FlightSense™ ST time-of-flight Proximity and Ranging sensors

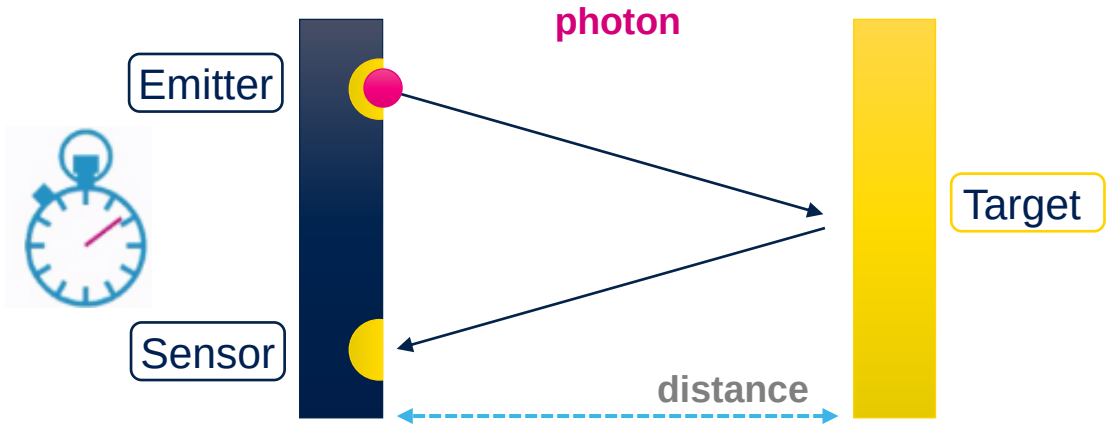
Mass-Market presentation

Imaging Division
Personal Electronics, Industrial & MassMarket

Updated the 02nd, July 2020

FlightSense™
… Making Light work

Time-of-Flight Principle



Measured distance = Photon travel time / 2 x Speed of light

1cm round-trip takes 67ps

- ST proprietary **Flight**Sense™ technology
- True distance measurement
  - Independent of target size, color & reflectance
- Fast and low power
- Truly invisible 940nm illumination

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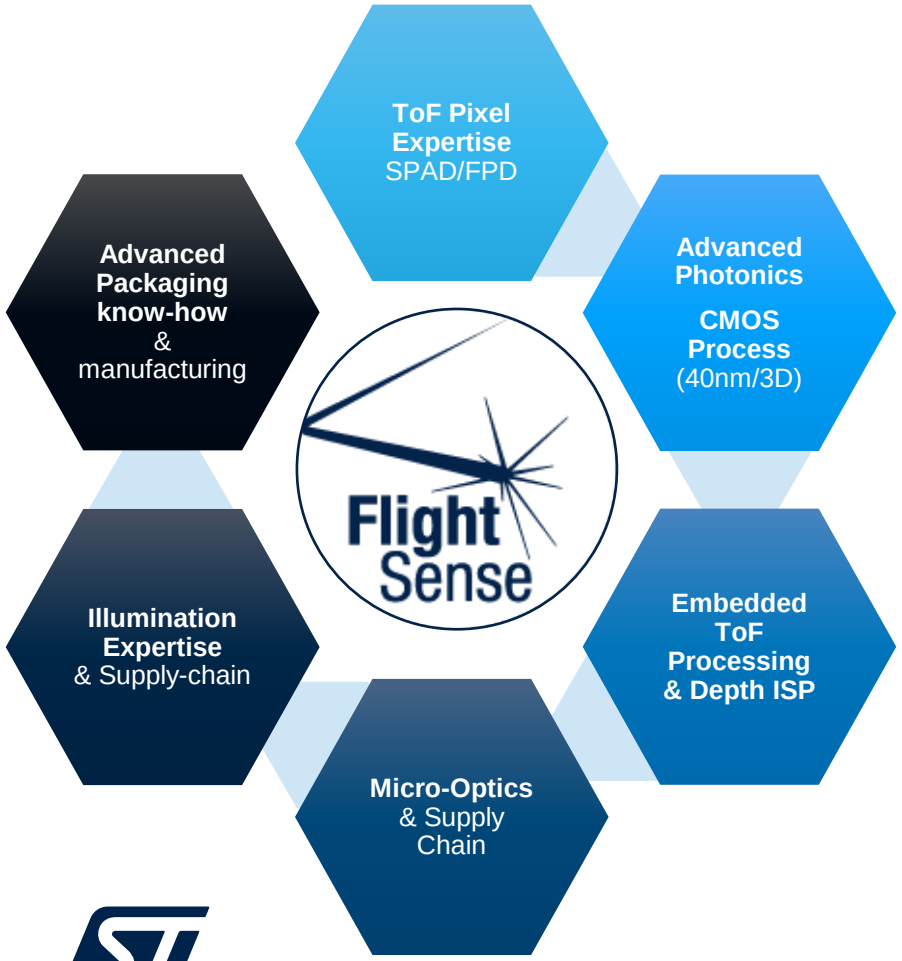
FlightSense™
ST Pioneer and Leader in Time-of-Flight (ToF)

ST is #1 Worldwide Time-of-Flight sensor supplier



4 Generations
of all-in-one ToF solution deployed since 5 years

>50 OEMs
Over 170 phones with ST's Time of Flight technology
Several hundreds of non wireless end products on the market
Unlimited variety of use-cases beyond smartphones

>42,000
Evaluation kits deployed

VL53L5
4th generation FlightSense™

1 Billion
ToF units shipped. Mastering end-to-end supply chain

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FlightSense™ Typical Module overview

All-in-One (illumination & sensor) Time of Flight System → Optimized Size, Performance, Cost mix

Advanced optics with integrated IR filters

State-of-art assembly & testing
ST manufacturing line in Shenzhen

Monolithic ToF SoC, SPAD Array, RAM/ROM & high safety Class1 VCSEL driver

Full Class 1 safety high efficiency VCSEL

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FlightSense™ Full Class 1 Laser product Certification

All FlightSense™ products are Laser Class 1 certified, to typically higher standards than competitors

- IEC/EN Class 1 laser product certified:
  - For both 60825-1 2007 and 2014 editions
  - Under all operating conditions
  - Under single-fault failure conditions

  ➔ SAFEST laser class

- Final product laser safety certification guaranteed provided:
  1. The laser output power must not be increased by any means, including firmware and hardware
  2. No magnifying lens must be added to the product
  3. The ToF sensors should be mounted in the consumer product under a glass/plastic material such that the sensors cannot be physically accessed by the user without a specialist tool

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Product Service

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FlightSense™
Functions, Use-cases & Applications

FlightSense™ Typical Applications

Camera Assistance

- Laser autofocus
- Touch-to-Focus
- Scene understanding
- AWB assist based on 940nm content

Ranging & Proximity

- True ToF distance
- High accuracy
- Up-to 4 meters

Multispectral & Flicker

- True tone color display & ALS
- Camera AWB
- Light flicker measurement and correction

Face Identification

- Face anti-spoofing
- Cost, power, size optimized
- All-in-one depth sensing

Presence, User Detect

- Security
- Comfort
- Power saving
- Eye protection
- Wellness

Depth Map & AR/VR

- All-in-one Module
- High resolution receiver
- Gesture
- Consumer LiDAR

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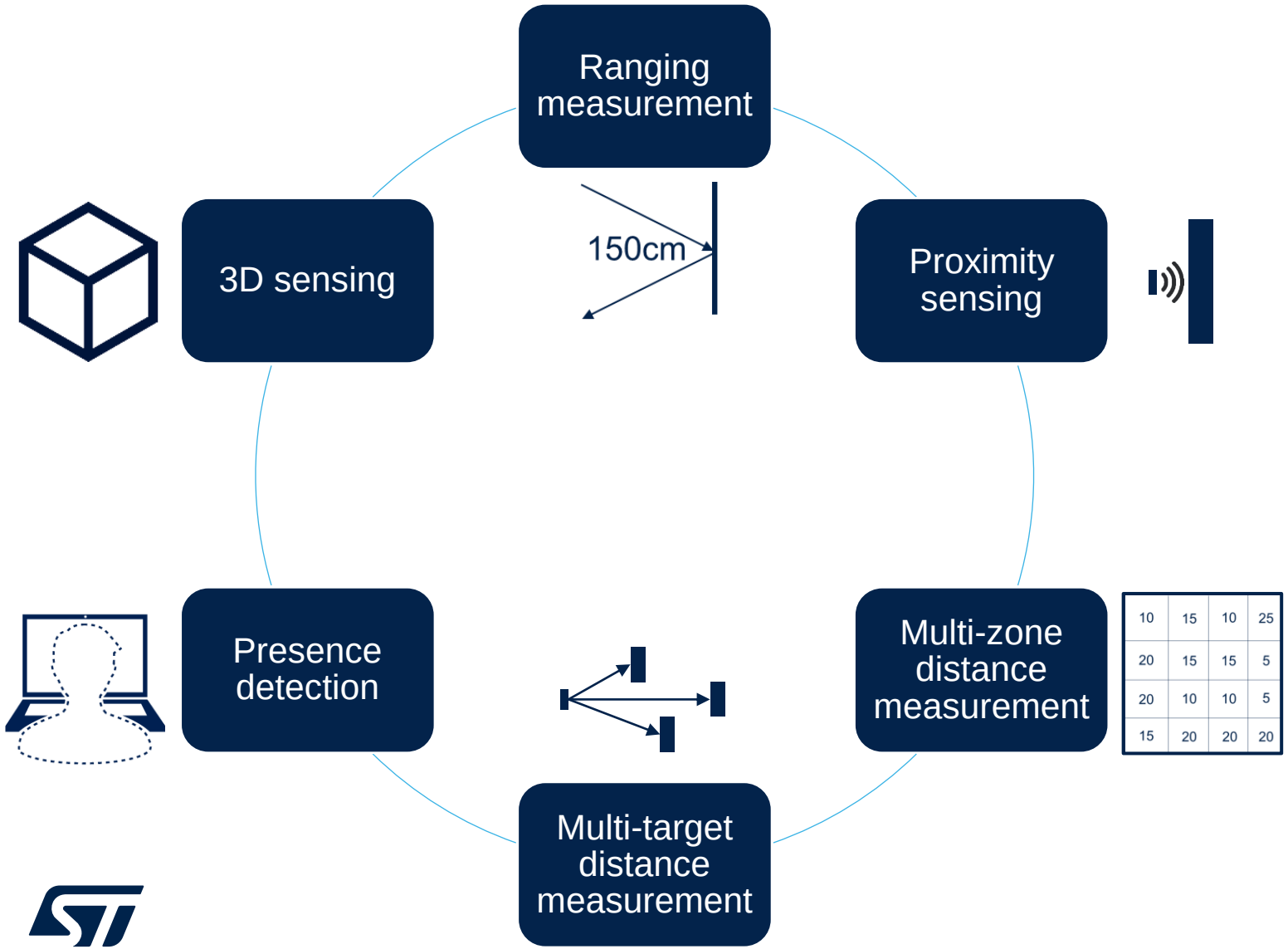
FlightSense™ sensors main functions



Enabling multiple Use-Cases :

- Ceiling detection
- Content analysis
- Cliff detection
- Gesture control
- Hands-free operation
- Light control
- Load management
- Object detection
- Obstacle avoidance
- Occupancy detection
- Parking occupancy
- People counting
- Power saving
- SLAM
- Touch-less operation
- Presence detection
- Volume control
- Wall tracking

To develop unlimited Markets…

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Unlimited Markets & Applications


Laptops


Tablets


Cleaning robots


Service Robots


Toys


Lighting


Printers


Public Parking


Drones

ATM


AR/VR

Smart home


Industrial


Lockers

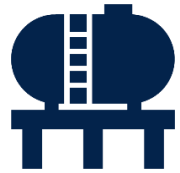

Projectors


Wearable
& IoT


Faucets


Logistics


Trucks


Tanks


Dispensers


White Goods


Medical


Farming


Warehouse


Vending
machines

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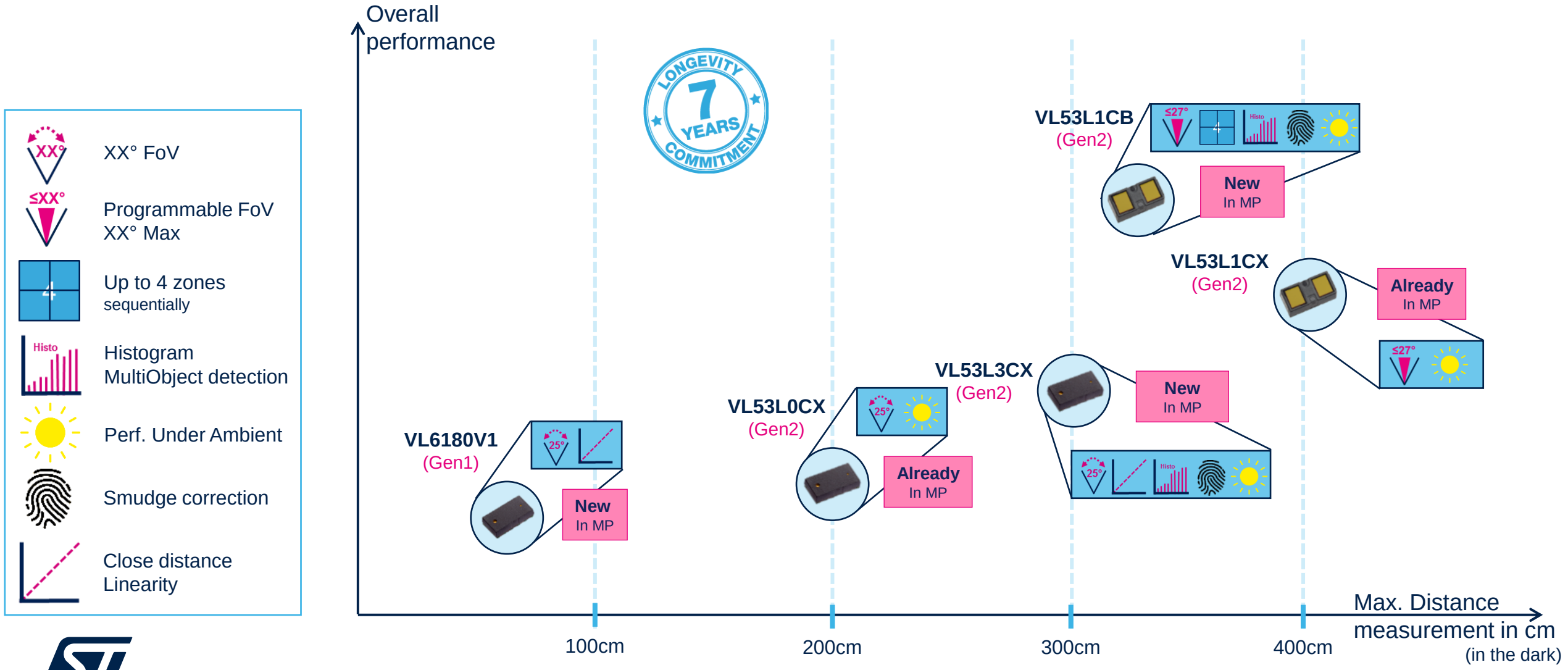
Flightsense™ mass-market roadmap

Updated the 26th of May 2020

FlightSense™ Mass-Market Roadmap



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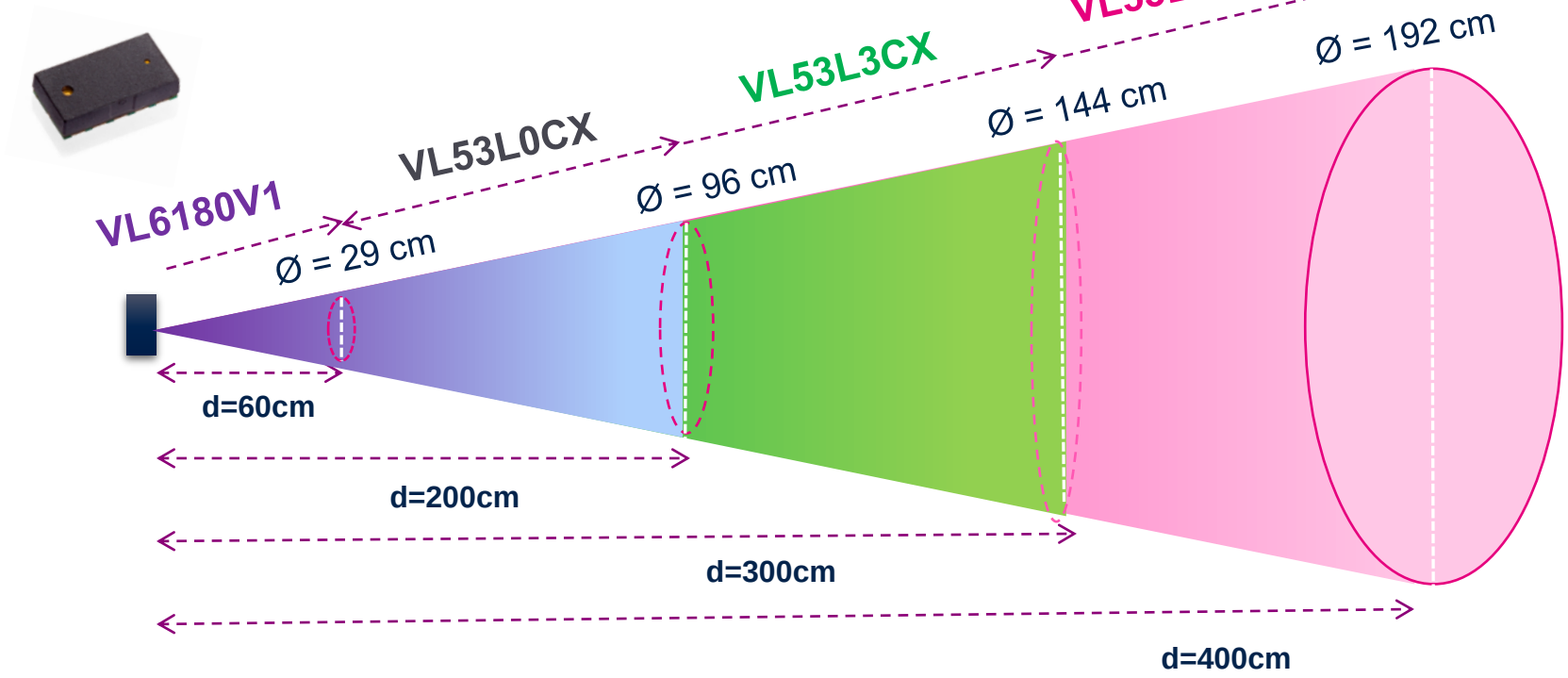
Detection Cones (Optical Field-of-view FoV)



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FlightSense™ Ecosystem and tools

Imaging products supported by ST eco-system & and expanding optical partnership eco-system

Complete package

- X-NUCLEO expansion board

- P-NUCLEO packs with STM32 NUCLEO

- Stand-alone Breakout boards

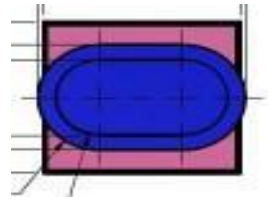
STM32 ODE

- **Flight**Sense™ fully integrated in STM32 Ecosystem
- Compatible with NUCLEO-F401RE and NUCLEO-L476RG
- Referenced on mbed & Arduino platforms

Cover glasses

Oval Cover Glass:

- Reference cover glass proposed in NUCLEO development boards



Square Cover Glass:

- 3 spacers 0.25/0.5/1mm to create various air gaps
- Cover glass holder

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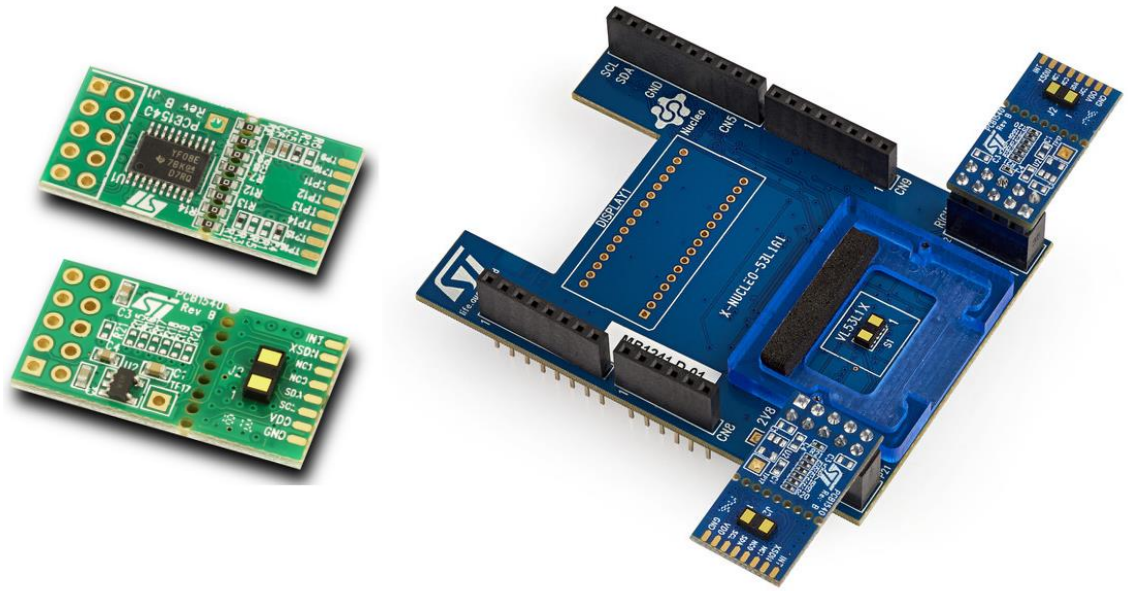
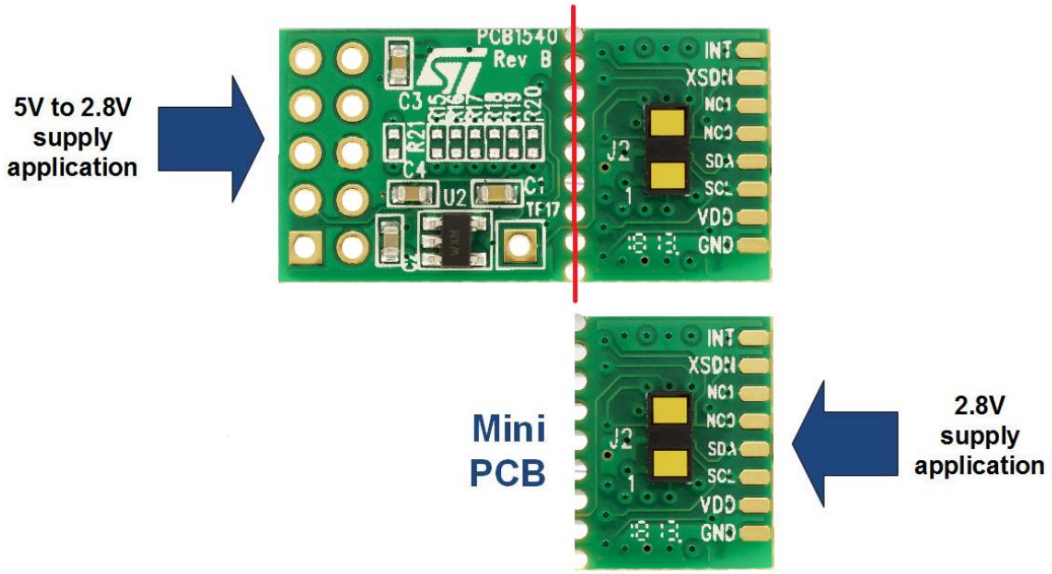
FlightSense™ Breakout boards

Breakout boards are available for each sensor variant, for easy integration into customer's device

- The expansion boards can accept breakout boards, through connectors or flying wires



- For 2.8V supply application, the breakout board can be separated, in order to use only the "mini PCB", easier to integrate into a customer device



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FlightSense™
Raspberry, Arduino & arm MBED

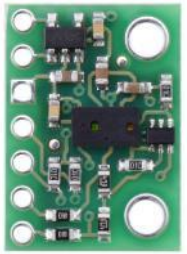
Raspberry Pi®

VL53L1CX
breakout board

Pololu
Robotics & Electronics

Forum, resources & Articles

VL6180X carrier (60 cm max range)



VL53L0X carrier (200 cm max range)

VL53L1X carrier (400 cm max range)

arm MBED

VL6180V0 →

X-NUCLEO-6180XA1 Proximity and Ambient Light Sensor

← VL53L0CX

X-NUCLEO-53L0A1 Ranging Sensor Expansion Board

VL53L1CX →

X-NUCLEO-53L1A1 Ranging Sensor Expansion Board

ARDUINO

Forum, open source code

GitHub

Videos

Tutorials

sparkfun
START SOMETHING

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