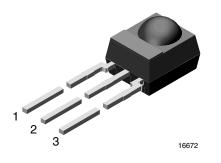


Vishay Semiconductors

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.

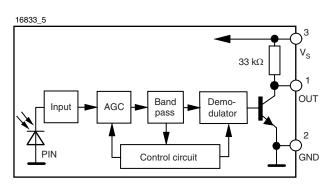
This component has not been qualified according to automotive specifications.

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

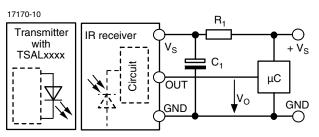
Note

⁽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)



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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)

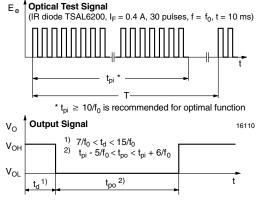


Fig. 1 - Output Active Low

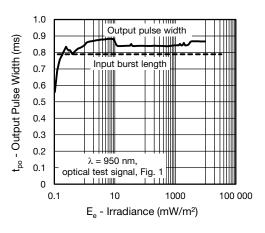


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

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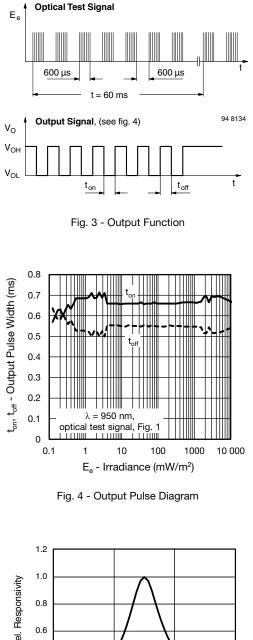
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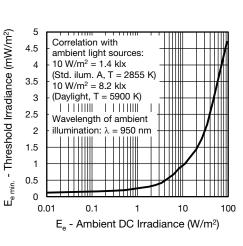
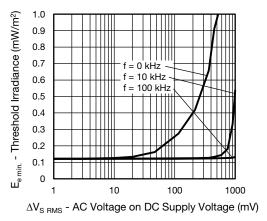
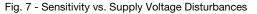


Fig. 6 - Sensitivity in Bright Ambient





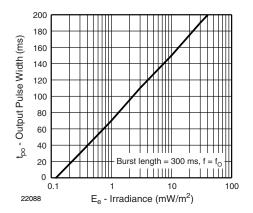


Fig. 8 - Max. Output Pulse Width vs. Irradiance

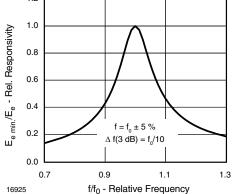


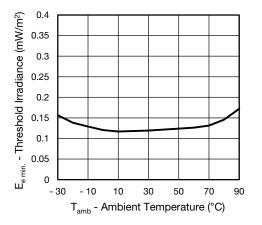
Fig. 5 - Frequency Dependence of Responsivity

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Fig. 9 - Sensitivity vs. Ambient Temperature

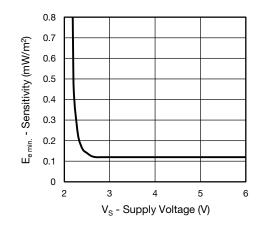


Fig. 12 - Sensitivity vs. Supply Voltage

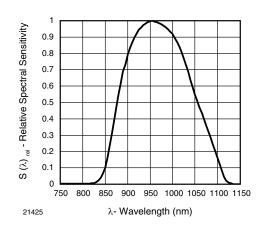


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

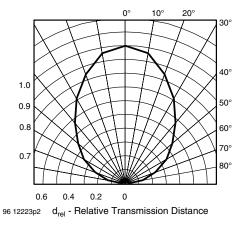


Fig. 11 - Horizontal Directivity

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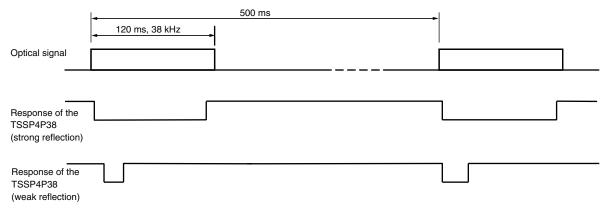


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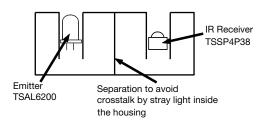
TSSP4P38

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.

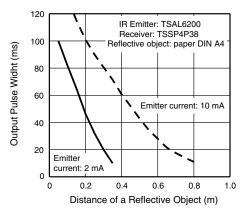


Fig. 13 - Distance Characterisitic of a Typical Reflective Sensor Using the TSSP4P38

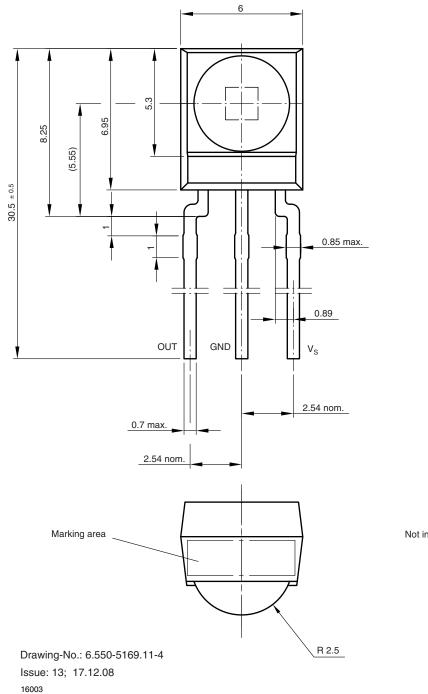
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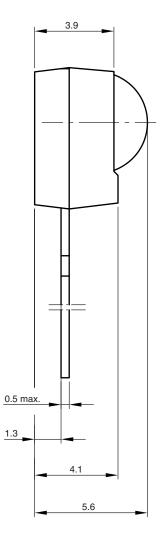


TSSP4P38

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PACKAGE DIMENSIONS in millimeters





Not indicated tolerances ± 0.2



technical drawings according to DIN specifications



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