

## Background

### **Time-of-flight beats structured light**

The advantages of the underlying Time-of flight (ToF) technology in contrast to stereoscopic or structured light technologies are multiple:

- The ToF image sensor chip directly measures the distance to objects. In other 3D technologies, the distance is calculated via complex algorithms. Thus, ToF is faster, more reliable and is saving power at the application processor.
- Modulated infrared light is emitted to the whole scenery. With each of its 38,000 pixels, the 3D image sensor chip measures the time the infrared light takes to travel from the camera to the object and back again. Each pixel detects the phase delay of the reflected light resulting in highly reliable distance information and, simultaneously, a grey scale picture of the complete scene: face authentication becomes possible even through a single frame data acquisition.
- A microlens is applied to each pixel in a specific manufacturing step developed by Infineon. Thus, despite the small pixel size of 14 x 14µm the high optical sensitivity provides very low power consumption during operation.
- ToF is unbeatable in outdoor performance. The new image sensor chip is tuned to work at 940 nm and features the unique Suppression of Background Illumination (SBI) circuitry in each pixel. Structured light cameras do not deliver any usable depth data in such sunny conditions, even with twice the illumination peak power.
- The ToF camera module design is simple and robust. The camera consists of only two key components: the image sensor chip and the illumination component, without the need of any mechanical baseline between them. The result are very small camera modules with a high flexibility of integration into a mobile phone and a lean and fast calibration procedure. The bill-of-material (BoM) is expected to be less than USD 10 in high volume in 2019.