

Scope

This document describes 2 application principles for the MLX75303 Optical Switch SensorEyeC:

- Dirt-Robust Contactless Switch
- Contactless Position Switch



The description focuses on the principle of the applications rather than providing full circuit layouts or component values.

Applications

General

- Contactless switch and contactless position switch
- Hand presence detection, e.g. for water taps
- Range detection, e.g. staircase detection for robot vacuum cleaners
- Twilight Sensor, e.g. for sun screens, roof windows
- Security Screens

Automotive

- Steering angle measurement
- Contactless switch for steering stocks
- Headlights ON/OFF sensor
- Keyless car entry – hand presence detection

Printers/Copiers

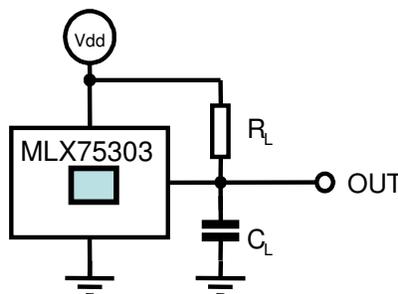
- Paper feed, size and orientation detection
- Toner cartridge presence detection

Related Melexis Products

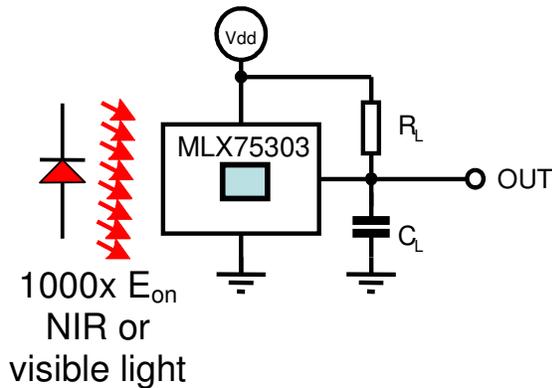
- MLX75303 Optical Switch SensorEyeC
- MLX75304 Light-to-Frequency SensorEyeC
- MLX75305 Light-to-Voltage SensorEyeC

Other Components Needed

- Decoupling capacitors between Vdd and Vss. Typically 1uF in parallel with 100nF
- A typical value for the load resistor R_L is 1kOhm
- The load capacitance C_L is typically formed by the input capacitance of the component that is connected to the sensor output, the wiring capacitance and the output capacitance of the sensor itself.



**Dirt-Robust
Contactless Switch Applications**



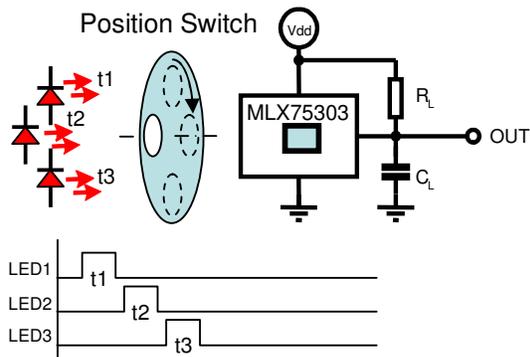
Explanation

In the datasheet of the MLX75303 you will find that the sensor turn-off time is typically 10us and max. 20us. This specification is guaranteed for light intensities of up to 1000x E_{on} .

This means that if you over-saturate the switch with 1000x more light than its turn-on value, the sensor still keeps its speed. This feature is very useful when designing dirt-robust applications.

In some environments, dirt and dust can build up on the sensor over time. By applying a higher light intensity, you shine through the dust. In other words, this sensor allows for **a very high light budget margin**. This leads to long-life dirt-robust stable operations of your application.

Contactless Position Switch



Explanation

The picture at the left describes how to use the MLX75303 for building a optical contactless multiple position switch. In this example we consider a position switch with 4 possible positions.

3 low-cost LEDs are needed for a switch with 4 possible positions. All LEDs are pulsed in a sequential way from t1 to t3. If for instance the switch is set in position 2 then the light of LED2 will be able to reach the sensor. Comparison of the sensor output with the pulse times gives the switch position.

Conclusion

Optical contactless switch applications in dusty environments are now perfectly possible without the need for perfect sealing of the sensor module, thanks to the light over-saturation capabilities of the MLX75303 Optical Switch SensorEyeC.

Other features of the MLX75303 include precise and guaranteed light sensitivity specs, automotive qualification AEC-Q100 up to 125degC operating temperature and solder reflow 260degC compliance.