

Time-of-Flight high accuracy low power proximity sensor



Features

High accuracy proximity ranging

- High performance proximity sensor
- From 0 to 1200 mm with full field of view (FoV)
- Short distance linearity down to 1 mm
- Diagonal FoV of 18°
- Fast ranging frequency up to 100 Hz

Ultralow power (ULP) detection mode is available with the STSW-IMG034 application programming interface (API)

- Programmable interrupt threshold to wake up the host
- Ultralow power consumption down to 55 μ A and adapted to battery-powered devices
- Embedded on-chip processing
- A comprehensive application note (AN5870) provided for detailed technical guidance

Fully integrated miniature module

- 940 nm invisible laser emitter (VCSEL) and analog driver
- Low power microcontroller running advanced digital firmware
- 4.4 x 2.4 x 1 mm size
- Pin-to-pin compatible with VL53L0X, VL53L1X, VL53L1CB, VL53L3CX, VL53L4CX, and VL53L4ED

Easy integration

- Reflowable component
- Single power supply 2v8
- Can be hidden behind cover window
- I²C interface (up to 1 MHz)
- Full set of C software drivers (Linux compatible) for turnkey ranging
- Embedded processing for a very low memory footprint

Product status link
VL53L4CD
STSW-IMG034
STSW-IMG039

Applications

- Proximity ranging applications such as:
 - Wall tracking and cliff detection for robotics
 - System activation and presence detection
 - Touchless switch
- Very-low power consumption for battery-powered devices including:
 - Access control
 - Sanitary (faucets, dispensers, etc.)
 - Home appliances (thermostats, lighting control)
- Fast ranging:
 - Bar code readers
 - Biometric distance applications
 - Virtual fences
- Liquid (water, milk, soda, oil, fuel) level measurement solution for:
 - Home appliance devices
 - Industrial applications
 - Smart farming including rice paddies, milk collectors, and food containers for pet feeding
 - Sanitary devices
 - Smart housing and smart buildings

Description

The VL53L4CD sensor is specifically designed for proximity and short-range measurements. It provides very accurate distance measurements from only 1 mm up to 1200 mm. This new generation laser emitter has an 18° FoV. It improves performance under ambient light with a ranging speed up to 100 Hz.

The VL53L4CD device features ULP mode for continuous FoV monitoring. It has a minimal power consumption, down to 55 μ A (see the [AN5870](#)), which is optimized for battery-powered devices. The sensor processes data on-chip, without sending raw data to the host. It sends an interrupt to the host when a target is detected. Such integrated on-chip processing reduces design complexity and the BOM (bill of material) cost. These features enable the use of less powerful, more cost-effective microcontrollers.

The FlightSense technology, along with the principles of the VL53L4CD, inspired liquid level monitoring (STSW-IMG039) example codes. This cutting-edge solution from STMicroelectronics enables the use of a nonmechanical sensor for measuring liquid levels. This in turn reduces the risks associated with corrosion and rust. The solution delivers precise measurements across a wide range of liquids, from water to fuel.

Like all Time-of-Flight (ToF) sensors based on ST's FlightSense technology, the VL53L4CD records an absolute distance measurement regardless of the target color and reflectance.

The VL53L4CD is housed in a miniature reflowable package, which integrates a SPAD (single photon avalanche diode) array. It achieves the best ranging performance in various ambient lighting conditions and for a wide range of cover glass materials.

All of ST's ToF sensors integrate a VCSEL (vertical-cavity surface-emitting laser) which emits fully invisible 940 nm IR light. This light has a Class 1 certification and is totally safe for the eyes.

Revision history

Table 1. Document revision history

Date	Version	Changes
02-Sep-2021	1	Initial release
22-Apr-2024	2	Updated Features Product status link: Added STSW-IMG034 and STSW-IMG039. Updated Applications Updated Description

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