IR Mid Range Proximity Sensors

23196

LINKS TO ADDITIONAL RESOURCES

Product Page | Marking | Packages | Holders | Bends and Cuts

DESCRIPTION

The TSSP4P38 is a compact infrared detector module for proximity sensing applications. 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.

FEATURES

- Up to 2 m for proximity sensing
- Uses modulated bursts at 38 kHz
- 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

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

APPLICATIONS

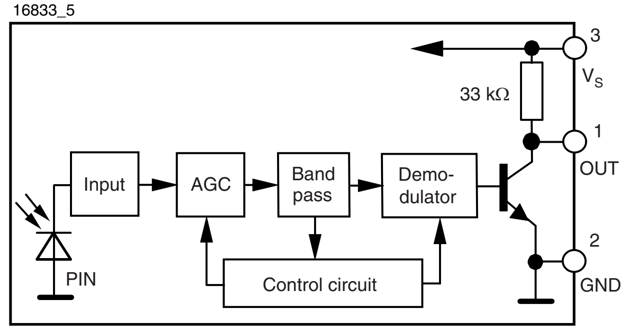
- Object approach detection for activation of displays and user consoles, signaling of alarms, etc.
- Simple gesture controls
- Differentiation of car arrival, static, car departure in parking lots
- Reflective sensors for toilet flush
- Navigational sensor for robotics

DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

BLOCK DIAGRAM

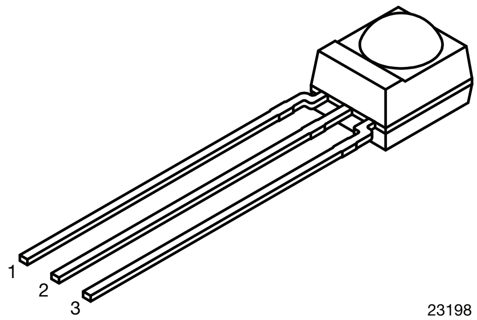
16833_5



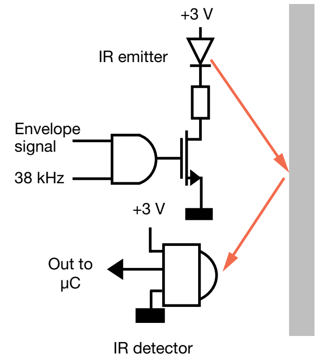
MECHANICAL DATA

Pinning

1 = OUT, 2 = GND, 3 = V_S



PROXIMITY SENSING



ORDERING CODE

TSSP4P38 - 2160 pieces in tubes

PARTS TABLE		
Carrier frequency	38 kHz	TSSP4P38
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		Proximity sensors
Special options		• 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 +6	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
Power consumption	$T_{amb} \leq 85$ °C	P_{tot}	10	mW
Soldering temperature	t ≤ 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 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Supply current	E_e = 0, V_S = 3.3 V	I_{SD}	0.25	0.35	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.45	-	mA
Supply voltage		V_S	2.0	-	5.5	V
Receiving distance	Direct line of sight, test signal see Fig. 1, IR diode TSAL6200, I_F = 50 mA	d	-	26	-	m
Output voltage low	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m², 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	$E_{e\ min.}$	-	0.1	0.2	mW/m²
Maximum irradiance	Pulse width tolerance: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 5/f_o$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half receiving distance	$\varphi_{1/2}$	-	± 45	-	deg

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

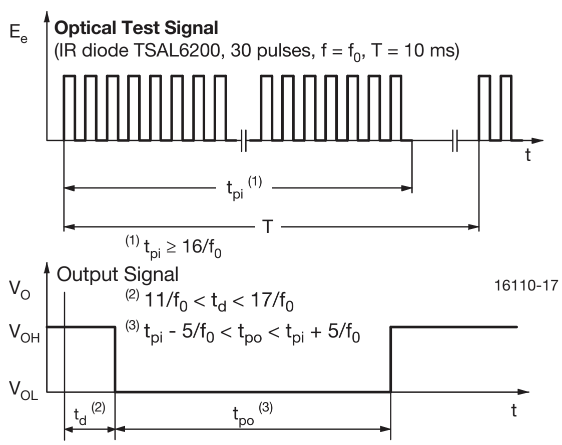


Fig. 1 - Output Active Low

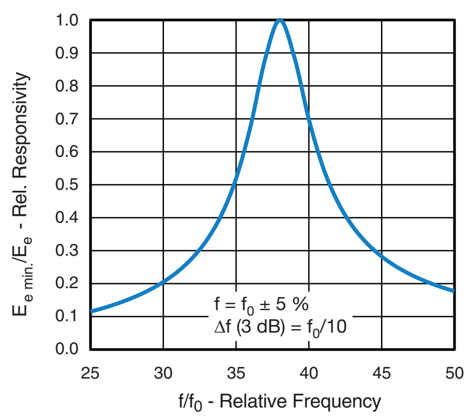


Fig. 3 - Frequency Dependence of Responsivity

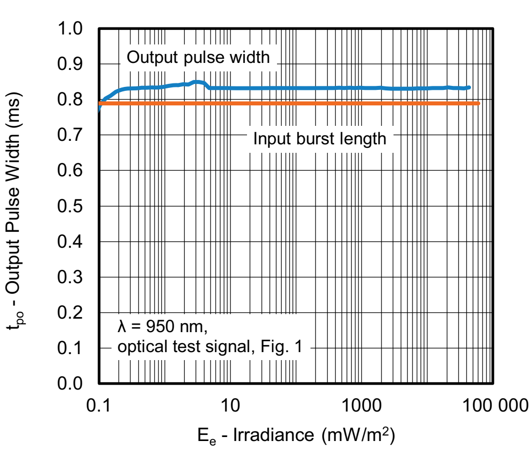


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

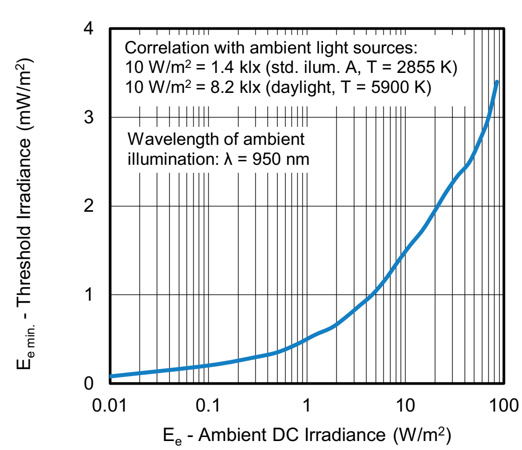


Fig. 4 - Sensitivity in Bright Ambient

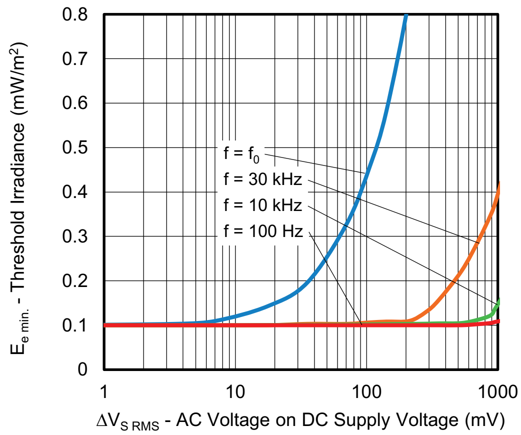


Fig. 5 - Sensitivity vs. Supply Voltage Disturbances

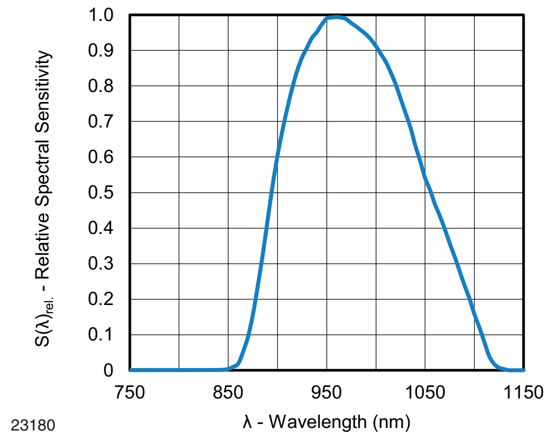


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

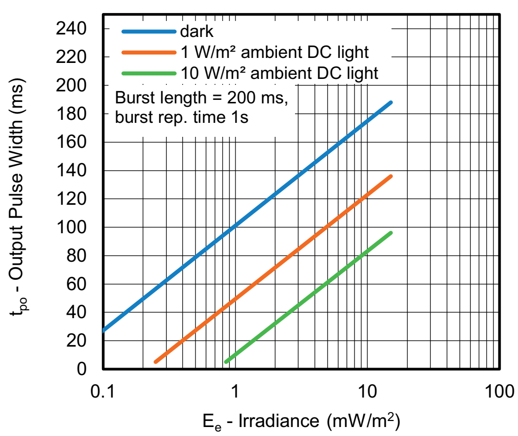


Fig. 6 - Max. Output Pulse Width vs. Irradiance

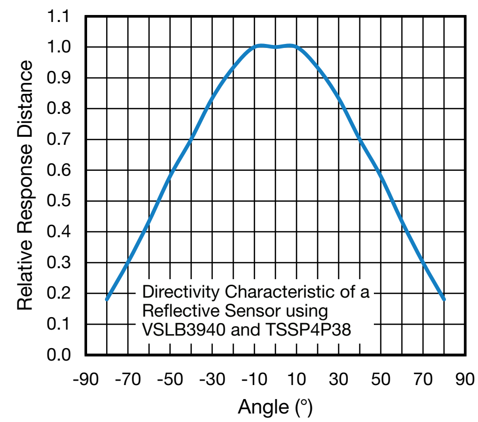


Fig. 9 - Angle Characteristic

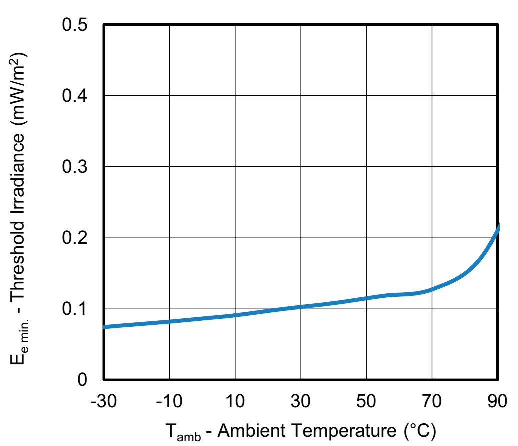


Fig. 7 - Sensitivity vs. Ambient Temperature

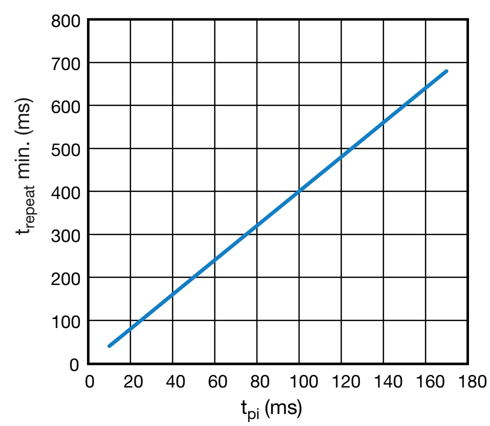


Fig. 10 - Max. Rate of Bursts

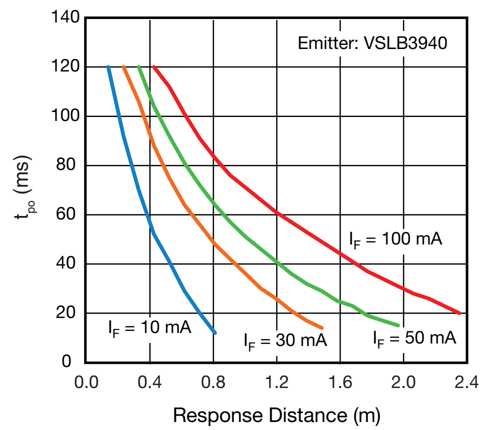


Fig. 11 - t_{po} vs. Distance Kodak Gray Card Plus 15 %

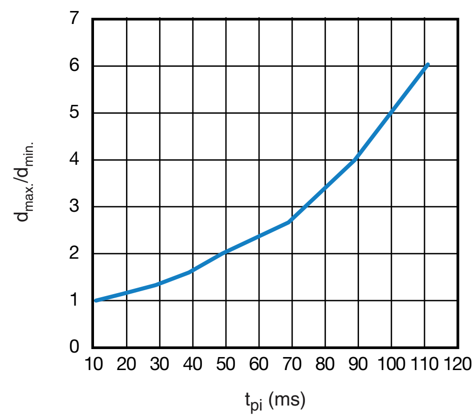
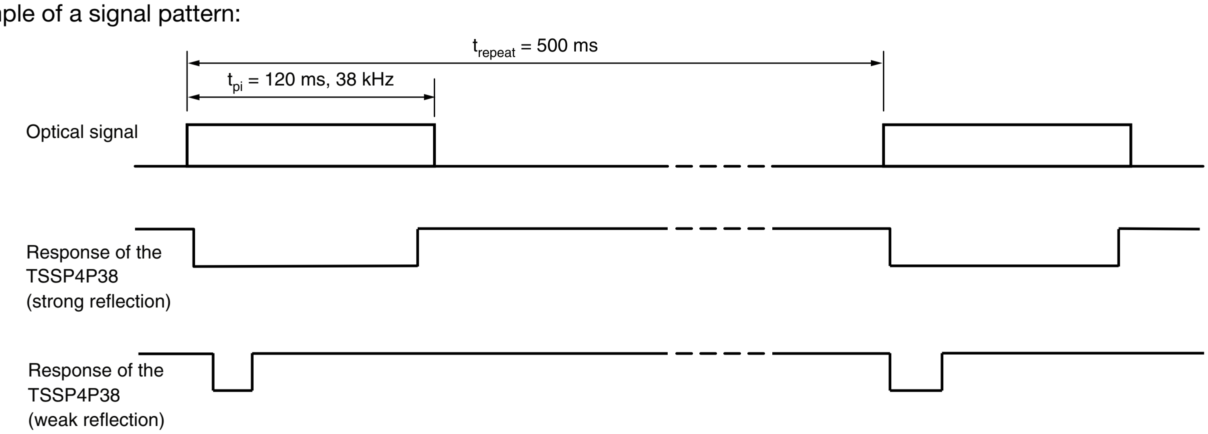


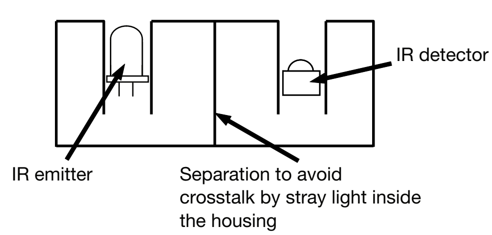
Fig. 12 - Dynamic Range of Sensor vs. t_{pi}

The typical application of the TSSP4P38 is a reflective sensor with analog information contained in its output. The sensor evaluates the time required by the AGC to suppress a quasi continuous signal. The time required to suppress a continuous signal is longer when the signal is strong than when the signal is weak. The result is an output pulse length which corresponds 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 on the infrared reflectivity of the object and is not evaluated. Only changes in the amount of reflected light, and therefore changes in the pulse width can be evaluated with accuracy.

Example of a signal pattern:



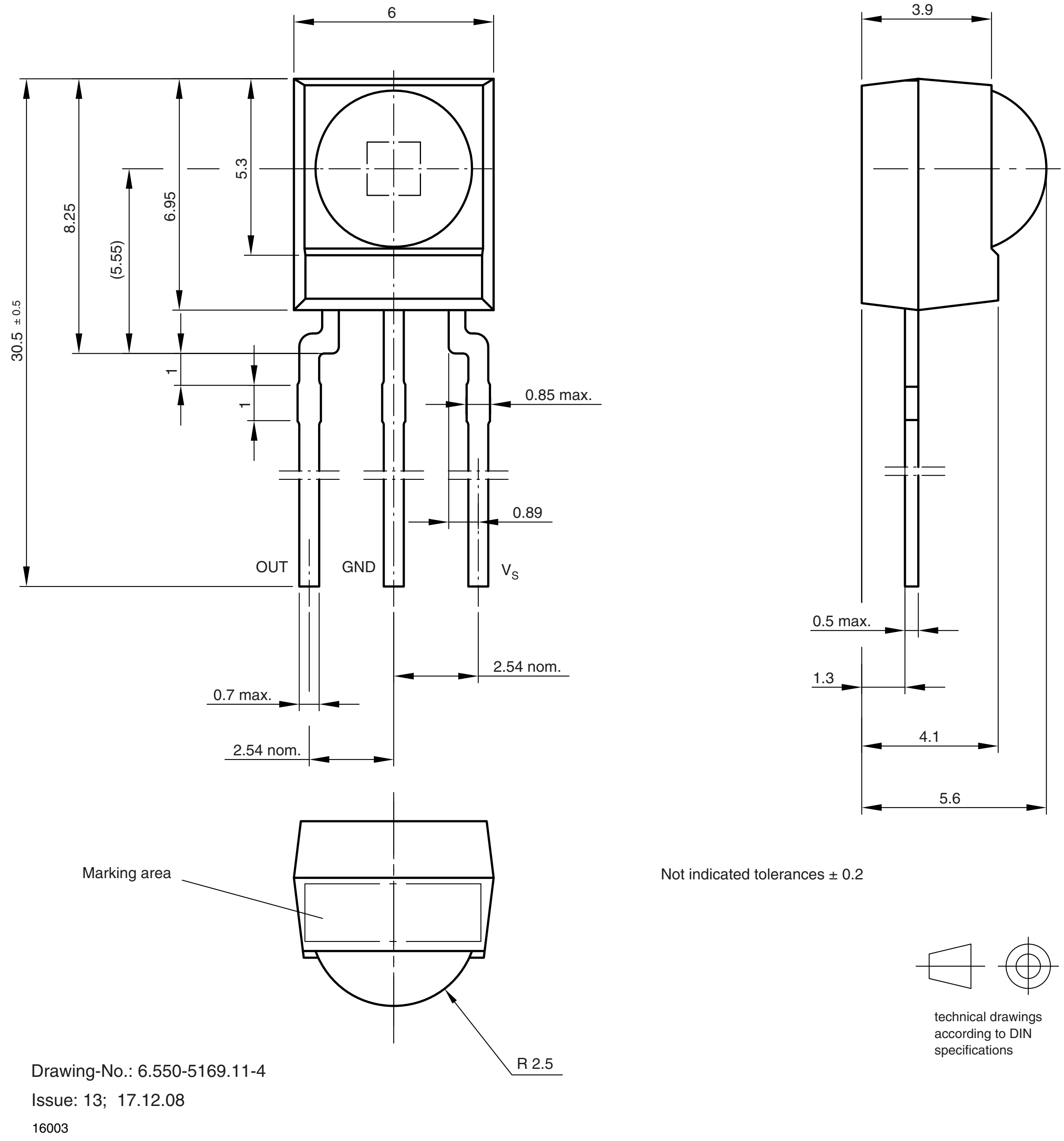
Example for a sensor hardware:



There should be no common window in front of the emitter and detector 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.

PACKAGE DIMENSIONS in millimeters



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