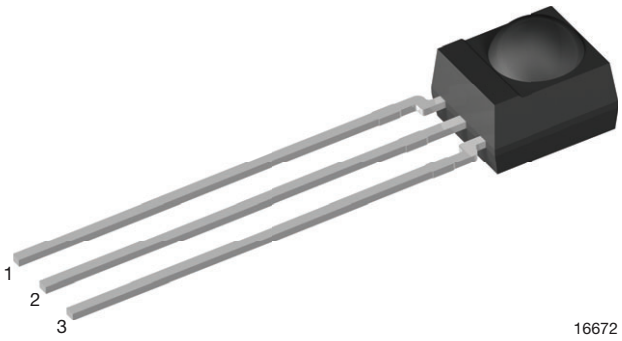
IR Sensor Module for Reflective Sensor, Light Barrier, and Fast Proximity Applications



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

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

DESIGN SUPPORT TOOLS AVAILABLE

3D Models

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

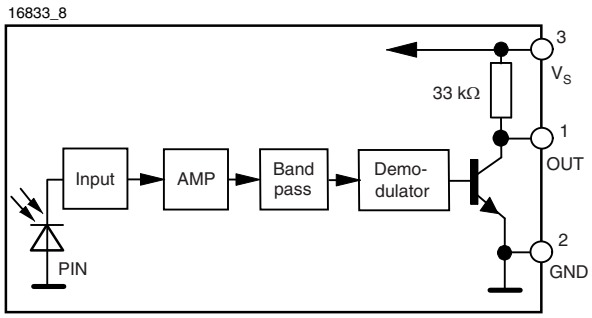
DESCRIPTION

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. The sensitivity of the device is selectable as shown on the electrical and optical characteristics table.

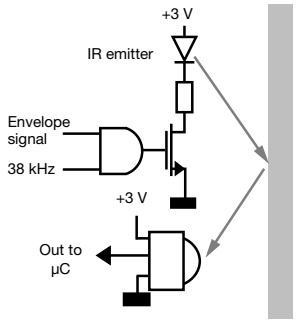
This component has not been qualified according to automotive specifications.

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	$T_{amb} \leq 85$ °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 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART [1]**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Supply current (pin 3)	E_v = 0, V_S = 3.3 V		I_{SD}	0.25	0.37	0.45	mA
	E_v = 40 klx, sunlight		I_{SH}	-	0.8	-	mA
Supply voltage			V_S	2.0	-	3.6	V
Transmission distance	E_v = 0, IR diode TSAL6200, I_F = 50 mA, test signal see Fig. 1		d	-	12	-	m
Output voltage low (pin 1)	I_{OSL} = 0.5 mA, E_e = 2 mW/m², test signal see Fig. 1		V_{OSL}	-	-	100	mV
Minimum irradiance	Pulse width tolerance: $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$, test signal see Fig. 1	TSSP940xxZ3	$E_{e\ min.}$	-	0.1	0.2	mW/m²
		TSSP940xx		0.32	0.4	0.5	
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$, test signal see Fig. 1		$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance		$\varphi_{1/2}$	-	± 45	-	°

Note

[1] xx = frequency, 38 kHz or 56 kHz

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

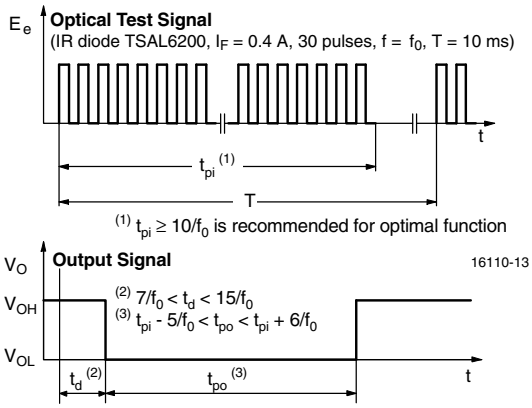


Fig. 1 - Output Delay and Pulse Width

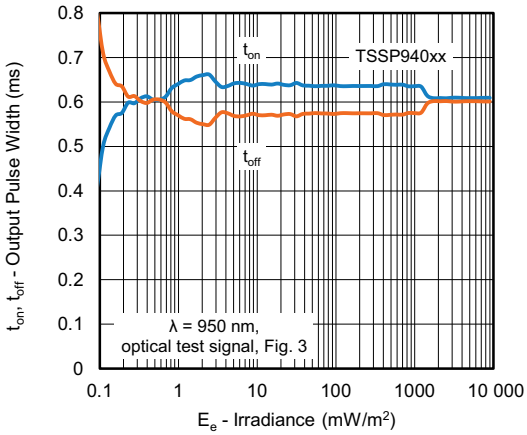


Fig. 4 - Output Pulse Diagram

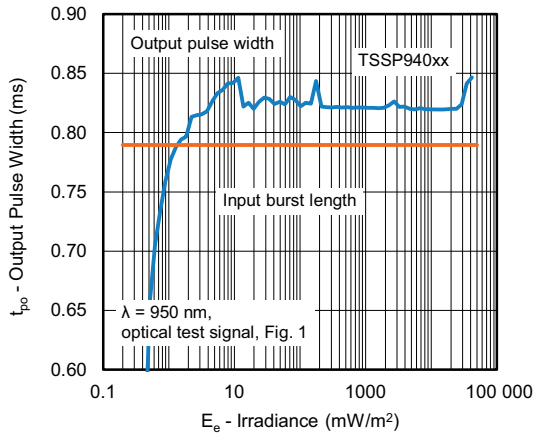


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

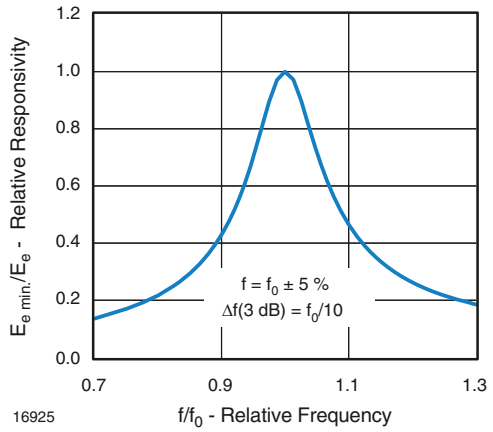


Fig. 5 - Frequency Dependence of Responsivity

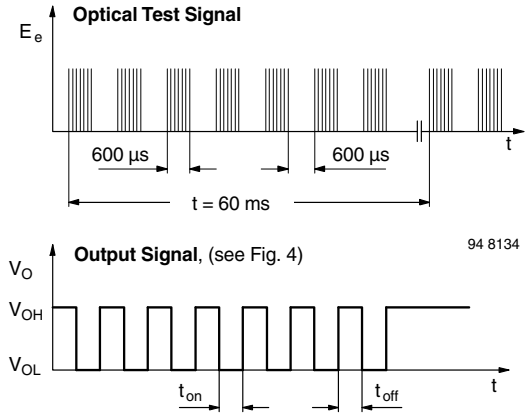


Fig. 3 - Test Signal

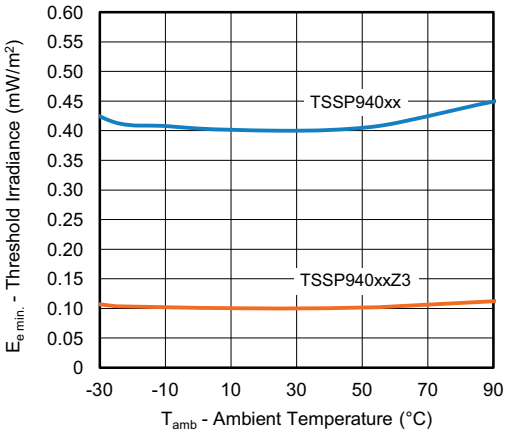


Fig. 6 - Sensitivity vs. Ambient Temperature

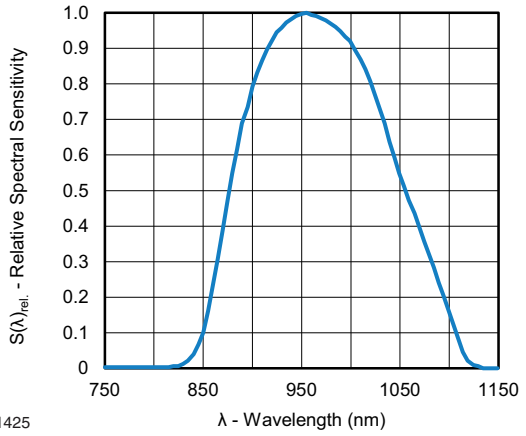


Fig. 7 - Relative Spectral Sensitivity vs. Wavelength

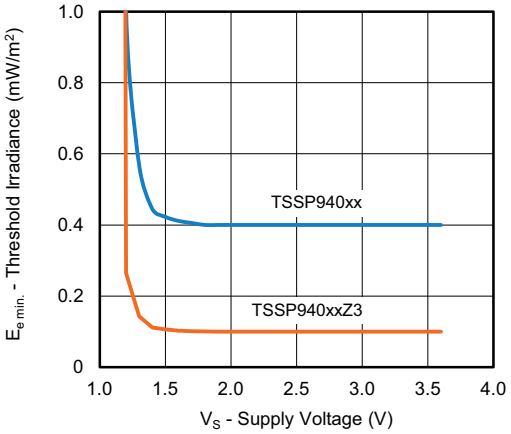


Fig. 9 - Sensitivity vs. Supply Voltage

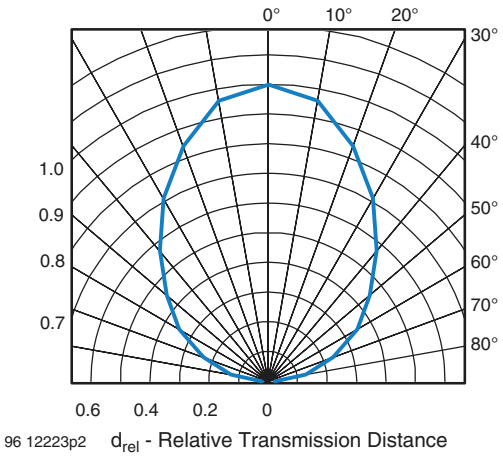
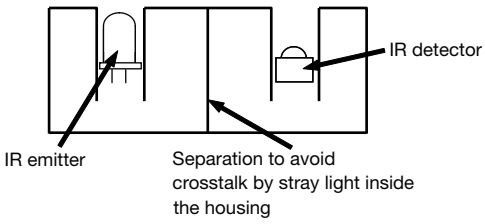


Fig. 8 - Directivity

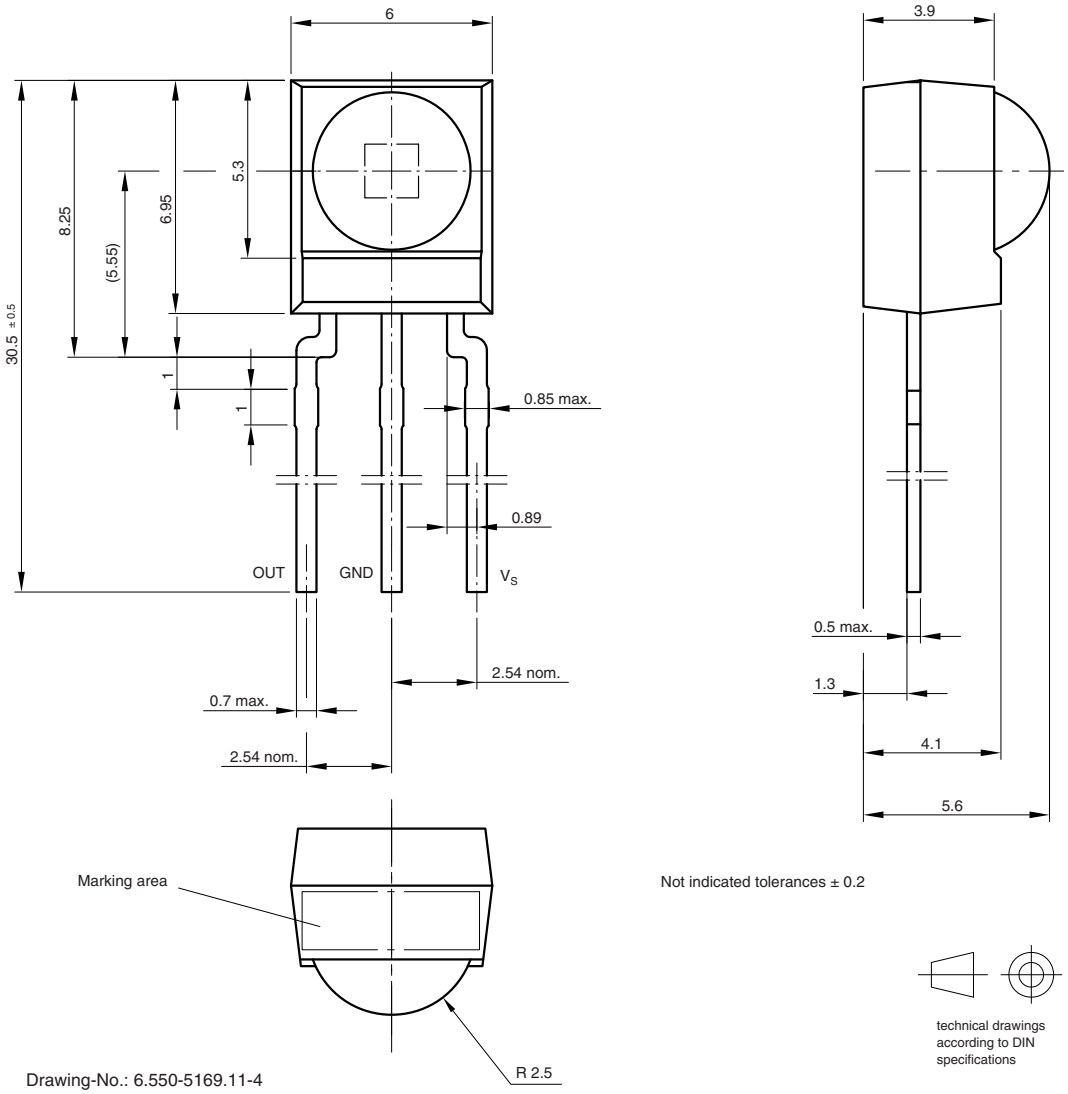
The typical application of these devices is a reflective or beam break sensor with active low “detect” or “no detect” information contained in its output. The TSSP940.. is also suitable for fast (~ 15 ms) proximity sensor applications for ranges between 10 cm and 2 m, if a burst pattern with variable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



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