



# OptiML™ Wafer-Level Optics

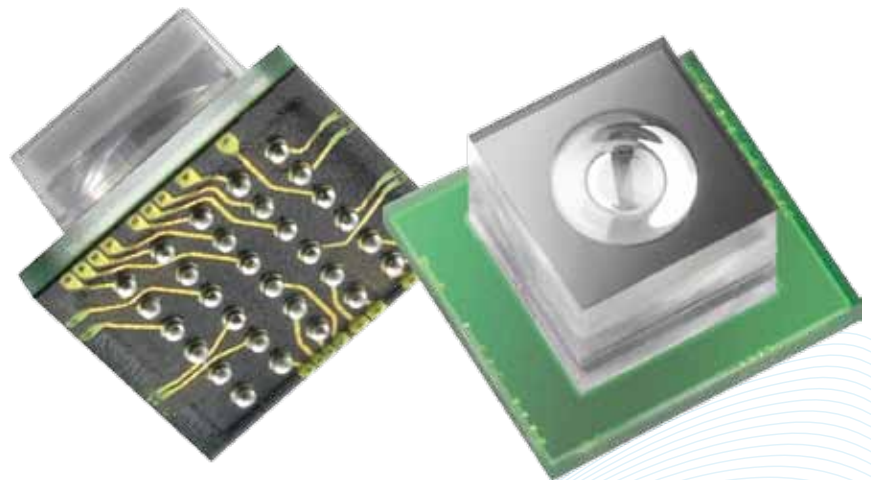
## Reduce Form Factors, Cut Costs and Boost Performance with Wafer-Level Optics

Analysts forecast that in 2013 approximately 525 million VGA camera modules will be manufactured for cell phone applications. Manufacturers of today's camera modules are constantly challenged to find more efficient and cost-effective ways to meet market demands for smaller devices with greater capabilities. DigitalOptics Corporation's OptiML Wafer-Level Optics technology solves these challenges by enabling manufacturers to significantly advance the integration of miniaturized cameras in cell phones, personal computers, security cameras and other portable devices.

Based on advanced semiconductor manufacturing techniques, OptiML Wafer-Level Optics technology makes it possible to manufacture camera modules at the wafer level, dramatically reducing the size and total materials cost of camera modules while maintaining camera performance.

This innovative approach enables manufacturers to simultaneously build thousands of lenses on a single wafer. The number of lens wafers required to build the optical module is based upon the optical requirements of the camera module. The lens wafers are aligned and bonded at the wafer level and diced into individual, integrated optical stacks that are mounted on top of a wafer-level packaged image sensor. The accuracy of the wafer stacking process optimizes the performance of integrated optics and packaged image sensors and eliminates the need for costly manual focusing.

OptiML Wafer-Level Optics technology can be used for a wide range of camera resolutions, from VGA to multi-megapixel.





# OptiML™ Wafer-Level Optics

## Benefits

- Enables higher yield and significantly reduces costs
- Minimizes the camera form factor without sacrificing performance
- Reduces part count and cycle time
- Utilizes standard reflow processes
- Sustains high-temperature soldering
- Enables camera module assembly directly on the phone board
- Lowers overall cost
- Reduces components

OptiML Wafer-Level Optics technology is scalable, from a single-element CIF/VGA lens to a multi-element megapixel lens structure, where the lens wafers are precision aligned, bonded together and diced to form multi-element lens stacks. Tight alignment tolerances can be achieved to enable higher yield.

## OptiML Single-Element VGA Lenses

The OptiML single-element VGA lens is an innovative camera solution for cell phones, PCs, gaming consoles, security cameras and web cams. The reflow-compatible two-surface lens is designed to work with 2.2µm or 1.75µm pixel size VGA image sensors. The lens offers several cost and performance advantages and its reflow compatibility enables camera modules to sustain high temperature soldering during the manufacturing process without damage. The lens, which incorporates an infra-red filter to reduce the number of components required by the camera module, can be customized.

## Specifications

Pixel Size	2.2µm
Cover Glass	400µm
	2.8
Relative Illumination (y=1.32mm)	>50%
Chief Ray Angle (Max.)	28°
TTL Diagonal FOV	60°
Optical Distortion	<1%
TV Distortion	<2%
	2.25mm
Min MTF @ Nyquist/4	
On-axis	65%
0.8 Field	30%
1.0 Field	15%
Min MTF @ Nyquist/2	
On-axis	30%
0.8 Field	10%
Die Size	2.3x2.3mm

Contact a DigitalOptics sales representative for more information about OptiML Wafer-Level Optics.

3025 Orchard Parkway | San Jose, CA 95134 | T +1.408.321.6000 | F +1.408.321.8257 | www.doc.com

DigitalOptics, the DigitalOptics logo, OptiML, µPILR, µZ and µBGA are trademarks or registered trademarks of DigitalOptics Corporation or its affiliated companies in the United States and other countries.