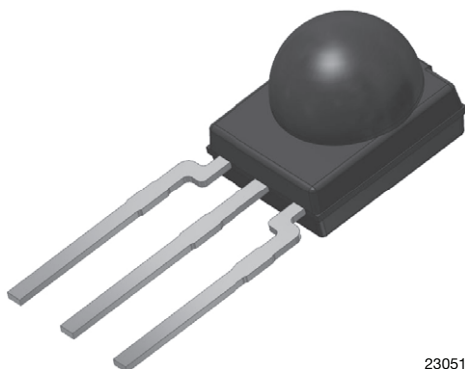


# IR Sensor Module for Reflective Sensor, Light Barrier, and Fast Proximity Applications



23051

## ADDITIONAL RESOURCES



3D Models

## MECHANICAL DATA

### Pinning:

1 = OUT, 2 = GND, 3 =  $V_S$ 

## APPLICATIONS

- Reflective sensors for hand dryers, towel or soap dispensers, water faucets, toilet flush
- Vending machine fall detection
- Security and pet gates
- Person or object vicinity switch
- Fast proximity sensors for toys, robotics, drones, and other consumer and industrial uses

## FEATURES

- Up to 2 m for presence and proximity sensing
- Up to 20 m distance for light curtain application
- Uses continuous AC signal or burst pattern of infrared light
- Small sensitivity scattering range
- PIN diode and sensor IC in one package
- Low supply current
- Shielding against EMI
- Visible light is suppressed by IR filter
- Insensitive to supply voltage ripple and noise
- Supply voltage: 2.0 V to 3.6 V
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## DESCRIPTION

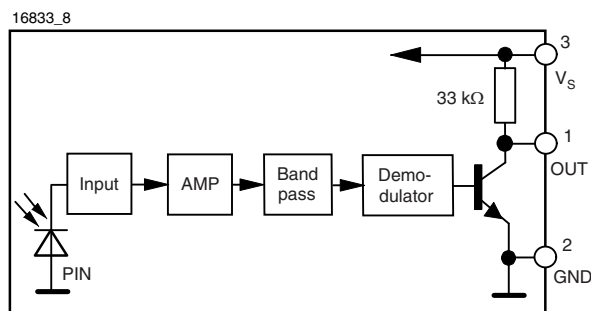
The TSSP930.. device is the latest generation of compact infrared detector module for presence, proximity, or light curtain applications. They provide an active low output in response to infrared bursts at 940 nm. The frequency of the burst should correspond to the carrier frequency shown in the parts table.

This component has not been qualified according to automotive specifications.

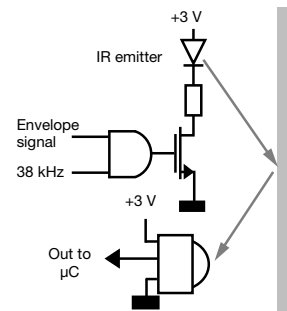
## PARTS TABLE

|                   |                                          |           |
|-------------------|------------------------------------------|-----------|
| Carrier frequency | 38 kHz                                   | TSSP93038 |
|                   | 56 kHz                                   | TSSP93056 |
| Package           | Minimold                                 |           |
| Pinning           | 1 = OUT, 2 = GND, 3 = $V_S$              |           |
| Dimensions (mm)   | 5.4 W x 6.35 H x 4.9 D                   |           |
| Mounting          | Leaded                                   |           |
| Application       | Presence sensors, fast proximity sensors |           |

## BLOCK DIAGRAM



## PRESENCE SENSING



**ABSOLUTE MAXIMUM RATINGS**

| PARAMETER                   | TEST CONDITION              | SYMBOL      | VALUE                   | UNIT |
|-----------------------------|-----------------------------|-------------|-------------------------|------|
| Supply voltage (pin 3)      |                             | $V_S$       | -0.3 to +3.6            | V    |
| Supply current (pin 3)      |                             | $I_S$       | 5                       | mA   |
| Output voltage (pin 1)      |                             | $V_O$       | -0.3 to +3.6            | V    |
| Voltage at output to supply |                             | $V_S - V_O$ | -0.3 to ( $V_S + 0.3$ ) | V    |
| Output current (pin 1)      |                             | $I_O$       | 5                       | mA   |
| Junction temperature        |                             | $T_j$       | 100                     | °C   |
| Storage temperature range   |                             | $T_{stg}$   | -25 to +85              | °C   |
| Operating temperature range |                             | $T_{amb}$   | -25 to +85              | °C   |
| Power consumption           | $T_{amb} \leq 85\text{ °C}$ | $P_{tot}$   | 10                      | mW   |

**Note**

- Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect the device reliability

**ELECTRICAL AND OPTICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

| PARAMETER                  | TEST CONDITION                                                                                   | SYMBOL            | MIN. | TYP.     | MAX. | UNIT              |
|----------------------------|--------------------------------------------------------------------------------------------------|-------------------|------|----------|------|-------------------|
| Supply current (pin 3)     | $E_v = 0, V_S = 3.3\text{ V}$                                                                    | $I_{SD}$          | 0.25 | 0.37     | 0.45 | mA                |
|                            | $E_v = 40\text{ klx, sunlight}$                                                                  | $I_{SH}$          | -    | 0.8      | -    | mA                |
| Supply voltage             |                                                                                                  | $V_S$             | 2.0  | -        | 3.6  | V                 |
| Output voltage low (pin 1) | $I_{OSL} = 0.5\text{ mA}, E_e = 2\text{ mW/m}^2$ , test signal see Fig. 1                        | $V_{OSL}$         | -    | -        | 100  | mV                |
| Transmission distance      | $E_v = 0$ , IR diode TSAL6200, $I_F = 50\text{ mA}$ , test signal see Fig. 1                     | $d$               | -    | 12       | -    | m                 |
| Minimum irradiance         | Pulse width tolerance:<br>$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ ,<br>test signal see Fig. 1 | $E_e\text{ min.}$ | 0.3  | 0.4      | 0.6  | mW/m <sup>2</sup> |
| Maximum irradiance         | $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ ,<br>test signal see Fig. 1                           | $E_e\text{ max.}$ | 30   | -        | -    | W/m <sup>2</sup>  |
| Directivity                | Angle of half transmission distance                                                              | $\Phi_{1/2}$      | -    | $\pm 45$ | -    | °                 |

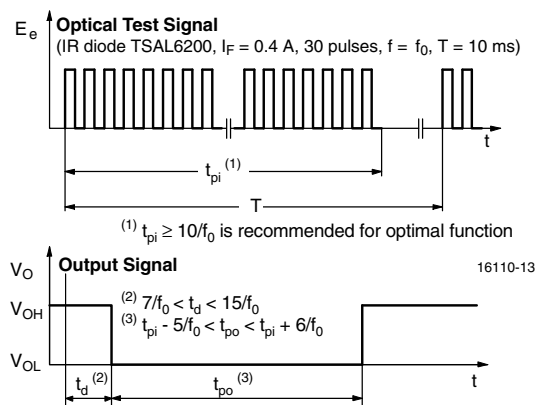
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Output Delay and Pulse Width

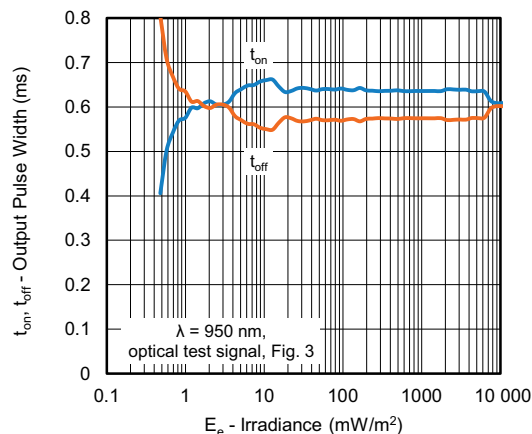


Fig. 4 - Output Pulse Diagram

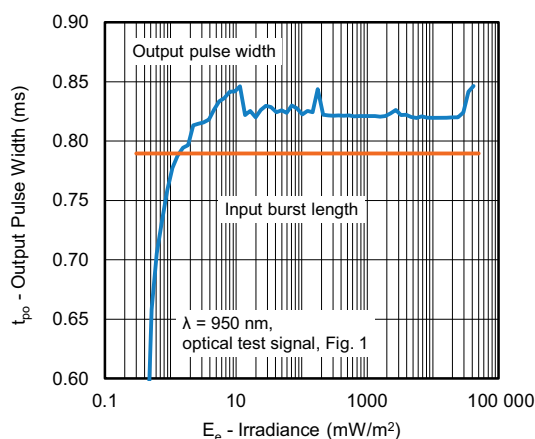


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

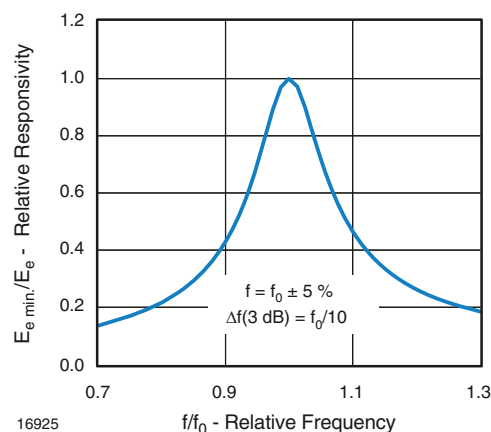


Fig. 5 - Frequency Dependence of Responsivity

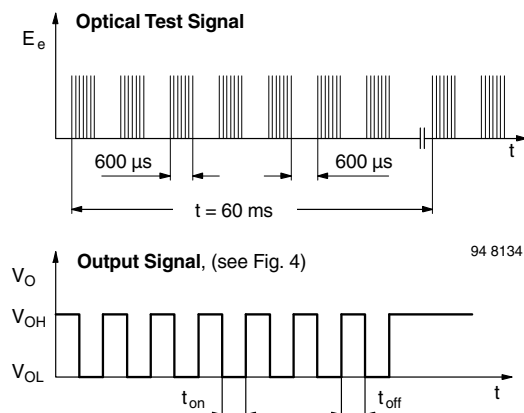


Fig. 3 - Test Signal

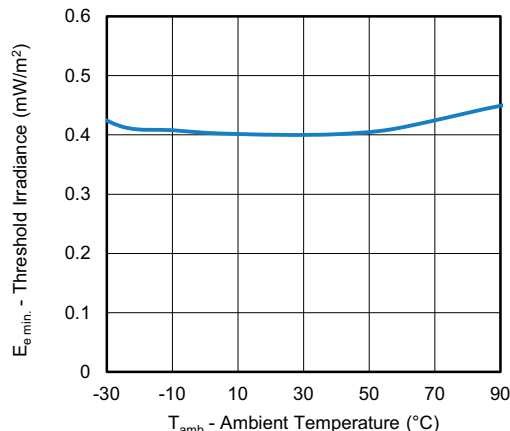


Fig. 6 - Sensitivity vs. Ambient Temperature

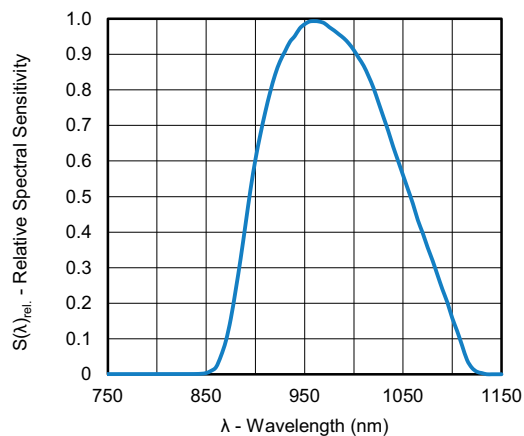


Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

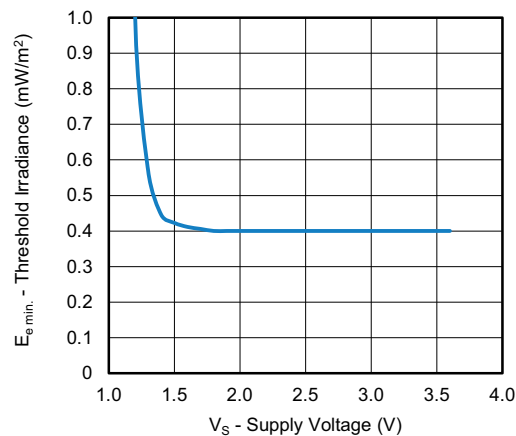


Fig. 9 - Sensitivity vs. Supply Voltage

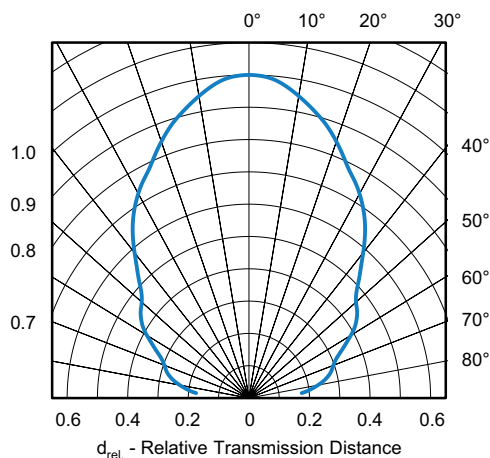
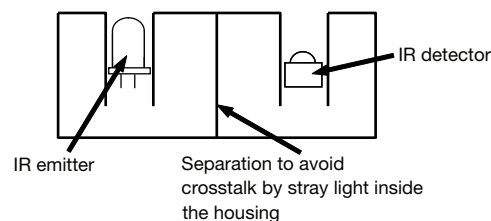


Fig. 8 - Directivity

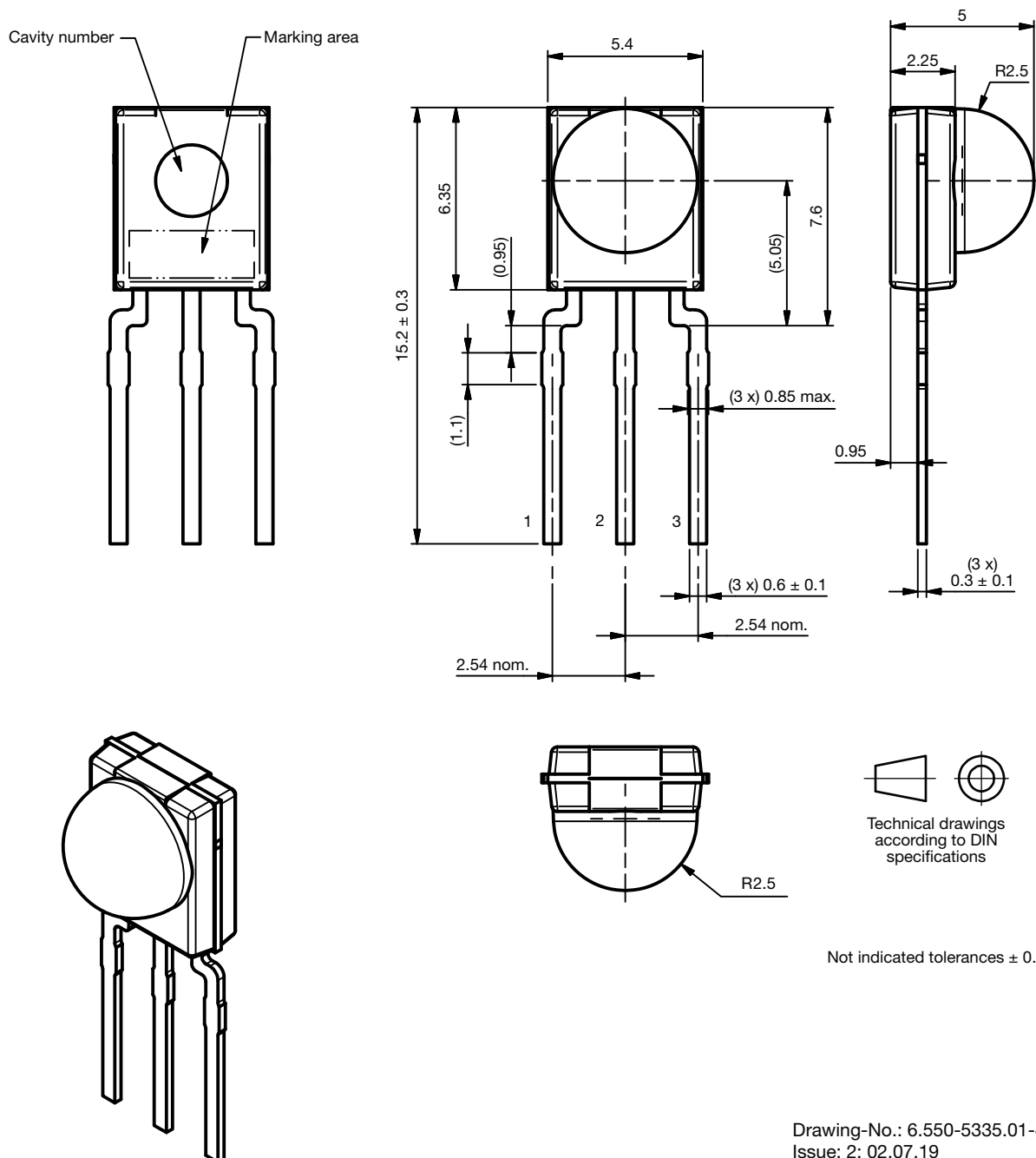
The typical application of these devices is a reflective or beam break sensor with active low “detect” or “no detect” information contained in its output. The TSSP930.. is also suitable for fast (~ 15 ms) proximity sensor applications for ranges between 10 cm and 2 m, if a burst pattern with variable intensity is used.

Example for a sensor hardware:



There should be no common window in front of the emitter and detector in order to avoid crosstalk via guided light through the window.

### PACKAGE DIMENSIONS in millimeters





## **BULK PACKAGING**

Standard shipping for minimold is in conductive plastic bags. The packing quantity is determined by weight and the number of components per carton may vary by a maximum of  $\pm 0.3\%$ .

## **ORDERING INFORMATION**

Examples: TSSP93038SS1

For more information, see: [www.vishay.com/doc?80076](http://www.vishay.com/doc?80076)

## **PACKAGING QUANTITY**

- 300 pieces per bag (each bag is individually boxed)
- 6 bags per carton



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