- **package dimensions:**
  - **a-CSP™:** 8034 µm x 7210 µm
  - **a-BGA™:** 10 mm x 9 mm

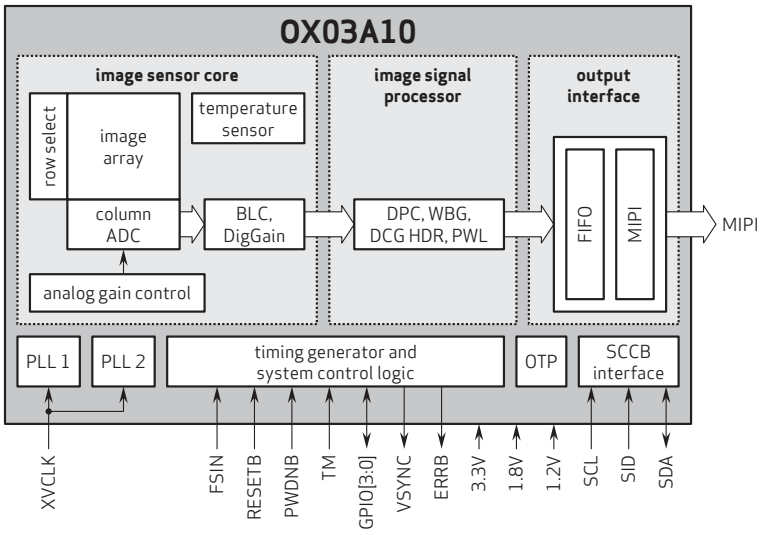
Ordering Information

- **OX03A10-E80Y-1E-Z** (color, lead-free)
  80-pin a-CSP™ packed in tray without protective film
- **OX03A10-E80Y-OE-Z** (color, lead-free)
  80-pin a-CSP™ packed in tape & reel wth protective film (TL)
- **OX03A10-E80Y-LE-Z** (color, lead-free)
  80-pin a-CSP™ packed in tray with protective film (TL)
- **OX03A10-E80Y-SE-Z** (color, lead-free)
  80-pin a-CSP™ packed in tape & reel wth protective film (BL)
- **OX03A10-E80Y-QE-Z** (color, lead-free)
  80-pin a-CSP™ packed in tray with protective film (BL)
- **OX03A10-B83Y-1E-Z** (color, lead-free)
  83-pin a-BGA™ packed in tray without protective film
- **OX03A10-B83Y-OE-Z** (color, lead-free)
  83-pin a-BGA™ packed in tape & reel with protective film
- **OX03A10-B83Y-LE-Z** (color, lead-free)
  83-pin a-BGA™ packed in tray with protective film

Product Features

- support for image size:
  - 1920 x 1280
  - 1920 x 1080
  - VGA
  - QVGA, and any cropped size
- high dynamic range
- high sensitivity
- image sensor processor functions:
  - defective pixel cancelation
  - HDR combination
  - automatic black level correction
  - PWL compression, etc.
- pixel data: 12b RAW RGB
- SCCB for register programming
- dedicated safety features for supporting minimum ASILB applications
- programmable GPIOs
- high speed serial data transfer with MIPI CSI-2
- external frame synchronization capability
- embedded temperature sensor
- one time programmable (OTP) memory

Functional Block Diagram



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Version 1.2, October 2018

OG02B1B 2MP product brief

available in a lead-free package

High-Resolution, Cost-Effective Global Shutter Image Sensors for Machine Vision Applications

OmniVision's OG02B1B (monochrome) and OG02B10 (color) are global shutter image sensors designed to cost-effectively enable a wide range of consumer and industrial machine vision applications such as AR/VR headsets and accessories, industrial automation, robotics, agricultural drones and 3D modeling. These sensors provide designers with best-in-class resolution and the option for full-color imaging, and both have a 15 degree chief ray angle (CRA) to support wide field-of-view lens designs. This combination of color imaging and CRA is excellent for applications such as agricultural drones that must capture high-resolution color images for crop and field monitoring.

Available in a 1/2.9 inch optical format, the OG02B1B and OG02B10 capture 2 megapixel or 1600 x 1300 resolution images and video at 60 frames per second (fps) using advanced 3 x 3 micron OmniPixel®3-GS pixel technology. This global shutter technology eliminates motion artifacts and blurring, and dramatically improves low-light sensitivity. Additionally, both sensors' excellent near infrared (NIR) sensitivity at 850 nm and 940 nm helps reduce device power consumption to extend battery life.

Find out more at www.ovt.com.

OmniVision

OG02B1B

Applications

- Augmented and Virtual Reality
- Drones
- 3D Imaging
- Machine Vision
- Industrial Bar Code Scanning
- Industrial Automation

Ordering Information

- **OG02B1B-G04A-Z**
  (b&w, chip probing, 200 µm backgrinding, reconstructed wafer with good die)

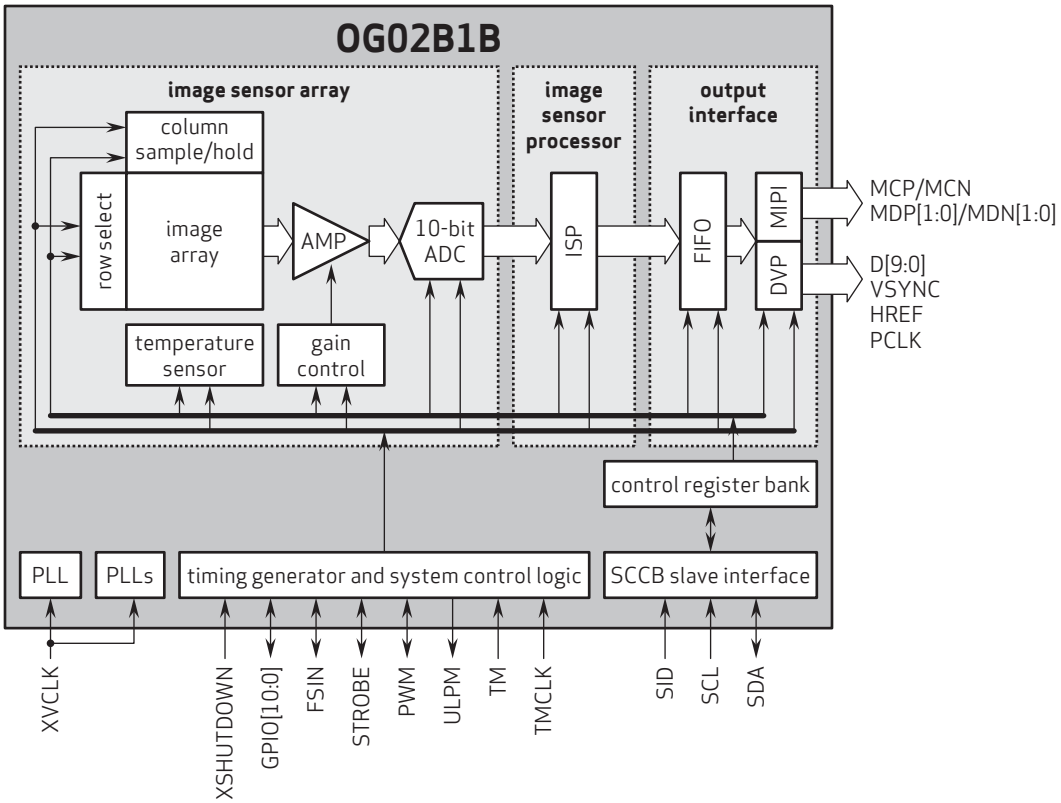
Product Features

- 3 µm x 3 µm pixel with OmniPixel®3-GS technology
- automatic black level calibration (ABLC)
- programmable controls for:
  - frame rate
  - mirror and flip
  - cropping
  - windowing
- support output formats: 8/10-bit RAW
- fast mode switching
- supports 2x2 monochrome binning
- two-lane MIPI serial output interface
- DVP parallel output interface
- supports horizontal and vertical 2:1 monochrome subsampling
- support for image sizes:
  - 1600 x 1300
  - 1280 x 720
  - 640 x 480
- embedded 128 bytes of one-time programmable (OTP) memory
- two on-chip phase lock loops (PLLs)
- LED PWM
- temperature sensor
- built-in strobe control

Product Specifications

- **active array size:** 1600 x 1300
- **power supply:**
  - **analog:** 2.8V (nominal)
  - **core:** 1.2V (nominal)
  - **I/O:** 1.8V (nominal)
- **temperature range:**
  - **operating:** -30°C to +85°C junction temperature
- **output interface:** 2-lane MIPI serial output and DVP parallel output
- **output formats:** 10-bit RAW
- **lens size:** 1/2.9"
- **input clock frequency:** 6 - 27 MHz
- **lens chief ray angle:** 15° linear
- **maximum image transfer rate:**
  - **1600 x 1300:** 60 fps
- **minimum exposure time:** 1 row period
- **maximum exposure time:** frame length - 12 row periods, where frame length is set by registers {0x380E, 0x380F}
- **pixel size:** 3 µm x 3 µm

Functional Block Diagram



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