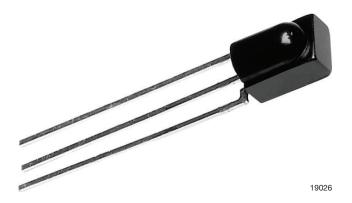




www.vishay.com

Vishay Semiconductors

IR Detector for Mid Range Proximity Sensor



FEATURESUp to 2 m for

- Up to 2 m for proximity sensing
- Receives 38 kHz modulated signal
- Photo detector and preamplifier 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 5.5 V

 Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

LINKS TO ADDITIONAL RESOURCES











DESCRIPTIONThe TSSP58P38 is

The TSSP58P38 is a compact infrared detector module for proximity sensing application. It receives 38 kHz modulated signals and has a peak sensitivity of 940 nm.

The length of the detector's output pulse varies in proportion to the amount of light reflected from the object being detected.





RoHS

COMPLIANT
HALOGEN
FREE

GREEN (5-2008)

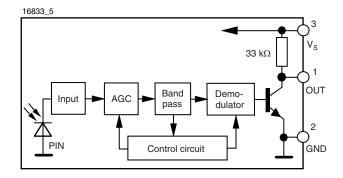
APPLICATIONS

- Object approach detection for activation of displays and user consoles, signaling of alarms, etc.
- Simple gesture controls
- Differentiation of car arrival, static, car departure in parking lots
- Reflective sensors for toilet flush
- Navigational sensor for robotics

DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

BLOCK DIAGRAM





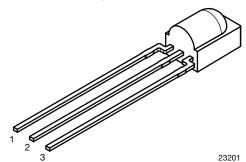


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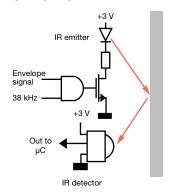
MECHANICAL DATA

Pinning

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



PROXIMITY SENSING



ORDERING CODE

TSSP58P38 - 1500 pieces in bags

PARTS TABLE				
Carrier frequency 38 kHz	TSSP58P38			
Package	Minicast			
Pinning $1 = OUT, 2 = GND, 3 = V_S$				
Dimensions (mm)	5.0 W x 6.95 H x 4.8 D			
Mounting	Leaded			
Application	Proximity sensors			

ABSOLUTE MAXIMUM RATINGS								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
Supply voltage (pin 3)		V _S	-0.3 to +6	V				
Supply current (pin 3)		I _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)		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



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ELECTRICAL AND OPTICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)								
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT		
Supply current (pin 3)	$E_e = 0, V_S = 3.3 V$	I _{SD}	0.25	0.35	0.45	mA		
	$E_v = 40 \text{ klx, sunlight}$	I _{SH}	-	0.45	-	mA		
Supply voltage		Vs	2.0	-	5.5	V		
Receiving distance	Direct line of sight, test signal see Fig. 1, IR diode TSAL6200, I _F = 50 mA	d	-	21	-	m		
Output voltage low (pin 1)	$I_{OSL} = 0.5$ mA, $E_e = 0.7$ mW/m ² , test signal see Fig. 1	V _{OSL}	-	-	100	mV		
Minimum irradiance	Pulse width tolerance: t_{pi} - $5/f_o < t_{po} < t_{pi} + 5/f_o$, test signal see Fig. 1	E _{e min.}	-	0.15	0.3	mW/m²		
Maximum irradiance	t_{pi} - 5/f _o < t_{po} < t_{pi} + 5/f _o , test signal see Fig. 1	E _{e max} .	30	-	-	W/m ²		
Directivity	Angle of half receiving distance	Ψ1/2	-	± 45	-	deg		

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

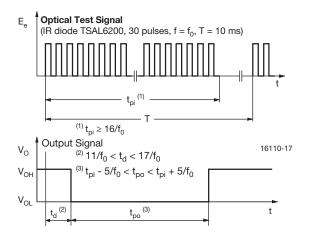


Fig. 1 - Output Active Low

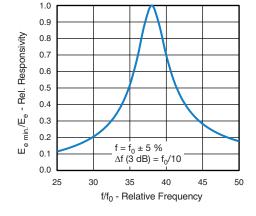


Fig. 3 - Frequency Dependence of Responsivity

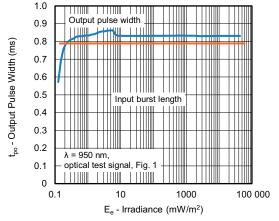


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

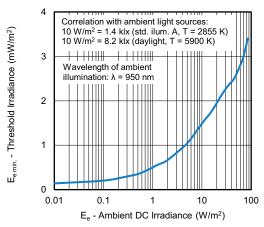


Fig. 4 - Sensitivity in Bright Ambient



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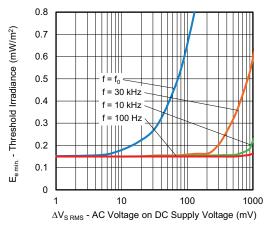


Fig. 5 - Sensitivity vs. Supply Voltage Disturbances

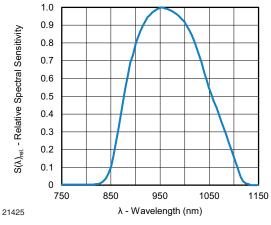


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

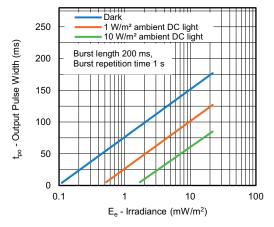


Fig. 6 - Maximum Output Pulse Width vs. Irradiance

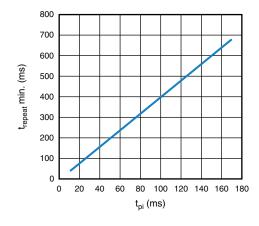


Fig. 9 - Max. Rate of Bursts

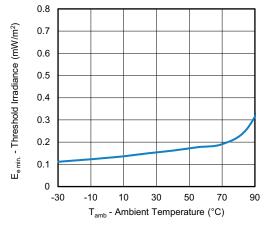


Fig. 7 - Sensitivity vs. Ambient Temperature

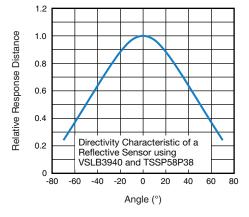
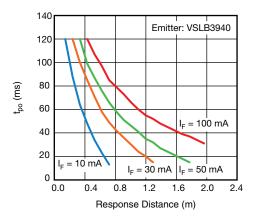


Fig. 10 - Angle Characteristic



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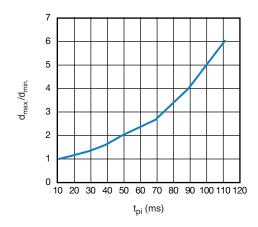
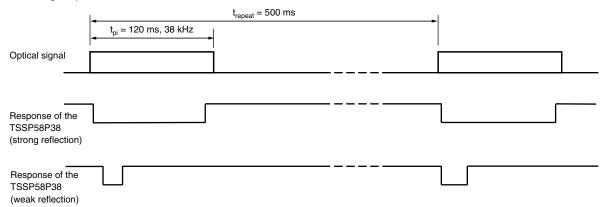


Fig. 11 - t_{po} vs. Distance Kodak Gray Card Plus 15 %

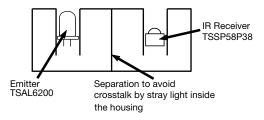
Fig. 12 - Dynamic Range of Sensor vs. tpi

The typical application of the TSSP58P38 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 of a signal pattern:



Example for a sensor hardware:



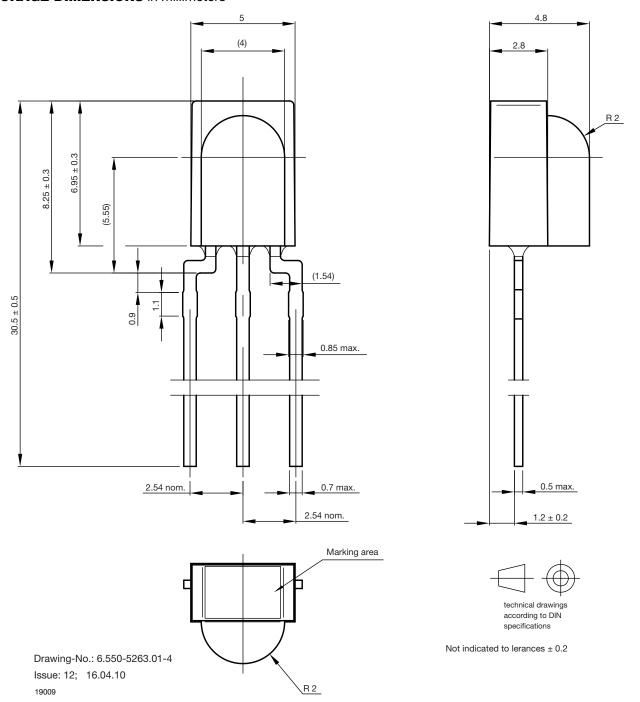
The logarithmic characteristic of the AGC in the TSSP58P38 results in an almost linear relationship between distance and pulse width. Ambient light has also some impact to the pulse width of this kind of sensor, making the pulse shorter.

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



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PACKAGE DIMENSIONS in millimeters





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