

Product brief

REAL3™ image sensor IRS2381C

3D Time-of-Flight single-chip

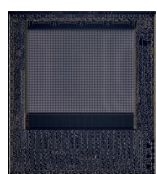
IRS2381C is a Time of Flight (ToF) image sensor specially designed for mobile consumer applications. As other members of Infineon REAL3™ portfolio, IRS2381C is based in cost-efficient, standard Infineon CMOS technology with leading edge photo efficiency and contrast performance. IRS2381C is in mass production and fulfills the high volume delivery and quality requirements the mobile phone market demands. With proven stable and high production assembly yields together with a fast, in-factory enabled and lifetime valid calibration process, IRS2381C is a device of choice to ensure a leading 3D camera module manufacturing.

The high performance pixel array is highly sensitive to 940 nm infrared light and provides unbeaten outdoor performance. The unique performance under all environmental light conditions – from bright sunlight to dim light and shadow – is possible 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, IRS2381C features an optimized voltage supply unit and a full SPI master memory interface for self-booting.

With only 4.4 x 4.8 mm total imager size, IRS2381C is the perfect fit for miniature 3D camera module designs where space on the pcb board is a premium.

The sensor's features like coded modulation and increased configuration flexibility offer improved performance and robustness for different use-cases and multi-camera scenarios. This perfect combination of performance, power consumption, functionality, size and cost makes IRS2381C a preferred solution for reliable 3D sensing applications in mobile devices.



Key benefits

- > Small size sensor boosting camera module miniaturization
- > 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 pitch 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

- > Rear 3D camera in mobile phones
 - Augmented reality
 - Computational photography
 - 3D scanning and reconstruction
- > Front 3D camera in mobile phones
 - Secure face authentication
 - Selfie-apps (avatar, emoji animation, morphology)

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Time-of-Flight principle and benefits

Time-of-Flight technology directly measures 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 simple operating principle in combination to IRS2381C's product's specific features provides unique value to the application and sets a performance benchmark in the market – well ahead of algorithm-intensive depth sensing technologies like structured light or stereovision:

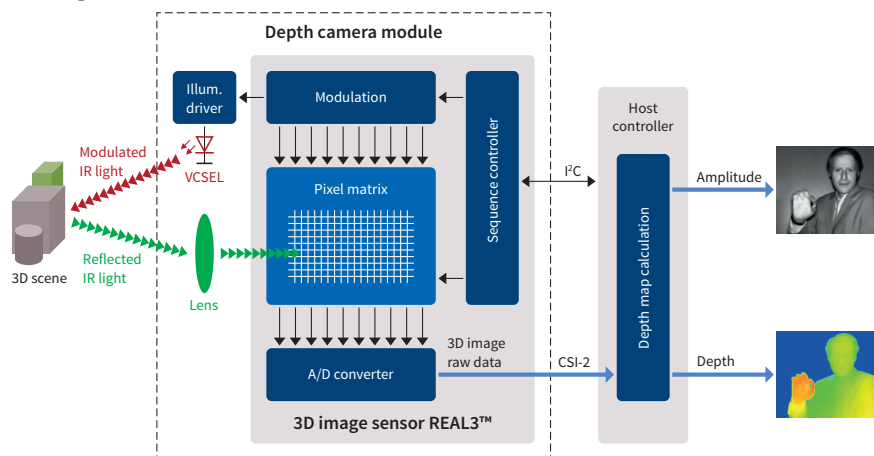
- > High reliable 3D depth point cloud and amplitude picture in every ambient light condition
- > Minimum power consumption and fast data acquisition for real-time operation

- > 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

Increase value, customize your design and speed-up time to market with REAL™

Besides the value a high performance product like IRS2381 adds to the application, engineers seeking to implement ToF sensors in 3D cameras for the mobile device market can further benefit from a complete service package. In addition to the image sensor, the software driver and 3D depth processing pipeline, also reference designs and customization support as well as reference production setup for calibration and test are available for camera module makers and OEMs. Our application experts worldwide are always ready to support you to design your systems with REAL3™ devices.

Time-of-Flight block diagram



Published by
Infineon Technologies AG
81726 Munich, Germany

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