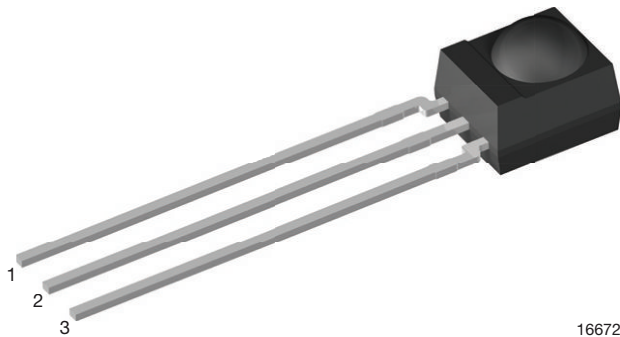


## IR Sensor Module for Reflective Sensor, Light Barrier, and Fast Proximity Applications



16672

### DESIGN SUPPORT TOOLS AVAILABLE



### MECHANICAL DATA

#### Pinning:

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

### 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

### FEATURES

- Up to 2 m for presence and proximity sensing
- Uses continuous AC signal or burst pattern of infrared light
- Small sensitivity scattering range
- PIN diode and sensor IC 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 3.6 V
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

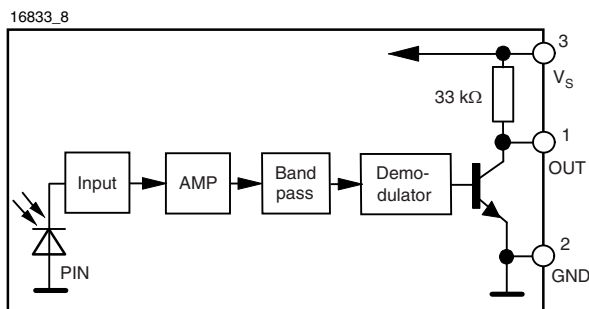
### DESCRIPTION

The TSSP940.. series are the latest generation of compact infrared detector modules for presence, 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.

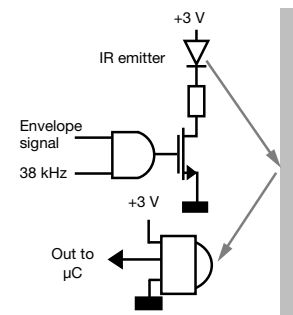
This component has not been qualified according to automotive specifications.

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	

### BLOCK DIAGRAM



### PRESENCE SENSING





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	$T_{amb} \leq 85\text{ °C}$	$P_{tot}$	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 ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current (pin 3)	$E_v = 0, V_S = 3.3\text{ V}$	$I_{SD}$	0.25	0.37	0.45	mA
	$E_v = 40\text{ klx, sunlight}$	$I_{SH}$	-	0.8	-	mA
Supply voltage		$V_S$	2.0	-	3.6	V
Transmission distance	$E_v = 0, \text{IR diode TSAL6200, } I_F = 50\text{ mA, test signal see Fig. 1}$	$d$	-	12	-	m
Output voltage low (pin 1)	$I_{OSL} = 0.5\text{ mA, } E_e = 2\text{ mW/m}^2, \text{ test signal see Fig. 1}$	$V_{OSL}$	-	-	100	mV
Minimum irradiance	Pulse width tolerance: $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0, \text{ test signal see Fig. 1}$	$E_e \text{ min.}$	0.32	0.4	0.5	$\text{mW/m}^2$
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0, \text{ test signal see Fig. 1}$	$E_e \text{ max.}$	30	-	-	$\text{W/m}^2$
Directivity	Angle of half transmission distance	$\phi_{1/2}$	-	$\pm 45$	-	°

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

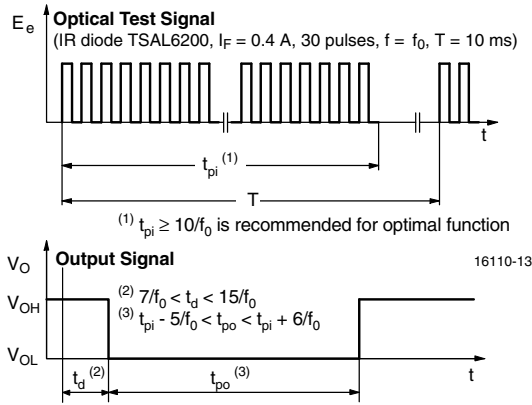


Fig. 1 - Output Delay and Pulse Width

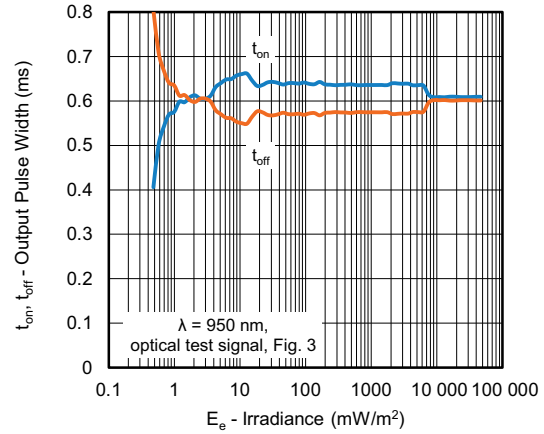


Fig. 4 - Output Pulse Diagram

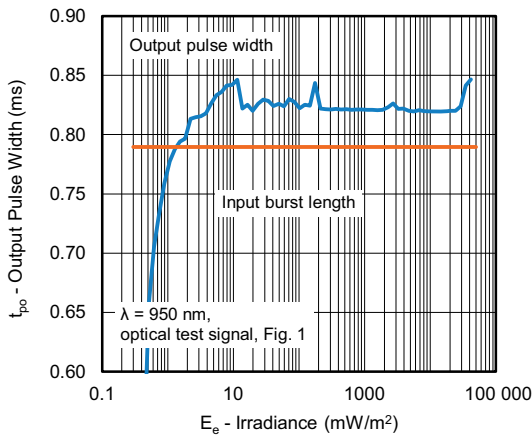


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

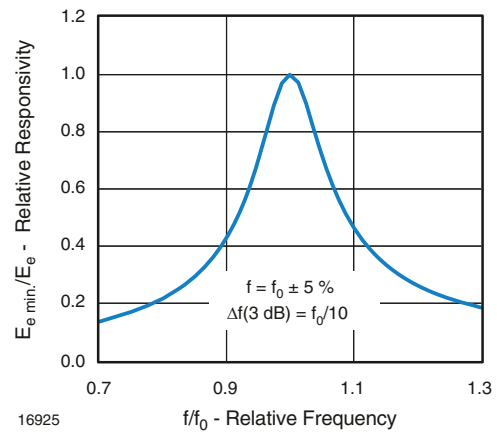


Fig. 5 - Frequency Dependence of Responsivity

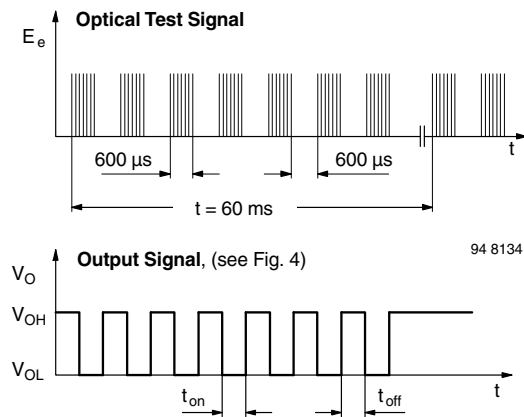


Fig. 3 - Test Signal

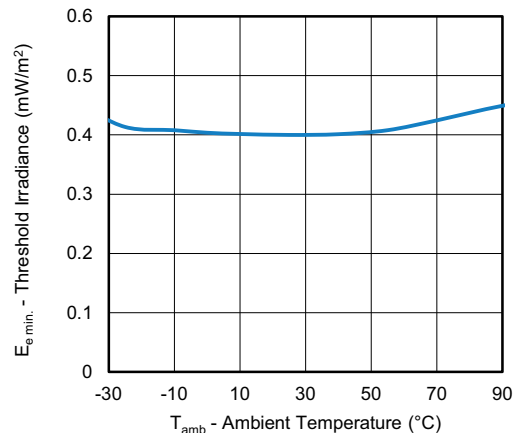
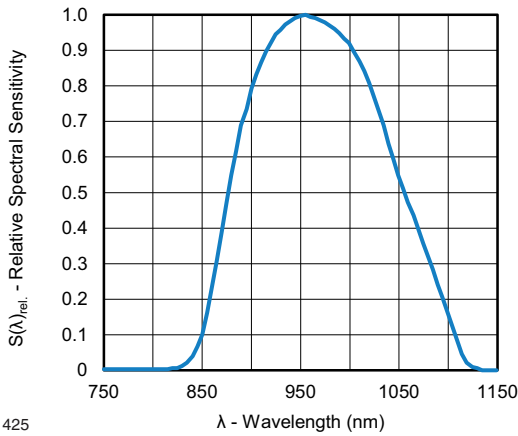


Fig. 6 - Sensitivity vs. Ambient Temperature



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Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

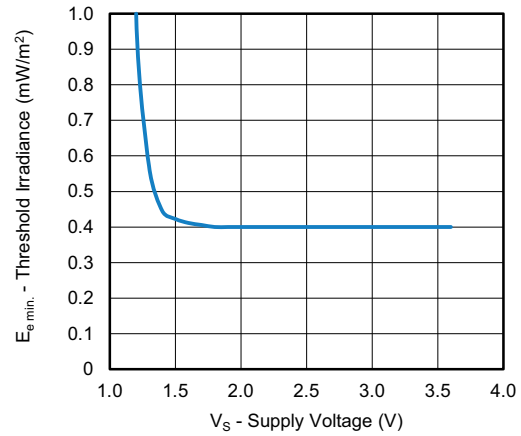
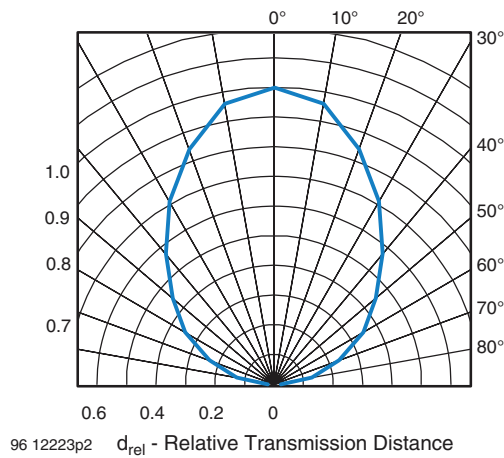


Fig. 9 - Sensitivity vs. Supply Voltage

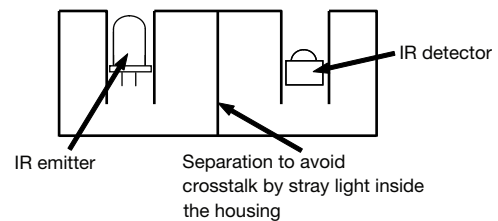


96 12223p2 d<sub>rel</sub> - Relative Transmission Distance

Fig. 8 - Directivity

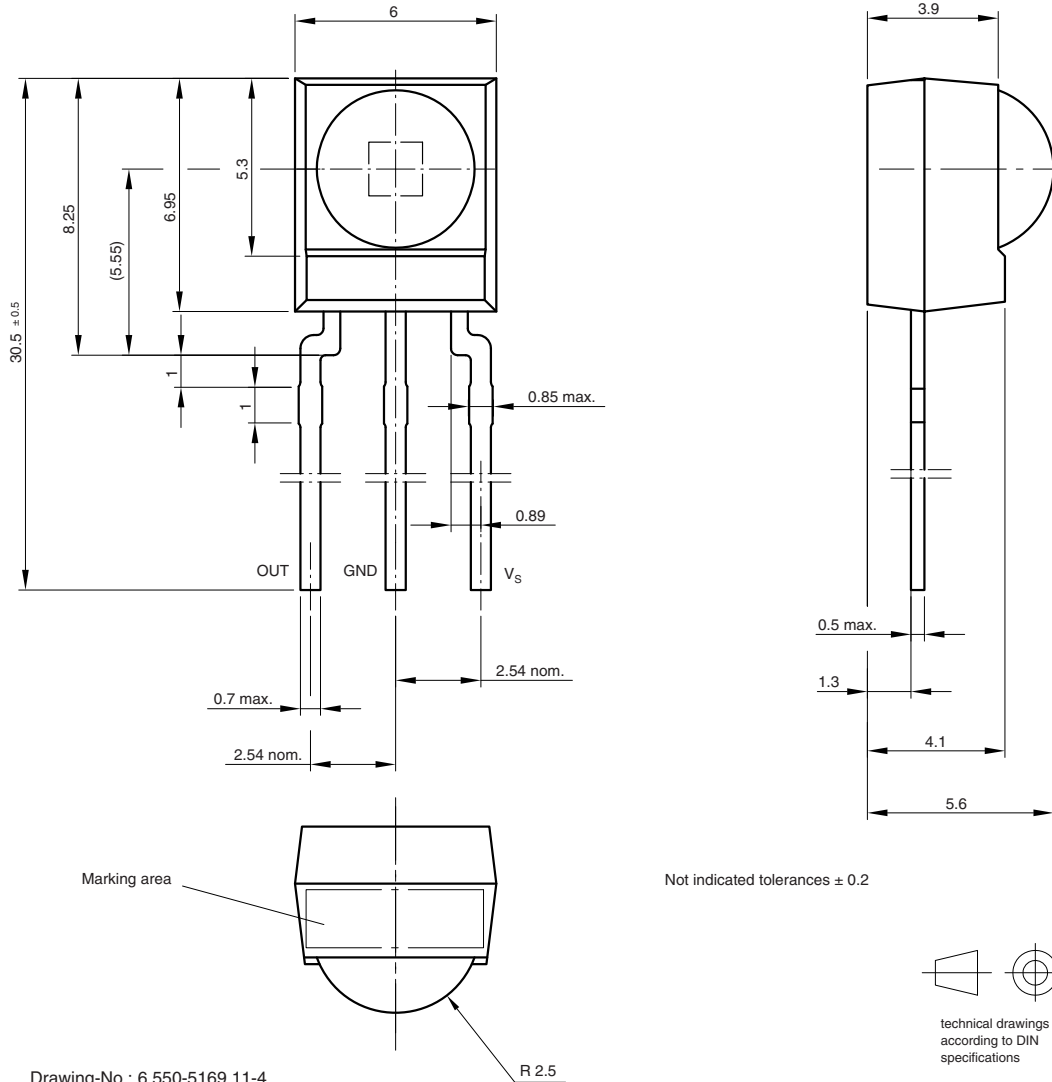
The typical application of these devices is a reflective or beam break sensor with active low “detect” or “no detect” information contained in its output. The TSSP940.. is also suitable for fast (~ 15 ms) proximity sensor applications for ranges between 10 cm and 2 m, if a burst pattern with variable 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



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