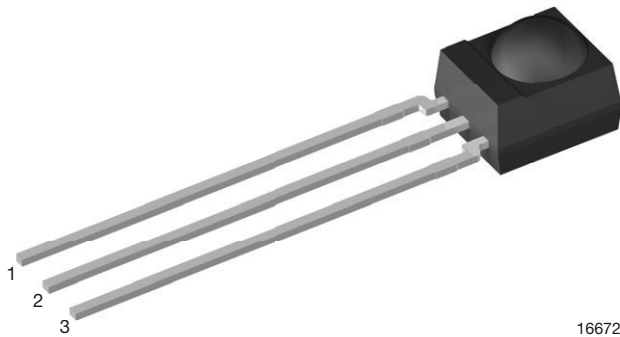


IR Sensor Module for Presence Sensor, Light Barrier, and Fast Proximity Applications



16672

FEATURES

- Presence sensor: up to 2 m distance, find more info at: 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
- Fast proximity: up to 2 m range at 5 ms response time, find more info at: www.vishay.com/doc?82741
- Supply voltage: 2.0 V to 3.6 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The TSSP940.. series are the latest generation of compact infrared detector modules for presence, fast 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. The sensitivity of the device is selectable as shown on the electrical and optical characteristics table. This component has not been qualified according to automotive specifications.

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

MECHANICAL DATA

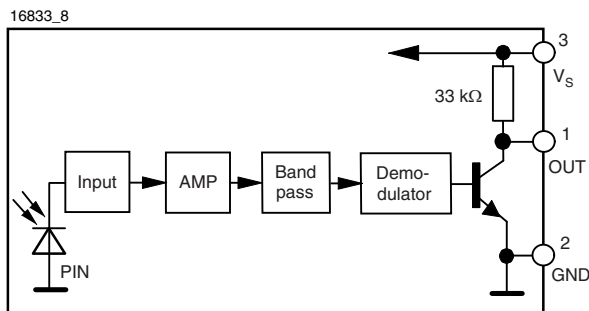
Pinning:

1 = OUT, 2 = GND, 3 = V_S

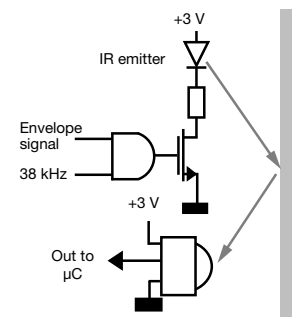
ORDERING CODE

TSSP940.. - 2160 pieces in tubes

BLOCK DIAGRAM



PRESENCE SENSING





| PARTS TABLE | | |
|-------------------|--|-----------|
| Carrier frequency | 38 kHz | TSSP94038 |
| | 56 kHz | TSSP94056 |
| 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"> Narrow optical filter: www.vishay.com/doc?81590 Wide optical filter: www.vishay.com/doc?82726 | |

| 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} ≤ 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

| ELECTRICAL AND OPTICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---------------------|---------------------|------|------|------|-------------------|
| PARAMETER | TEST CONDITION | PART ⁽¹⁾ | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Supply current (pin 3) | E _v = 0, V _S = 3.3 V | | I _{SD} | 0.25 | 0.37 | 0.45 | mA |
| | E _v = 40 klx, sunlight | | I _{SH} | - | 0.5 | - | mA |
| Supply voltage | | | V _S | 2.0 | - | 3.6 | V |
| Transmission distance | E _v = 0, IR diode TSAL6200, I _F = 50 mA, test signal see Fig. 1 | | d | - | 12 | - | m |
| Output voltage low (pin 1) | I _{OSL} = 0.5 mA, E _o = 2 mW/m ² , test signal see Fig. 1 | | V _{OSL} | - | - | 100 | mV |
| Minimum irradiance | Pulse width tolerance: t _{pi} - 5/f ₀ < t _{po} < t _{pi} + 6/f ₀ , test signal see Fig. 1 | TSSP940xxZ3 | E _{e min.} | - | 0.1 | 0.2 | mW/m ² |
| | | TSSP940xx | | 0.32 | 0.4 | 0.5 | |
| Maximum irradiance | t _{pi} - 5/f ₀ < t _{po} < t _{pi} + 6/f ₀ , test signal see Fig. 1 | | E _{e max.} | 30 | - | - | W/m ² |
| Directivity | Angle of half transmission distance | | φ _{1/2} | - | ± 45 | - | ° |

Note

- ⁽¹⁾ xx = frequency, 38 kHz or 56 kHz

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

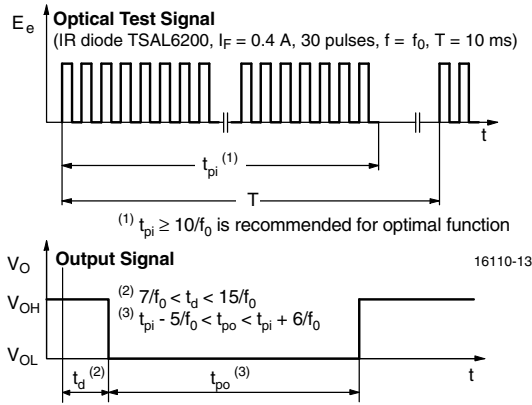


Fig. 1 - Output Delay and Pulse Width

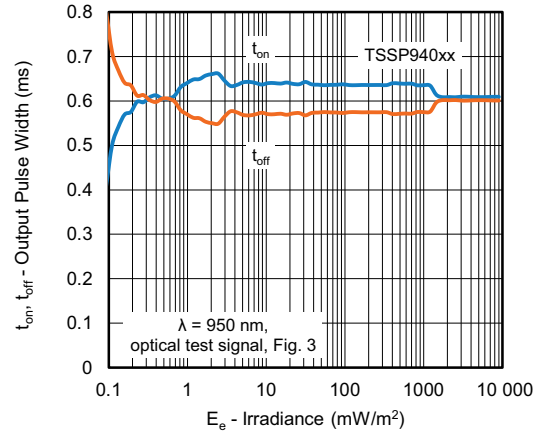


Fig. 4 - Output Pulse Diagram

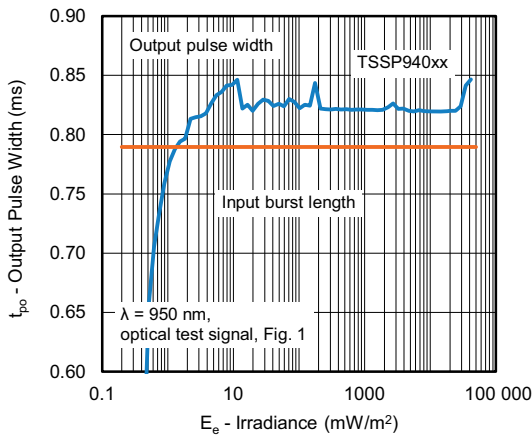


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

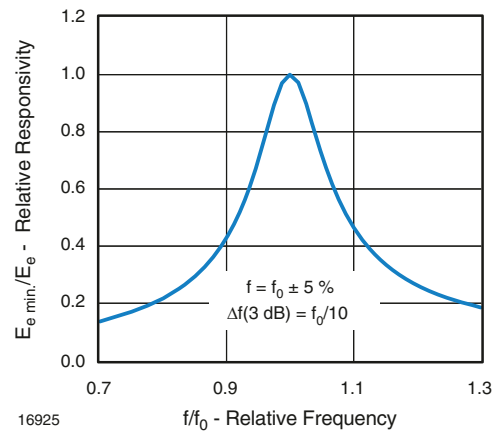


Fig. 5 - Frequency Dependence of Responsivity

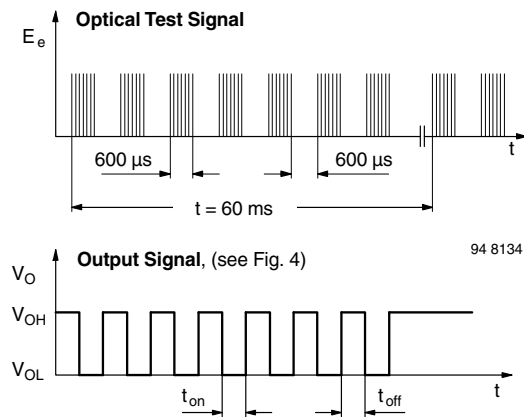


Fig. 3 - Test Signal

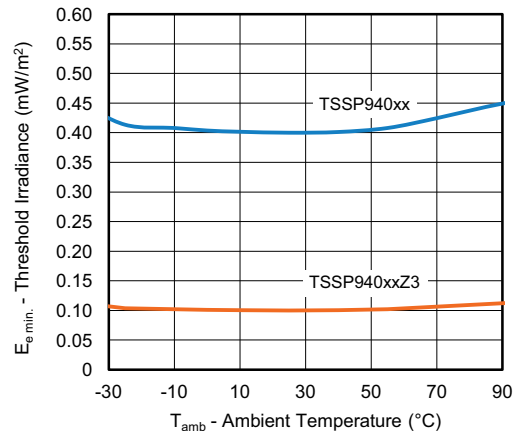
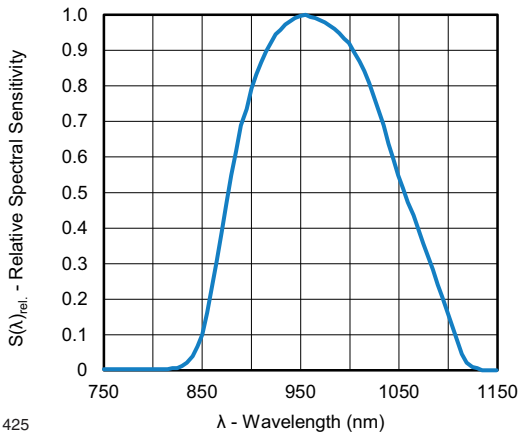


Fig. 6 - Sensitivity vs. Ambient Temperature



21425

Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

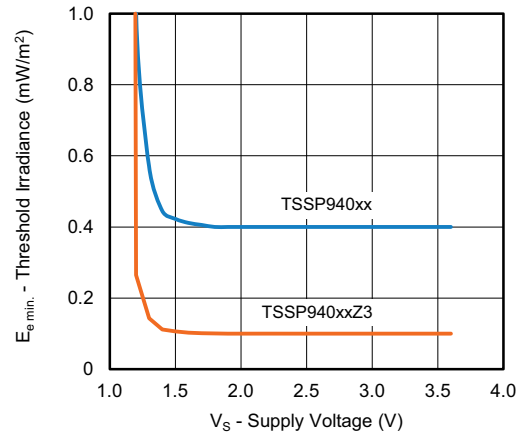


Fig. 9 - Sensitivity vs. Supply Voltage

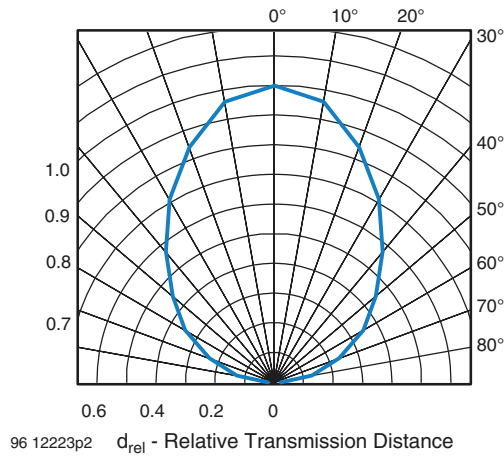
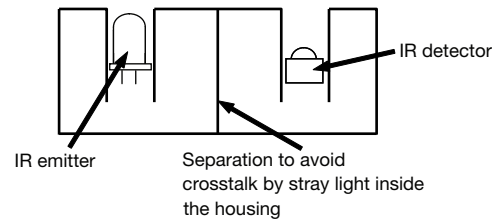


Fig. 8 - Directivity

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 TSSP940.. 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.

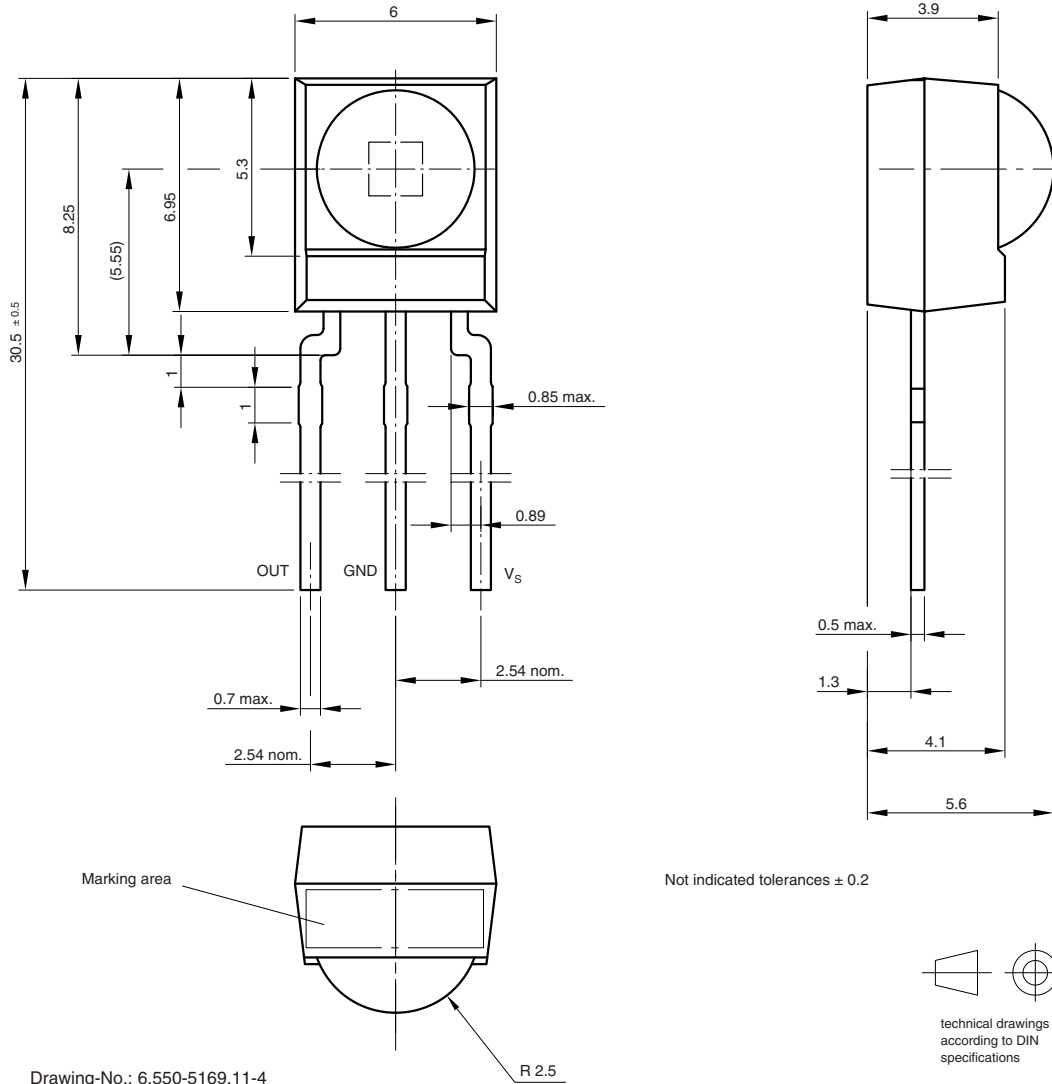
Example for a sensor hardware:



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



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.