

## OV9653 Color CMOS SXGA (1.3 MegaPixel) CAMERACHIP™ with OmniPixel® Technology

### General Description

The OV9653 CAMERACHIP™ is a low voltage CMOS image sensors that provides the full functionality of a single-chip SXGA (1280x1024) camera and image processor in a small footprint package. The OV9653 provides full-frame, sub-sampled or windowed 8-bit/10-bit images in a wide range of formats, controlled through the Serial Camera Control Bus (SCCB) interface.

This product has an image array capable of operating at up to 15 frames per second (fps) in SXGA resolution with complete user control over image quality, formatting and output data transfer. All required image processing functions, including exposure control, gamma, white balance, color saturation, hue control, white pixel canceling, noise canceling, and more, are also programmable through the SCCB interface. In addition, OmniVision CAMERACHIPS use proprietary sensor technology to improve image quality by reducing or eliminating common lighting/electrical sources of image contamination, such as fixed pattern noise, smearing, etc., to produce a clean, fully stable color image.



**Note:** The OV9653 uses a lead-free package.

### Features

- High sensitivity for low-light operation
- Low operating voltage for embedded portable applications
- Standard SCCB interface
- Supports SXGA, VGA, QVGA, QQVGA, CIF, QCIF, QQCIF, and windowed outputs with Raw RGB, RGB (GRB 4:2:2), YUV (4:2:2) and YCbCr (4:2:2) formats
- VarioPixel® method for sub-sampling formats (VGA, QVGA, QQVGA, CIF, QCIF, and QQCIF)
- Automatic image control functions including: Automatic Exposure Control (AEC), Automatic Gain Control (AGC), Automatic White Balance (AWB), and Automatic Black-Level Calibration (ABLC)
- Image quality controls including color saturation, hue, gamma, sharpness (edge enhancement), lens correction, white pixel canceling, and noise canceling

### Ordering Information

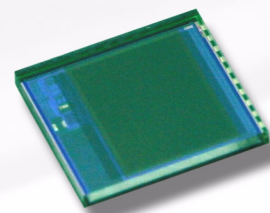
Product	Package
OV09653-VL1A (Color, Lead-free)	28-pin CSP2

### Applications

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

### Key Specifications

<b>Active Array Size</b>		1300 x 1028
<b>Power Supply</b>	<b>Core</b>	1.8VDC ± 10%
	<b>Analog</b>	2.45 to 2.8 VDC
	<b>I/O</b>	2.5V to (V <sub>DD-A</sub> +0.3V)
<b>Power Requirements</b>	<b>Active</b>	50 mW (15 fps, no I/O power)
	<b>Standby</b>	30 µW
<b>Temperature Range</b>	<b>Operation</b>	-20°C to 70°C
	<b>Stable Image</b>	0°C to 50°C
<b>Output Formats (8-bit)</b>		<ul style="list-style-type: none"> <li>• YUV/YCbCr 4:2:2</li> <li>• GRB 4:2:2</li> <li>• Raw RGB Data</li> </ul>
<b>Lens Size</b>		1/4"
<b>Maximum Image Transfer Rate</b>	<b>SXGA</b>	15 fps
	<b>VGA</b>	30 fps
	<b>QVGA, QQVGA, CIF</b>	60 fps
	<b>QCIF, QQCIF</b>	120 fps
<b>Sensitivity</b>		0.9 v/Lux-sec
<b>S/N Ratio</b>		40 dB
<b>Dynamic Range</b>		62 dB
<b>Scan Mode</b>		Progressive
<b>Maximum Exposure Interval</b>		1050 x t <sub>ROW</sub>
<b>Gamma Correction</b>		Programmable
<b>Pixel Size</b>		3.18 µm x 3.18 µm
<b>Dark Current</b>		30 mV/s at 60°C
<b>Well Capacity</b>		28 K e
<b>Fixed Pattern Noise</b>		<0.03% of V <sub>PEAK-TO-PEAK</sub>
<b>Image Area</b>		4.13 mm x 3.28 mm
<b>Package Dimensions</b>		5095 µm x 5715 µm



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**OmniVision Technologies**

**Resolution**

- 01 = Linear sensor
- 02 = 2 MegaPixel digital sensor
- 03 = 3 MegaPixel digital sensor
- 04 = 4 MegaPixel digital sensor
- 05 = 5 MegaPixel digital sensor/  
Low resolution analog sensor
- 06 = CIF digital sensor/  
Low resolution analog sensor
- 07 = VGA digital sensor/  
Full resolution analog sensor
- 08 = SVGA digital sensor
- 09 = SXGA 1.3 MegaPixel digital sensor
- 10 = High Dynamic Range (HDR) sensor

**Type**

(Analog vs. Digital, Color vs. B&W)

- 1 = B&W digital
- 4 = B&W analog
- 6 = Color digital
- 9 = Color analog

**Major Iteration of Chip**

**Minor Iteration of Chip**

- 0 = Color sensor with microlens
- 1 = B&W sensor with microlens
- 2 = Color sensor with microlens shift
- 3 = Sensor using CSP2 packaging
- 4 = Additional or custom features
- 5 = Additional or custom features
- 8 = SMIA-compliant sensor (except OV7648)

**Grade**

- A, B, or C
- V = Automotive grade

**Package Features**

- 0 = 48-pin
- 1 = 28-pin
- 2 = 24-pin
- 3 = 48-pin (large cavity CLCC)
- 4 = 16-pin
- 5 = 36-pin
- 6 = 22-pin
- 7 = 42-pin
- 8 = 40-pin

**If Package Type = G or W, then:**

- 0 = Chip probing
- 1 = No chip probing

**Chip Features**

- 0 = Digital sensor
- 1 = Analog NTSC sensor
- 2 = Analog PAL sensor
- L = Lead-free package

**If Package Type = G or W, then:**

- 0 = No backgrinding
- 1 = Custom
- 2 = Standard backgrinding (300 μm)

**Package Type**

- C = Ceramic
- P = Plastic
- K = Chip Scale Package (CSP)
- Q = Quad Flat Package (QFP)
- V = CSP2
- G = Die (for COB applications)
- W = Wafer

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