

## IR Receiver Module for Light Barrier Systems



### DESCRIPTION

The TSSP40..SS1XB are compact infrared detector modules for presence sensing applications. They provide an active low output in response to infrared bursts at 940 nm. The TSSP40..SS1XB are 20 x less sensitive than the TSSP40.., for ease of use in reflective applications at less than 1 m range where high sensitivity is not needed and can complicate the design.

This component has not been qualified to automotive specifications.

### FEATURES

- Presence sensor: up to 2 m distance, find more info at: [www.vishay.com/doc?49009](http://www.vishay.com/doc?49009)
- Light barrier: up to 12 m distance, TSAL6200 with  $I_F = 50$  mA, find more info at: [www.vishay.com/doc?49650](http://www.vishay.com/doc?49650)
- Fast proximity: up to 2 m range at 5 ms response time, find more info at: [www.vishay.com/doc?82741](http://www.vishay.com/doc?82741)
- Supply voltage: 2.0 V to 5.5 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)

### LINKS TO ADDITIONAL RESOURCES


[Product Page](#)

[Marking](#)

[Packages](#)

[Holders](#)

[Bends and Cuts](#)

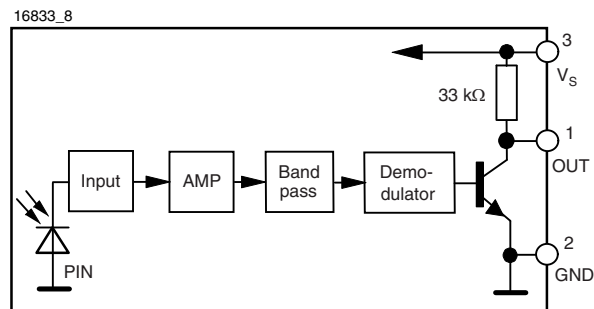
### APPLICATIONS

- 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

### DESIGN SUPPORT TOOLS

- [3D models](#)
- [Window size calculator](#)

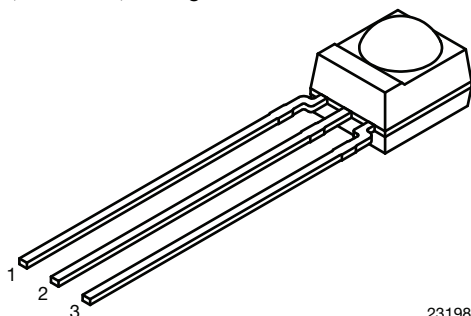
### BLOCK DIAGRAM



## MECHANICAL DATA

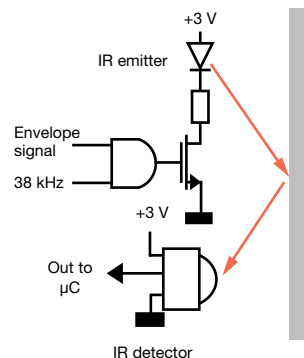
### Pinning:

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



23198

## PRESENCE SENSING



## ORDERING CODE

TSSP40..SS1XB - 2160 pieces in tubes

| PARTS TABLE       |  |               |
|-------------------|--|---------------|
| Carrier frequency | 38 kHz   | TSSP4038SS1XB |
|                   | 56 kHz   | TSSP4056SS1XB |
| Package           | Mold   |               |
| Pinning           | 1 = OUT, 2 = GND, 3 = $V_S$  |               |
| Dimensions (mm)   | 6.0 W x 6.95 H x 5.6 D   |               |
| Mounting          | Leaded   |               |
| Application       | Presence sensors, fast proximity sensors   |               |
| Special options   | <ul style="list-style-type: none"> <li>Narrow optical filter: <a href="http://www.vishay.com/doc?81590">www.vishay.com/doc?81590</a></li> <li>Wide optical filter: <a href="http://www.vishay.com/doc?82726">www.vishay.com/doc?82726</a></li> </ul> |               |

| ABSOLUTE MAXIMUM RATINGS    |                               |             |                         |      |
|-----------------------------|-------------------------------|-------------|-------------------------|------|
| PARAMETER                   | TEST CONDITION                | SYMBOL      | VALUE                   | UNIT |
| Supply voltage (pin 3)      |                               | $V_S$       | -0.3 to +6.0            | V    |
| Supply current (pin 3)      |                               | $I_S$       | 5                       | mA   |
| Output voltage (pin 1)      |                               | $V_O$       | -0.3 to 5.5             | 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   |
| Soldering temperature       | $t \leq 10$ s, 1 mm from case | $T_{sd}$    | 260                     | °C   |
| Power consumption           | $T_{amb} \leq 85$ °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

| <b>ELECTRICAL AND OPTICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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 | 0.35     | 0.45 | mA              |
|  | $E_v = 40\text{ klx}$ , sunlight   | $I_{SH}$          | -    | 0.45     | -    | mA              |
| Supply voltage   |  | $V_S$             | 2.0  | -        | 5.5  | V               |
| Transmission distance  | $E_v = 0$ , test signal see Fig. 1, IR diode TSAL6200, $I_F = 50\text{ mA}$                      | $d$               | -    | 2.4      | -    | m               |
| 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              |
| Minimum irradiance   | Pulse width tolerance:<br>$t_{pi} - 4/f_0 < t_{po} < t_{pi} + 4/f_0$ ,<br>test signal see Fig. 1 | $E_e\text{ min.}$ | -    | 7        | 14   | $\text{mW/m}^2$ |
| Maximum irradiance   | Pulse width tolerance:<br>$t_{pi} - 4/f_0 < t_{po} < t_{pi} + 4/f_0$ ,<br>test signal see Fig. 1 | $E_e\text{ max.}$ | 30   | -        | -    | $\text{W/m}^2$  |
| Directivity  | Angle of half transmission distance  | $\phi_{1/2}$      | -    | $\pm 45$ | -    | deg             |

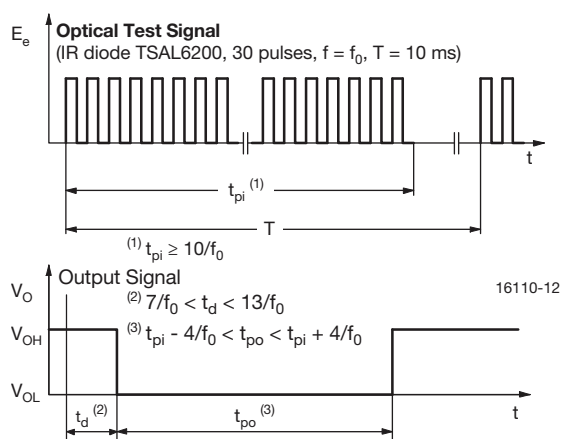
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Output Active Low

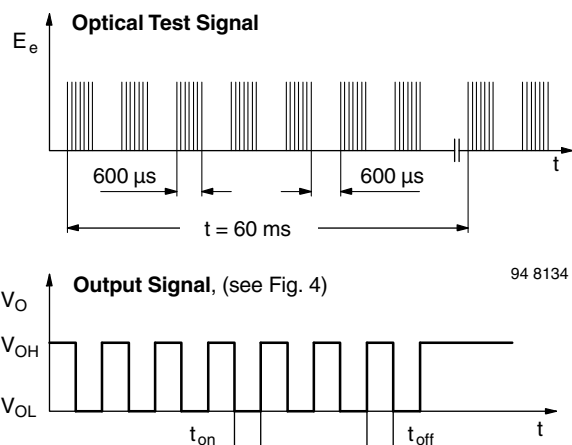


Fig. 3 - Output Function

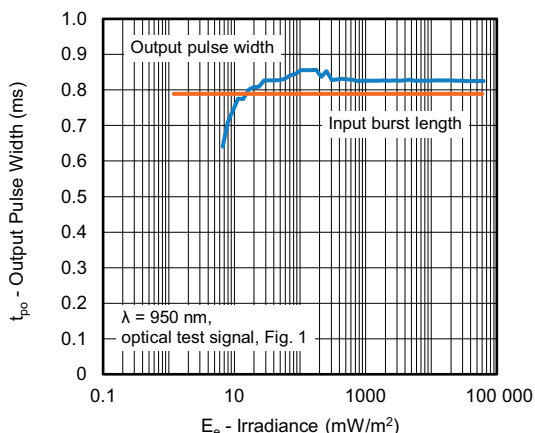


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

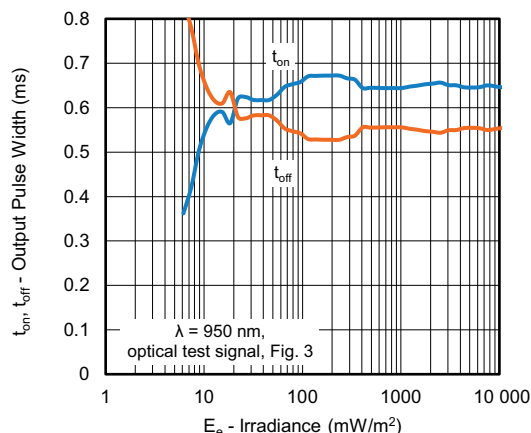


Fig. 4 - Output Pulse Diagram

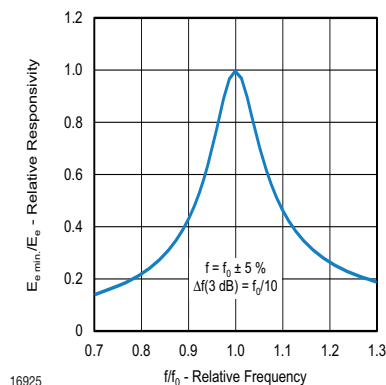


Fig. 5 - Frequency Dependence of Responsivity

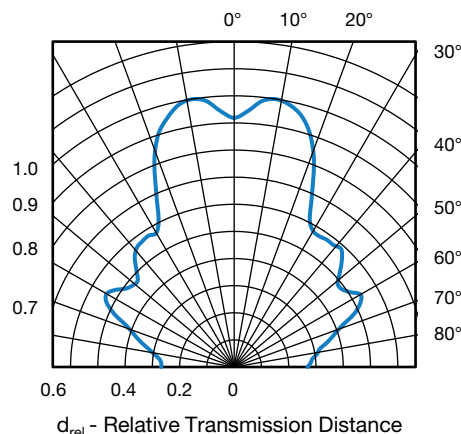


Fig. 8 - Horizontal Directivity

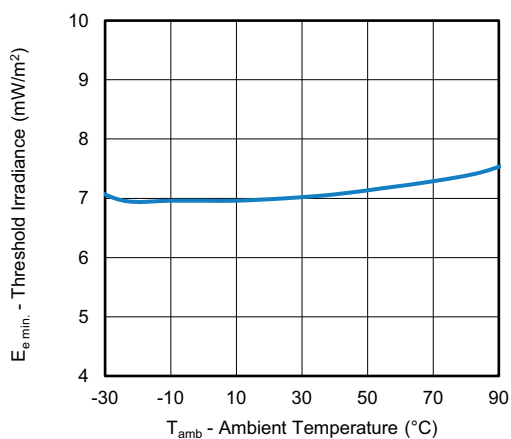


Fig. 6 - Sensitivity vs. Ambient Temperature

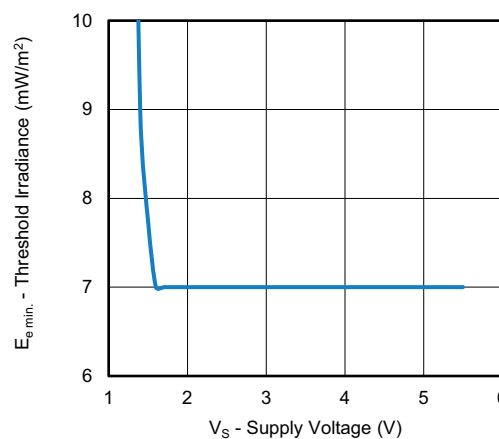


Fig. 9 - Sensitivity vs. Supply Voltage

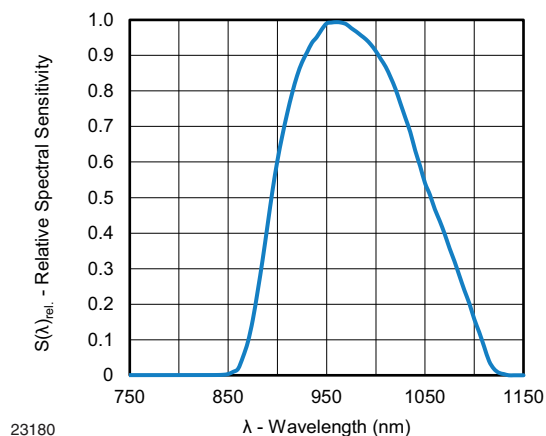
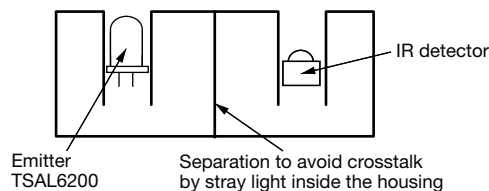


Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

The typical application of this device is a reflective or beam break sensor with active low “detect” or “no detect” information contained in its output. The TSSP40.. 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.

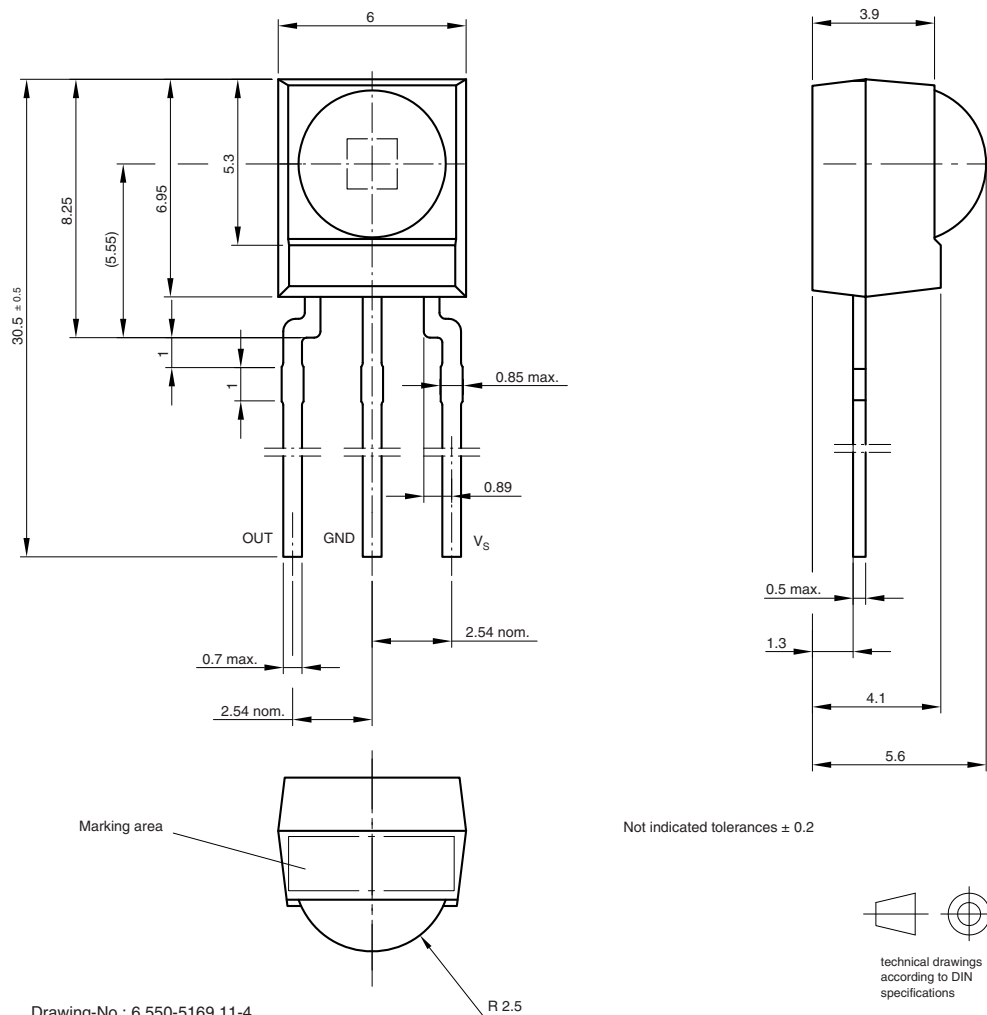
Example for a sensor hardware:



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



Drawing-No.: 6.550-5169.11-4  
Issue: 13; 17.12.08  
16003



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