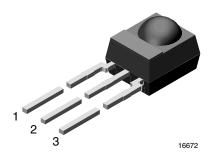


Vishay Semiconductors

IR Receiver Modules for Mid Range Proximity Sensors



MECHANICAL DATA

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

Please see the document "Product Transition Schedule" at <u>www.vishay.com/ir-receiver-modules/</u> for up-to-date info, when this product will be released.

FEATURES

- · Low supply current
- Photo detector and preamplifier in one package
- Internal filter for burst frequency
- Improved shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Material categorization: For definitions of compliance please see <u>www.vishay.com/doc?99912</u>

DESCRIPTION

The TSSP4P38 series are miniaturized receivers for Mid range proximity sensor systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

The output pulse width of the TSSP4P38 has an almost linear relationship to the distance of the emitter or the distance of an reflecting object. The TSSP4P38 is optimized to suppress almost all spurious pulses from energy saving fluorescent lamps.

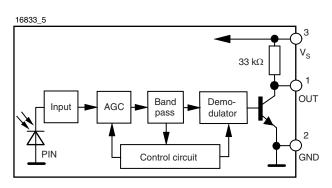
This component has not been qualified according to automotive specifications.

| PARTS TABLE | | | | |
|-----------------------|------------------|--|--|--|
| CARRIER FREQUENCY | MID RANGE SENSOR | | | |
| 38 kHz ⁽¹⁾ | TSSP4P38 | | | |

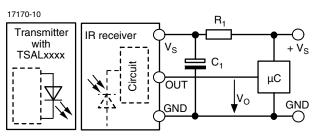
Note

⁽¹⁾ Other frequencies available by request

BLOCK DIAGRAM



APPLICATION CIRCUIT



The external components R₁ and C₁ are optional to improve the robustness against electrical overstress (typical values are R₁ = 100 Ω , C₁ = 0.1 μ F).



RoHS

COMPLIANT

GREEN (5-2008)



www.vishay.com

Vishay Semiconductors

TSSP4P38

| ABSOLUTE MAXIMUM RATINGS | | | | | | | | |
|-----------------------------|------------------------------|---------------------------------|---------------------------------|------|--|--|--|--|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT | | | | |
| Supply voltage (pin 3) | | VS | - 0.3 to + 6 | V | | | | |
| Supply current (pin 3) | | ا _S | 5 | mA | | | | |
| Output voltage (pin 1) | | Vo | - 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) | | Ι _Ο | 5 | mA | | | | |
| Junction temperature | | Tj | 100 | °C | | | | |
| Storage temperature range | | T _{stg} | - 25 to + 85 | °C | | | | |
| Operating temperature range | | T _{amb} | - 25 to + 85 | °C | | | | |
| Power consumption | $T_{amb} \le 85 \ ^{\circ}C$ | P _{tot} | 10 | mW | | | | |
| Soldering temperature | $t \le 10$ s, 1 mm from case | T _{sd} | 260 | °C | | | | |

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 | $E_v = 0, V_S = 5 V$ | I _{SD} | 0.55 | 0.7 | 0.9 | mA | | |
| | E _v = 40 klx, sunlight | I _{SH} | | 0.8 | | mA | | |
| Supply voltage | | VS | 2.5 | | 5.5 | V | | |
| Transmission distance | E _v = 0, test signal see fig. 1, IR diode TSAL6200, I _F = 200 mA | d | | 45 | | m | | |
| Output voltage low | $I_{OSL} = 0.5 \text{ mA}, E_e = 0.7 \text{ mW/m}^2,$ test signal see fig. 1 | V _{OSL} | | | 100 | mV | | |
| Minimum irradiance | Pulse width tolerance: t _{pi} - 5/f _o < t _{po} < t _{pi} + 6/f _o , test signal see fig. 1 | E _{e min.} | | 0.12 | 0.25 | mW/m ² | | |
| Maximum irradiance | t _{pi} - 5/f _o < t _{po} < t _{pi} + 6/f _o , test signal see fig. 1 | E _{e max.} | 50 | | | W/m ² | | |
| Directivity | Angle of half transmission distance | φ1/2 | | ± 45 | | deg | | |

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

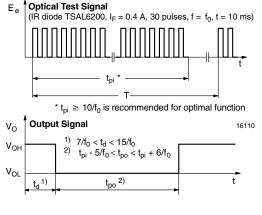


Fig. 1 - Output Active Low

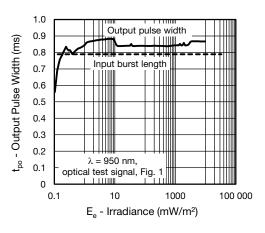


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

Rev. 1.1, 09-Mar-12

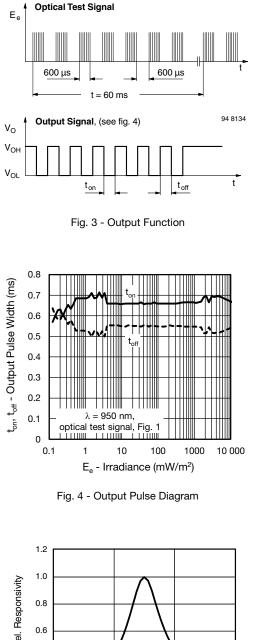
2

Document Number: 82474





Vishay Semiconductors



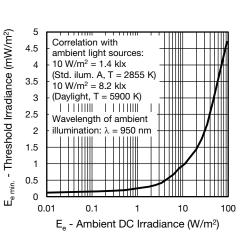
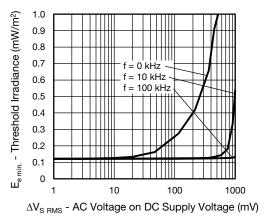
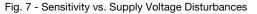


Fig. 6 - Sensitivity in Bright Ambient





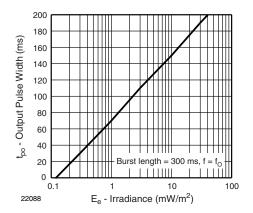


Fig. 8 - Max. Output Pulse Width vs. Irradiance

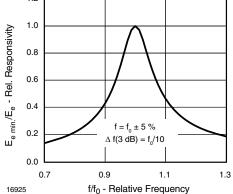


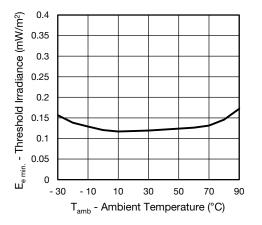
Fig. 5 - Frequency Dependence of Responsivity

Rev. 1.1, 09-Mar-12

3







www.vishay.com

Fig. 9 - Sensitivity vs. Ambient Temperature

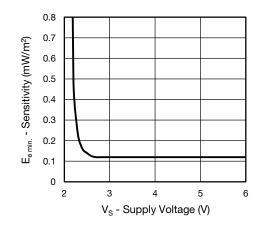


Fig. 12 - Sensitivity vs. Supply Voltage

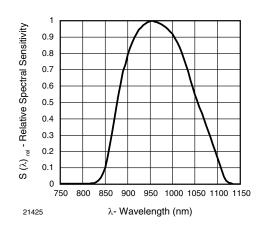


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

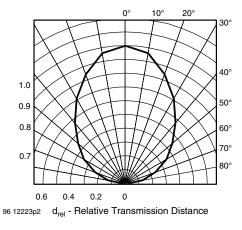


Fig. 11 - Horizontal Directivity

Rev. 1.1, 09-Mar-12

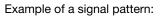
4

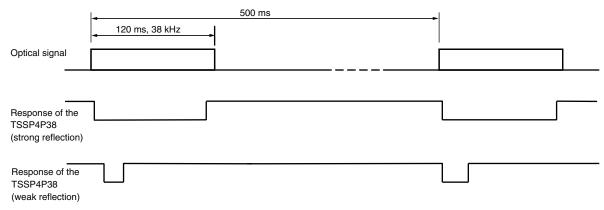


Vishay Semiconductors

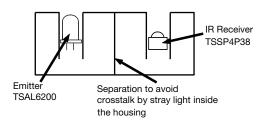
TSSP4P38

The typical application of the TSSP4P38 is a reflective sensor with analog information contained in its output. Such a sensor is evaluating the time required by the AGC to suppress a quasi continuous signal. The time required to suppress such a signal is longer when the signal is strong than when the signal is weak, resulting in a pulse length corresponding to the distance of an object from the sensor. This kind of analog information can be evaluated by a microcontroller. The absolute amount of reflected light depends much on the environment and is not evaluated. Only sudden changes of the amount of reflected light, and therefore changes in the pulse width, are evaluated using this application.





Example for a sensor hardware:



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

The logarithmic characteristic of the AGC in the TSSP4P38 results in an almost linear relationship between distance and pulse width. Ambient light has also some impact to the pulse width of this kind of sensor, making the pulse shorter.

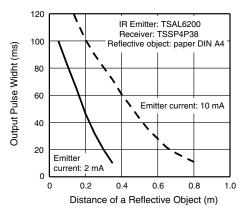


Fig. 13 - Distance Characterisitic of a Typical Reflective Sensor Using the TSSP4P38

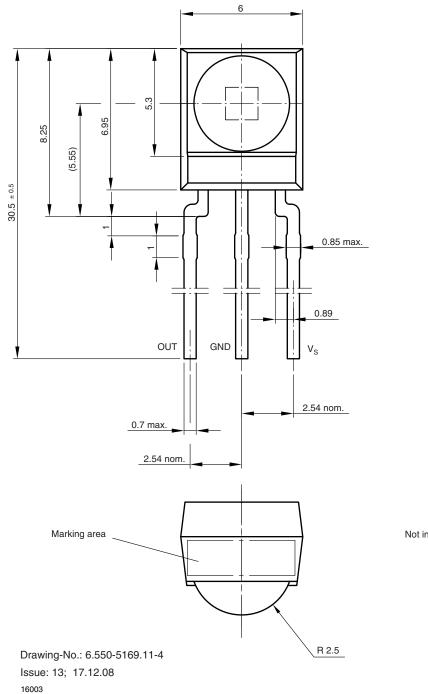
5

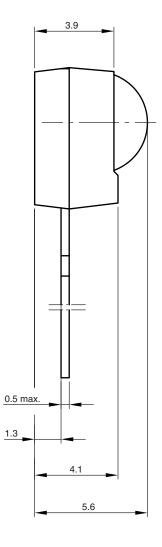


TSSP4P38

Vishay Semiconductors

PACKAGE DIMENSIONS in millimeters





Not indicated tolerances ± 0.2



technical drawings according to DIN specifications



Vishay

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.

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 and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. 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.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.