Time of Flight
Proximity/Ranging Sensor

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Industry’s smallest Time-of-Flight

VL53L0X

World’s smallest ToF ranging sensor

New Time-of-Flight (ToF) Ranging Sensor from STMicroelectronics
Boosts Range and Speed, in Industry’s Smallest Footprint
FlightSense™ Breakthrough Technology

Measurement at the speed of light!

FlightSense™ Principle

- Emitter
- Sensor
- Photon
- Target
- Distance

Measured distance = Photon travel time /2 \times \text{Speed of light}

1cm round-trip at 67ps

Fully Integrated Time of Flight Module
ST #1 World Wide Supplier

Direct distance measurement
Independent of target size, color & reflectance

Very fast (few ms)

Low power
FlightSense™ Technology advantages

- True Distance
- Gesture capable
- Fully integrated
- Color independent
- Texture independent
- Eye Safe
- Color independent
FlightSense™ unlocks endless new applications…
User detection and AF assist

Laptops & monitors

Presence detection for screen power on / off:
• Complies with EU Regulation 801/2013 (Lot 26): Networked standby losses of energy
• Fast detection (<30ms)
• Independent of target reflectance and color
• Robust to ambient light and backlight

AF Assist in case of AF camera:
• ToF can provide “instant focus”
• Works in the dark
• Not influenced by low contrast target
**Gesture Recognition**

**Multiple Gestures from a single FlightSense™ sensor**

- **Single Tap**
  - Press a virtual ‘button’ on top of the sensor, once

- **Double Tap**
  - Press a virtual ‘button’ on top of the sensor, twice

- **Single Swipe**
  - Slide hand left to right or from right to left over the sensor

- **Double Swipe**
  - Slide hand from left to right and back to left or from right to left and back to right over the sensor
VL6180X
Ambient Light Sensor (ALS) / Proximity Sensor

Highlights

- Small package
  - OLGA 4.8 x 2.8 x 1mm
- Robust and accurate proximity detection
- Highly efficient ALS embedded

- Fully integrated
  - Near-IR (850nm) VCSEL emitter
  - Filters
  - Receiver
  - Advanced µC
- Low power
- Field-of-View : 25°
- Laser Class 1 device (eye safe)
- Independent of reflectance/color/texture
- Complete API package and Android driver

Applications

Reliable Proximity detection

- User detection to safely power off touch screen or control white goods
- Obstacle detection for robotics
- ...

Ambient Light Sensing

Adjust the brightness of the display subject to the ambient light level detected
**Highlights**

- **World's smallest ToF sensor**
  - OLGA 4.4 x 2.4 x 1mm
- **Range up to 2 meters in less than 30ms**
- **High accuracy** (up to +/- 3%)
- **Fast ranging** time (up to 50Hz)
- **Fully integrated**
  - Near-IR (940nm) VCSEL emitter
  - Filters
  - Receiver
  - Advanced µC
- **Low power**
- **Field-of-View : 25°**
- **Laser Class 1 device (eye safe)**
- **Independent of reflectance/color/texture**
- **Complete API package and Android driver**

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**Applications**

**Laser AF**
WW #1 supplier, with Focus in 1 frame

**Drones**
Take-off and landing phase assistance. Ceiling detection

**User detection & Smart interaction**
Power saving, zoom, user detection and counting, …
VL53L0X NUCLEO expansion board

Arduino Connectors

4-digit display

PC GUI interface

VL53L0X Ranging sensor

2x VL53L0X satellites (plugged or hardwired)

Cover Glass sample
(PMMA material. Low XTalk)

Cover Glass holder
(Can hold Cover Glass and spacers)

Spacers
3 spacers 0.25/0.5/1mm to create various air gaps below CG
A color code is used in the document for each component of the ecosystem.

Documentation

VL53L0X API User Manual - UM2039
VL53L0X Datasheet – DS11555
VL53L0X Quick Start Guide
Applications Notes

VL53L0X GUI
User Manual - Embedded

VL53L0X Eval GUI - STSW-IMG006
Get ranging live curves on your PC
Change key settings of the device
Data logging capabilities

STSW-LINK007

VL53L0X C API package – STSW-IMG005
Discover API Source code

X-CUBE-53L0A1 (STM32Cube)
User Manual – UM2046

X-CUBE-53L0A1 package
Full integration in STM32 MCU (real-time)
All source code provided
Full access to product settings
Data logging capabilities
Ranging and Gesture detection demo

STSW-LINK009

X-NUCLEO-53L0A1 (HW)
User Manual – UM2047

Hardware
P-NUCLEO-53L0A1
X-NUCLEO-53L0A1

VL53L0X : Miniature ToF Ranging & Gesture Sensor
FlightSense™ Technology Summary

NV'S'BLE

Longevity 7 Years Commitment

Eye Safe
Thank you