

Product brief

REAL3™ image sensor IRS238xC

3D Time-of-Flight single-chip

Infineon's new REAL3™ Time-of-Flight (ToF) image sensor IRS238xC is the perfect fit for mobile consumer devices. The sensor extends Infineon's broad REAL3™ image sensor family portfolio.

The high performance pixel array is highly sensitive to 850 and 940 nm infrared light and provides unbeaten outdoor performance thanks to the patented Suppression of Background Illumination (SBI) circuitry in every pixel. SBI enables a pixel-fine expansion of the dynamic range by up to a factor of 20 and as such avoiding early saturation of the pixels in case of strong sunlight.

The high integration level of this single-chip design allows an optimized bill of material, smallest form factors and reduced design complexity. Beside the integration of high performance ADC's, a highly flexible modulation unit, the illumination control logic including the eye-safety circuitry to enable laser-class-1 and the high speed CSI-2 data interface, IRS238xC features an optimized voltage supply unit and a full SPI master memory interface for self-booting.

The sensor's new features like coded modulation and increased configuration flexibility offer improved performance and robustness for different use-cases and multi-camera scenarios. On top, the underlying ToF technology proved itself in mass production already – at stable and high assembly yields – at camera module manufacturers. The new IRS238xC will even simplify camera module design and calibration efforts.

The perfect combination of performance, power consumption, functionality, size and cost makes IRS238xC indispensable for reliable mobile 3D sensing applications in any kind of ambient light condition.



Product variants

Product type	Pixel resolution	Description	Package
IRS2380C	224 x 172 pixel (38 k)	Single-chip ToF image sensor, 850 nm	Bare die
IRS2381C	224 x 172 pixel (38 k)	Single-chip ToF image sensor, 940 nm	Bare die

Key benefits

- > Smallest module size
- > Sunlight robust at minimum power consumption
- > Low system BoM and easy design
- > Robust high volume assembly and low calibration efforts

Key features

- > Highest performance pixel array
 - 224 x 172 pixel (38 k)
 - 14 µm pixel with micro-lens
- > Suppression of Background Illumination (SBI): 20x dynamic expansion in every pixel against strong sunlight
- > Support of laser-class-1 compliance
- > Coded modulation

Key applications

- > Mobile phone, world facing
 - Augmented reality
 - Computational photography
 - 3D scanning and reconstruction
- > Mobile phone, front facing
 - Secure face authentication
 - Emoji animation

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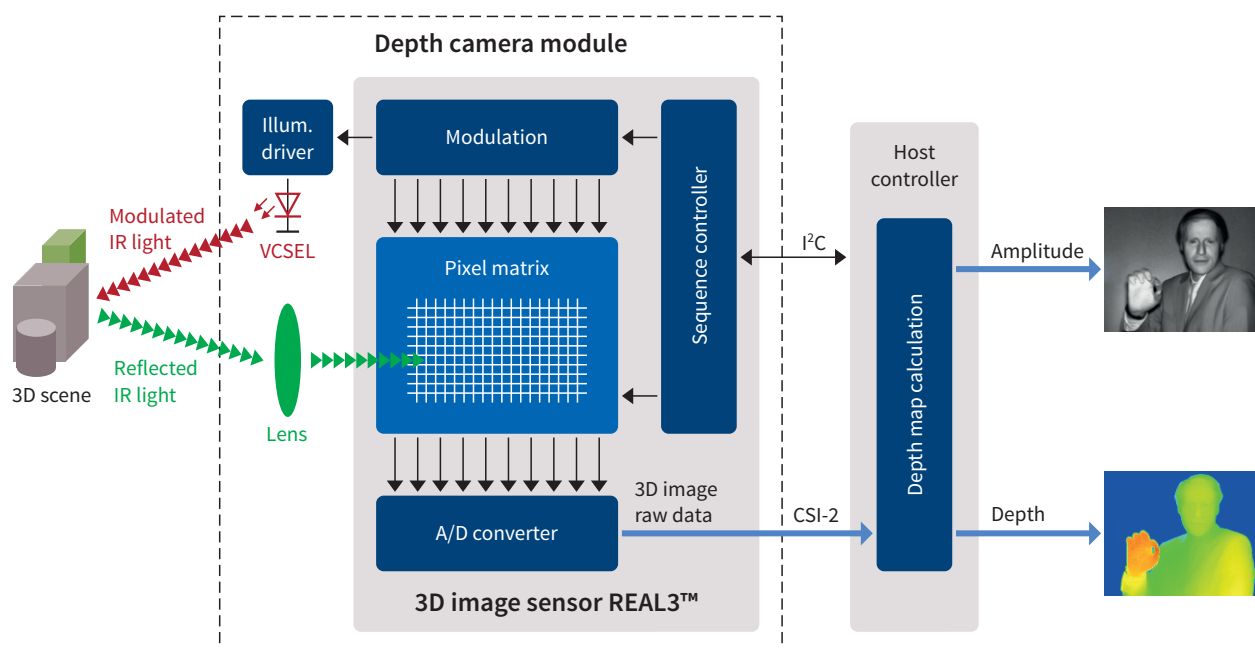
Time-of-Flight principle and benefits

Time-of-Flight technology is directly measuring the depth and amplitude information in every pixel by using only one infrared light source. The modulated infrared light is emitted to the whole scenery and the reflected light is captured by the ToF imager. The measured phase difference between emitted and received light as well as the amplitude values are resulting into highly reliable distance information and a greyscale picture of the complete scene simultaneously.

This principle combined with IRS238xC's unique features multiple inherent benefits compared to other algorithm intensive depth sensing technologies like structured light or stereovision:

- › High reliable 3D depth point cloud and amplitude picture in every ambient light condition
- › Minimum power consumption and fast data acquisition for real-time operation
- › Lean computational load, saving power and resources at the application processor
- › Simple and robust camera module design
 - Single lens and illumination design without any risk of de-calibration
 - No need of any mechanical baseline
 - Fast once-in-a-lifetime calibration and robust mass production at high assembly yields

Time-of-Flight block diagram



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