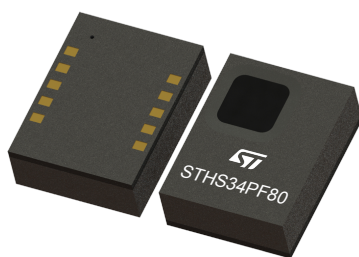


Low-power, high-sensitivity infrared sensor for presence and motion detection



OLGA-10L
3.2 x 4.2 x 1.455 (max) mm

Features

Key features

- High-sensitivity, infrared presence and motion sensor
- Reach up to 4 meters without lens for objects of 70 x 25 cm² and up to 6 meters for assumable human body size
- Integrated silicon IR filter
- SMD friendly
- Capable of detecting stationary objects
- Capable of distinguishing between stationary and moving objects
- 80° field of view
- Factory calibrated
- Low power
- Embedded smart algorithm for presence / motion detection

Electrical specifications

- Supply voltage: 1.7 V to 3.6 V
- Supply current: 10 µA
- 2-wire I²C / 3-wire SPI serial interface
- Programmable ODRs from 0.25 Hz to 30 Hz
- One-shot mode

Sensing specifications

- IR sensitivity: 2000 LSB/°C
- Noise: 120 LSBp-p
- Operating wavelength: 5 µm to 20 µm
- Local temperature sensor accuracy: ±0.5 °C

Package specifications

- Organic LGA 3.2 x 4.2 x 1.455 (max) mm, 10 leads
- **ECOPACK**, RoHS and “Green” compliant

Applications

- Alarm / Security systems
- Home automation
- Smart lighting
- IoT
- Smart lockers
- Smart wall pads

Product status link	
STHS34PF80	
Product summary	
Order code	STHS34PF80TR
Temperature range [°C]	-40 to +85
Package	OLGA-10L
Packing	Tape and reel
Product resources	
TN0018 (Design and soldering)	
Product label	
	

Description

The **STHS34PF80** is an uncooled, factory calibrated, IR sensor with operating wavelength between 5 μm and 20 μm .

The **STHS34PF80** sensor has been designed to sense accurately the absolute temperature of objects within its field of view. The information is digitally processed by the ASIC which can be programmed to monitor motion, presence or an overtemperature condition.

Thanks to its exceptional sensitivity, the **STHS34PF80** can detect human presence at a distance up to 6 meters without the need of a Fresnel lens.

The **STHS34PF80** is housed in a small 3.2 x 4.2 x 1.455 (max) mm 10-lead organic LGA package.

1 Overview

The STHS34PF80 is an infrared sensor that can be used to detect the presence of stationary and moving objects as well as overtemperature conditions. It measures the object's IR radiation with unique TMOS technology to detect its presence or motion when the object is inside the field of view.

An optical band-pass filter is deposited over the sensor limiting its operating range within the wavelengths of 5 μm and 20 μm , making it insensitive to visible light and other bands.

The sensor is based on a matrix of floating vacuum thermal transistors MOS (TMOS) connected together and acting as a single sensing element. A state-of-the-art thermal isolation is achieved thanks to ST's unique MEMS manufacturing technologies, allowing the sensor to translate the smallest temperature changes into electrical signals that, in turn, are fed to the ASIC.

The sensor is split into two parts, one exposed to IR radiation and the other one shielded. Differential reading between the two parts is implemented to remove the effect of sensor self-heating.

The STHS34PF80 embeds a high-accuracy temperature sensor to measure the ambient temperature and compensate for heating of the device / application.

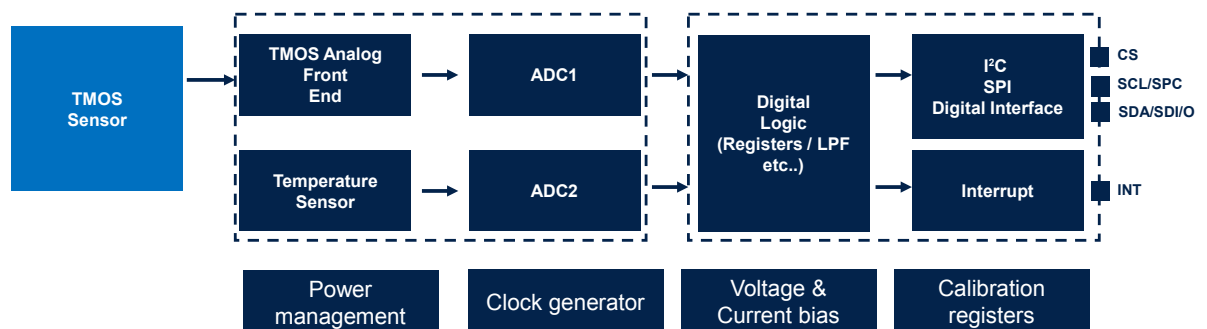
The ASIC also implements dedicated smart processing to detect / discriminate between stationary and moving objects and which can assert dedicated interrupts.

Different ODRs from 0.25 Hz to 30 Hz and a one-shot mode are available.

The STHS34PF80 is equipped with an I²C / 3-wire SPI interface and is housed in an OLGA 3.2 x 4.2 x 1.455 mm 10L package compatible with SMD mounting.

The field of view guaranteed by the package is 80°.

Figure 1. Block diagram



2 Pin description

Figure 2. Pin configuration (package bottom view)

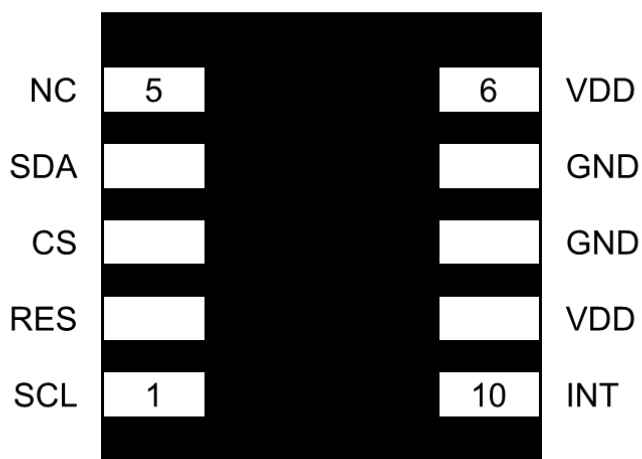


Table 1. Pin description

Pin number	Name	Function
1	SCL / SPC	I ² C / SPI serial interface clock
2	RES	Reserved (connect to GND)
3	CS	I ² C / SPI interface selection (1: I ² C enabled; 0: SPI enabled)
4	SDA / SDI/O	I ² C / SPI serial data line
5	NC	Leave floating (do not connect)
6	VDD	Power supply
7	GND	0 V supply
8	GND	0 V supply
9	VDD	Power supply
10	INT	Interrupt signal

3 Sensor and electrical specifications

Conditions at $V_{DD} = 1.8\text{ V}$, $T = 25\text{ }^{\circ}\text{C}$.

Table 2. Sensor specifications

Symbol	Parameter	Test condition	Min.	Typ. ⁽¹⁾	Max.	Unit
T_{bit}	Temperature output data (object and ambient)		–	16	–	Bit
T_{amb_s}	Ambient temperature sensitivity		–	100	–	LSB/ $^{\circ}\text{C}$
T_{obj_s}	Object temperature sensitivity ⁽²⁾			2000		LSB/ $^{\circ}\text{C}$
T_{amb_a}	Ambient temperature sensor accuracy	-10 $^{\circ}\text{C}$ to 60 $^{\circ}\text{C}$		± 0.5		$^{\circ}\text{C}$
		-40 $^{\circ}\text{C}$ to 85 $^{\circ}\text{C}$		± 1.0		
ODR	Object and ambient temperature output data rate	ODR [3:0] = 0001		0.25		Hz
		ODR [3:0] = 0010		0.5		
		ODR [3:0] = 0011		1.0		
		ODR [3:0] = 0100		2.0		
		ODR [3:0] = 0101		4.0		
		ODR [3:0] = 0110		8.0		
		ODR [3:0] = 0111		15.0		
		ODR [3:0] = 1xxx		30.0		
Noise				120		LSB _{p-p}
FFOV	Full field of view			80		Degree

1. Typical specifications are not guaranteed.

2. The object temperature measurement is specified for a full field-of-view coverage by a black body with more than 99% emissivity. The accuracy specifications apply under settled isothermal conditions only.

Table 3. Electrical specifications

Symbol	Parameter	Test condition	Min.	Typ. ⁽¹⁾	Max.	Unit
V_{DD}	Supply voltage		1.7	–	3.6	V
I_{DD}	Supply current	128 average @ 1 Hz ODR		10		μA
		32 average @ 1 Hz ODR		5		
I_{DDPN}	Power-down supply current			1		μA
T_{op}	Operating temperature range		-40	–	85	$^{\circ}\text{C}$

1. Typical specifications are not guaranteed.

4 Optical specifications

Table 4. Optical specification

Symbol	Parameter	Test condition	Min.	Typ. ⁽¹⁾	Max.	Unit
FFOV	Full field of view	At 50% intensity		80		Degree

1. Typical specifications are not guaranteed.

Figure 3. Typical field of view measurements

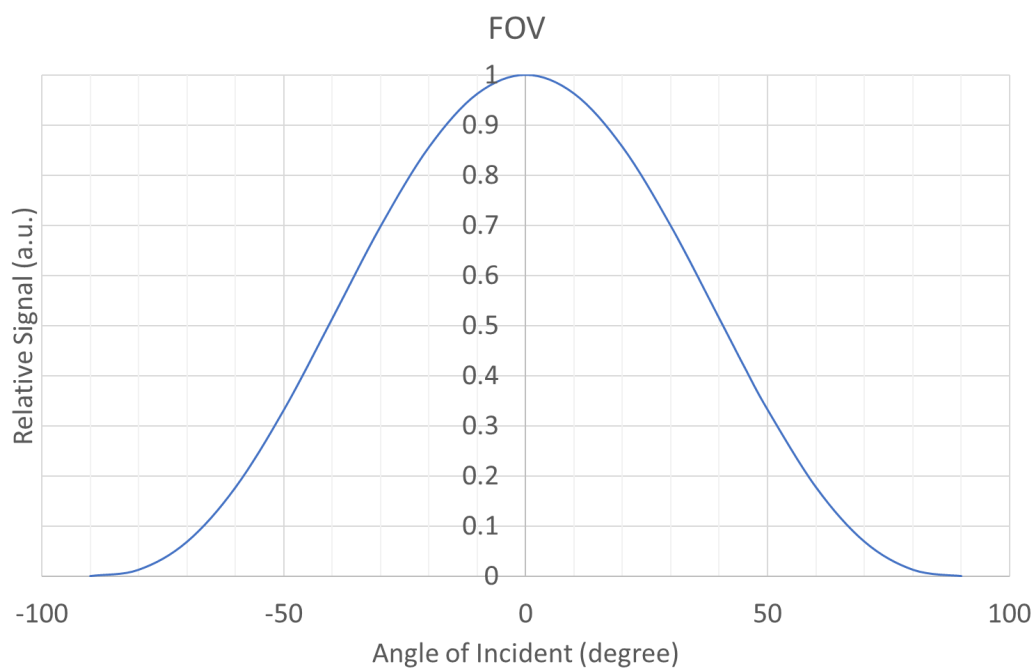
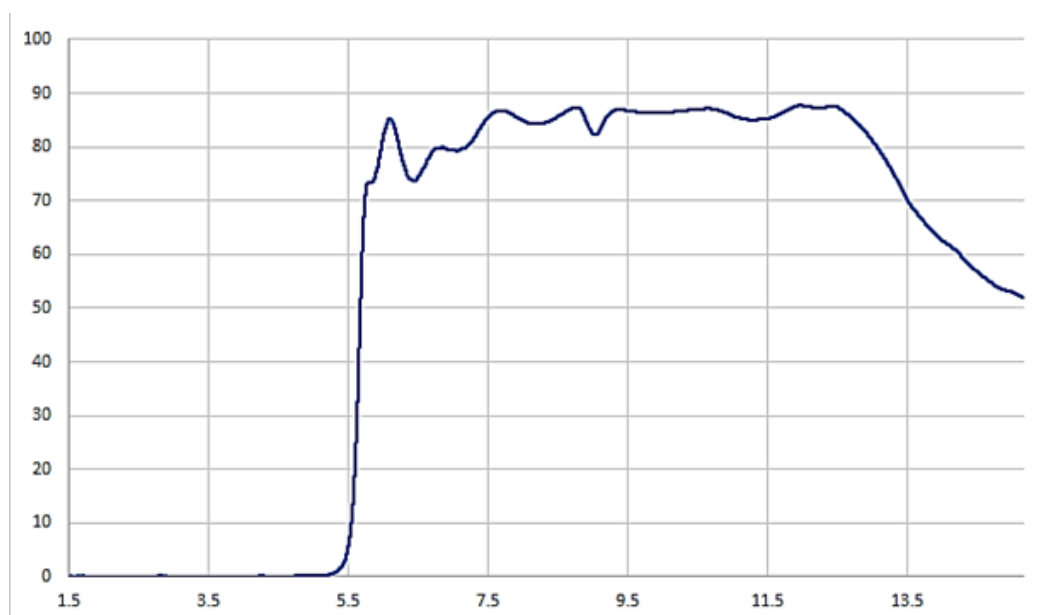


Figure 4. Filter transmittance typical curve



5 Application schematics

The device power supply must be provided through the VDD line, a power supply decoupling capacitor (100 nF) must be placed as near as possible to the supply pins of device (VDD). Depending on the application, an additional capacitor of 1 μ F could be placed on the VDD line to avoid power noise on VDD.

The functionality of the device and the measured data outputs are selectable and accessible through the I²C and SPI digital interface as shown in the following figures.

Figure 5. Application schematic with I²C connection

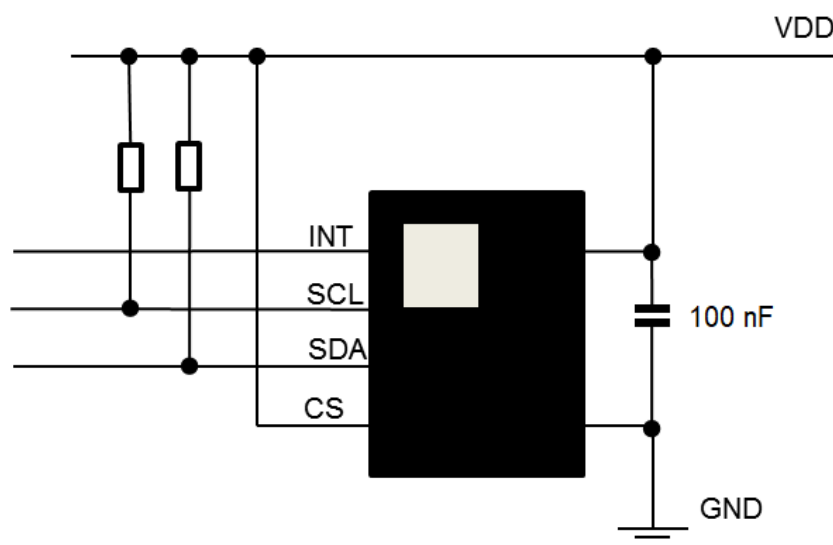


Figure 6. Application schematic with SPI connection

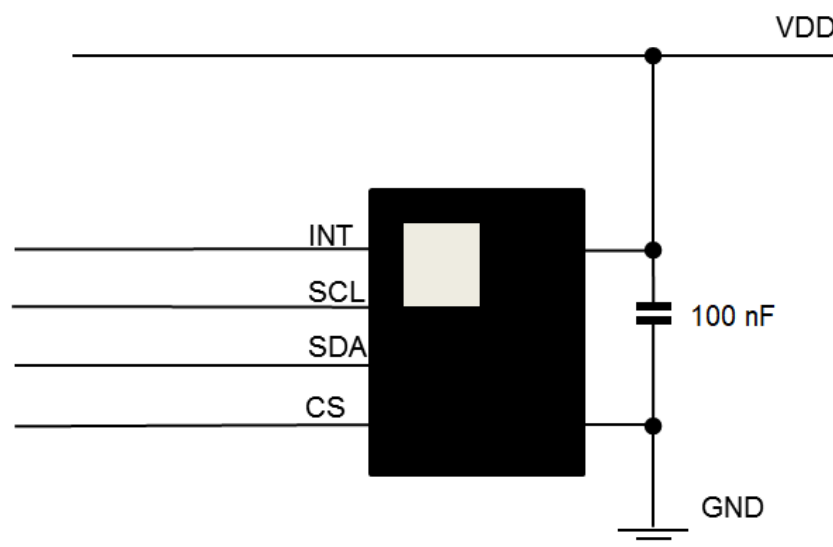


Table 5. Internal pin status

Pin number	Name	Default pin status
1	SCL / SPC	Default : Input without pull-up
2	RES	
3	CS	Default : Input with pull-up
4	SDA / SDI/O	Default : Input without pull-up
5	NC	
6	VDD	
7	GND	
8	GND	
9	VDD	
10	INT	Default : Input without pull-up

6 Soldering guidelines

The soldering profile depends on the number, size and placement of components on the application board. For this reason, it is not possible to define a unique soldering profile for the sensor only. The customer should use a time and temperature reflow profile based on PCB design and manufacturing expertise. In any case, the soldering profile should not exceed profiles as specified in Jedec J-STD-020.

LGA packages show metal traces on the side of the package so solder material must be avoided on the side of package during reflow.

The product package is not sealed as there is a 0.1 mm hole on the bottom of the package as illustrated in [Figure 7. OLGA-10L \(3.2 x 4.2 x 1.455 mm\) package outline and mechanical data](#). A dry reflow process such as convection reflow is recommended. Vapor phase reflow is not suitable for this type of optical component.

'No-wash' assembly process has to be used. "Self-cleaning" / "no flux" solder paste are to be used.

The product top surface can be eventually protected by suitable tape during reflow and other manufacturing steps to avoid contamination or scratches on the optical filter section of the component.

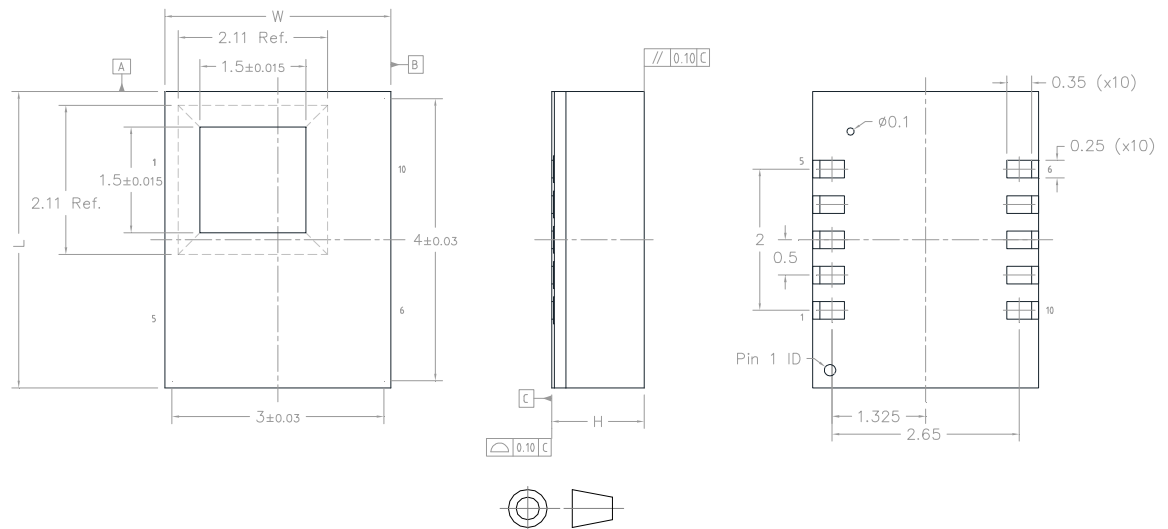
For land pattern and soldering recommendations, consult technical note [TN0018](#) available on www.st.com.

7 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

7.1 OLGA-10L 3.2 x 4.2 x 1.455 mm package information

Figure 7. OLGA-10L (3.2 x 4.2 x 1.455 mm) package outline and mechanical data



Dimensions are in millimeter unless otherwise specified
 General Tolerance is ± 0.1 mm unless otherwise specified

OUTER DIMENSIONS

ITEM	DIMENSION [mm]	TOLERANCE [mm]
Width [W]	3.2	± 0.1
Length [L]	4.2	± 0.1
Height [H]	1.455	MAX

DM00488758_4

Revision history

Table 6. Document revision history

Date	Version	Changes
21-Dec-2021	1	Initial release

Contents

1	Overview	3
2	Pin description	4
3	Sensor and electrical specifications.....	5
4	Optical specifications.....	6
5	Application schematics	7
6	Soldering guidelines.....	9
7	Package information.....	10
7.1	OLGA-10L 3.2 x 4.2 x 1.455 mm package information.	10
	Revision history	11
	Contents	12

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2021 STMicroelectronics – All rights reserved