Application brief

# How to use REAL3™ Time-of-Flight in your Application

3D Time-of-Flight (ToF) provides superior data of your surroundings: The distance information in every pixel, together with a gray-scale 2D image, are accurate and robust in all light conditions. 3D data of this caliber open up a whole new avenue of functionality and use-cases in a huge variety of applications.

Doesn't this sound great? It sure is! But there is no "one-fits-all" solution available. Usually, each application has its own dedicated requirements regarding range, opening angle, resolution, performance and many more parameters. The good news is that the REAL3™ imagers from Infineon are highly flexible and scalable products in order to fulfill these requirements. Nevertheless, the development of an optimized ToF solution is still quite a challenging and complex procedure, requiring in-depth ToF know-how along with proficiency in the fields of hardware design, assembly and software (see page 2).

Ultimately, this should neither faze nor bother you at all. After all, you are the No. 1 expert in your own application and you "just" want to reap the benefits of 3D ToF data or even a complete solution including application algorithms.

This is how Infineon would like to support you. We, as the supplier of the ToF imager, are not in a position to support each individual project directly. This is why we have established a partner ecosystem of camera module makers, camera design houses as well as software partners, who offer varying levels of REAL3™-based camera modules, system solutions and services.

In order to refer you to the most suitable partner, please provide us with the key requirements of your application, as demonstrated in the example on the right, and contact us under www.infineon.com/support
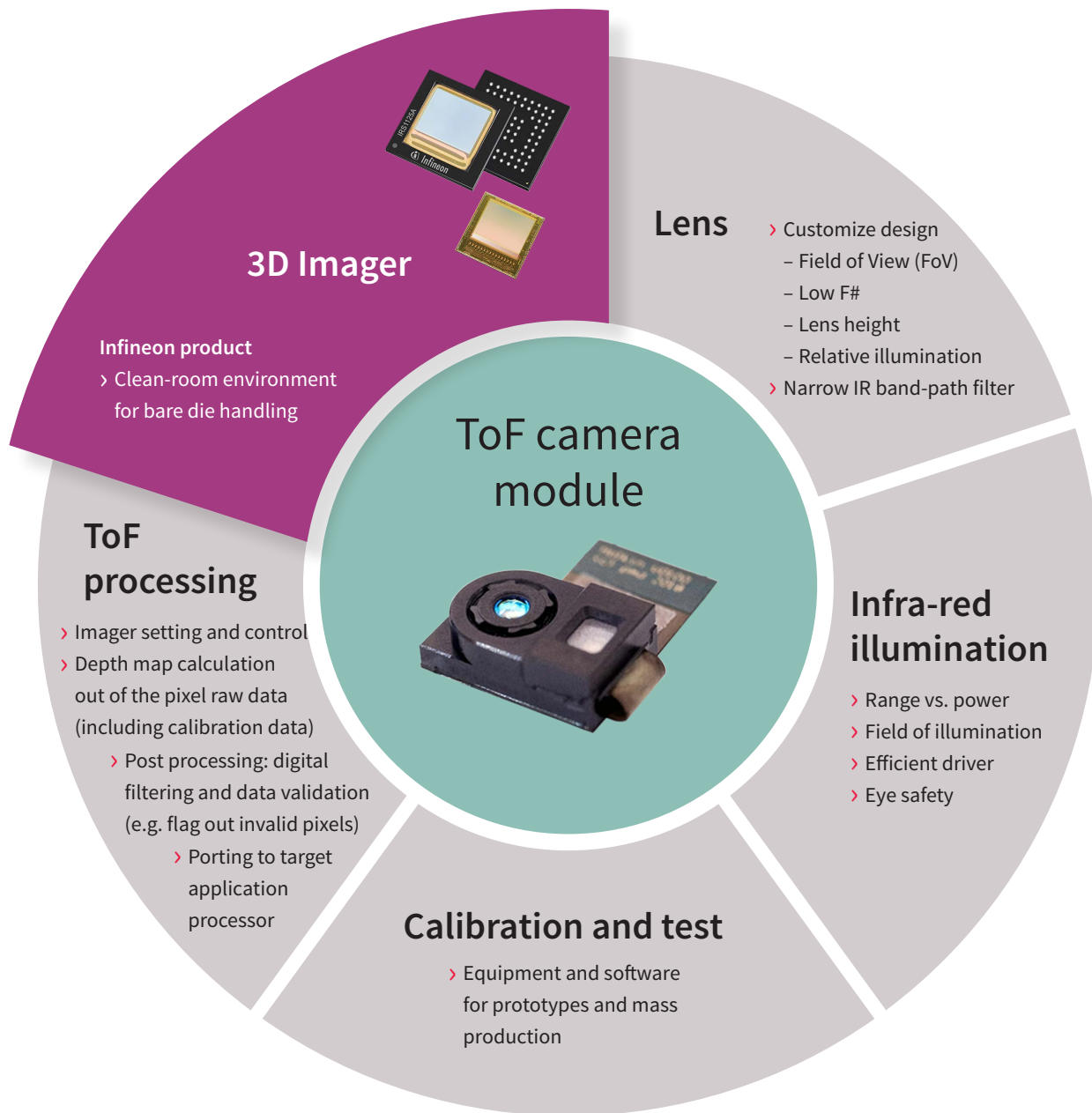
If you would first like to evaluate the 3D time-of-flight technology based on our REAL3™ products, please have a look at one of the reference cameras from our development partner pmd technologies https://pmdtec.com/picofamily/

## Applications

› Robot vacuum cleaner
› Face-ID payment
› Door opener and access control
› Social and entertainment robots
› People counter
› Area surveillance
› Factory automation
› Collaborative robotics
› Warehouse and delivery robots

## My application: example

› **Use case:** 3D face authentication for door opener
› **FoV (h × v):** 64 × 54°
› **Range:** 1.2 m in strong sunlight
› **Resolution:** VGA
› **Accuracy:** < 1% of range
› **Frame rate:** 15 fps
› **Others (e.g. size, power):** lens height < 5 mm
› **Volume:** 100 kpcs/year

## 3D Imager

**Infineon product**
› Clean-room environment
  for bare die handling

## Lens

› Customize design
  – Field of View (FoV)
  – Low F#
  – Lens height
  – Relative illumination
› Narrow IR band-path filter

## ToF camera module

## ToF processing

› Imager setting and control
› Depth map calculation
  out of the pixel raw data
  (including calibration data)
  › Post processing: digital
    filtering and data validation
    (e.g. flag out invalid pixels)
    › Porting to target
      application
      processor

## Infra-red illumination

› Range vs. power
› Field of illumination
› Efficient driver
› Eye safety

## Calibration and test

› Equipment and software
  for prototypes and mass
  production

The basis for a 3D ToF module design is the REAL3™ imager, but to come to a complete 3D ToF module solution also other core components like lens and VCSEL as well as calibration expertise and depth processing software are required, everything optimized in a way to meet the application requirements.

**Additional information**
For further information on technologies, our products, the application of our products, delivery terms and conditions and/or prices, please contact your nearest Infineon Technologies office (www.infineon.com).

**Warnings**
Due to technical requirements, our products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by us in a written document signed by authorized representatives of Infineon Technologies, our products may not be used in any life-endangering applications, including but not limited to medical, nuclear, military, life-critical or any other applications where a failure of the product or any consequences of the use thereof can result in personal injury.