

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



23051

### DESCRIPTION

The TSSP93038SS1ZA device is the latest generation of compact infrared detector module 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 for presence sensing.

This component has not been qualified according to automotive specifications.

### FEATURES

- Constant sensitivity in dark and bright ambient, up to direct sunlight level
- Presence sensor: up to 2 m distance, find more info at: [www.vishay.com/doc?49009](http://www.vishay.com/doc?49009)
- Light barrier: up to 12 m distance, TSAL6200 with  $I_F = 50 \text{ mA}$ , find more info at: [www.vishay.com/doc?49650](http://www.vishay.com/doc?49650)
- Fast proximity: up to 2 m range at 5 ms response time, find more info at: [www.vishay.com/doc?82746](http://www.vishay.com/doc?82746)
- 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)



### LINKS TO ADDITIONAL RESOURCES



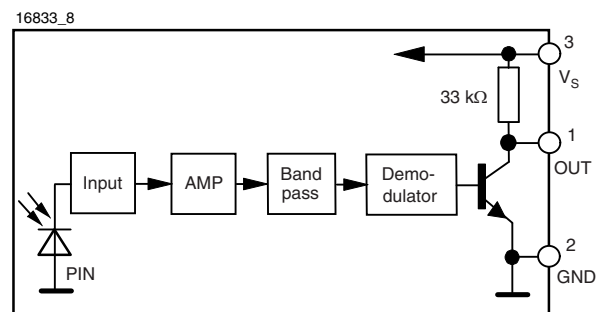
### DESIGN SUPPORT TOOLS

- [3D models](#)
- [Window size calculator](#)

### 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

### BLOCK DIAGRAM

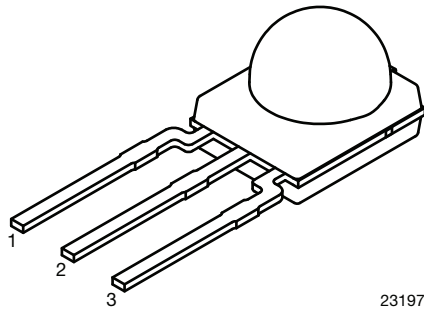




### MECHANICAL DATA

Pinning for TSSP93...:

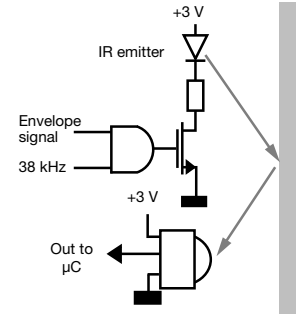
1 = OUT, 2 = GND, 3 = V<sub>S</sub>



### ORDERING CODE

TSSP93... - 1800 pieces in bags

### PRESENCE SENSING



PARTS TABLE	
Carrier frequency	38 kHz
Package	Minimold
Pinning	1 = OUT, 2 = GND, 3 = V <sub>S</sub>
Dimensions (mm)	5.4 W x 6.35 H x 4.9 D
Mounting	Leaded
Application	Presence sensors, fast proximity sensors

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage (pin 3)		V <sub>S</sub>	-0.3 to +3.6	V
Supply current (pin 3)		I <sub>S</sub>	5	mA
Output voltage (pin 1)		V <sub>O</sub>	-0.3 to +3.6	V
Voltage at output to supply		V <sub>S</sub> - V <sub>O</sub>	-0.3 to (V <sub>S</sub> + 0.3)	V
Output current (pin 1)		I <sub>O</sub>	5	mA
Junction temperature		T <sub>j</sub>	100	°C
Storage temperature range		T <sub>stg</sub>	-25 to +85	°C
Operating temperature range		T <sub>amb</sub>	-25 to +85	°C
Power consumption	T <sub>amb</sub> ≤ 85 °C	P <sub>tot</sub>	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

<b>ELECTRICAL AND OPTICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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
Output voltage low (pin 1)	$I_{OSL} = 0.5\text{ mA}, E_e = 2\text{ mW/m}^2$ , 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	$E_e\text{ min.}$	0.9	1.3	1.8	$\text{mW/m}^2$
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see Fig. 1	$E_e\text{ max.}$	30	-	-	$\text{W/m}^2$
Directivity	Angle of half transmission distance	$\phi_{1/2}$	-	$\pm 45$	-	$^{\circ}$

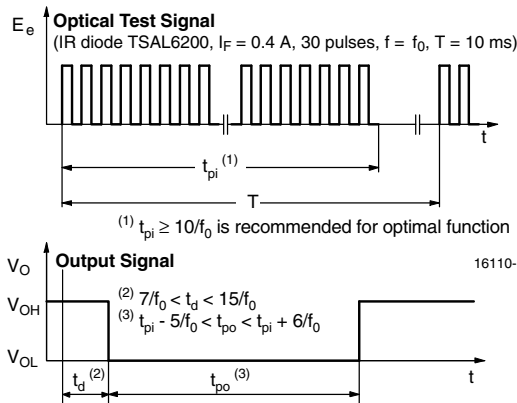
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Output Delay and Pulse Width

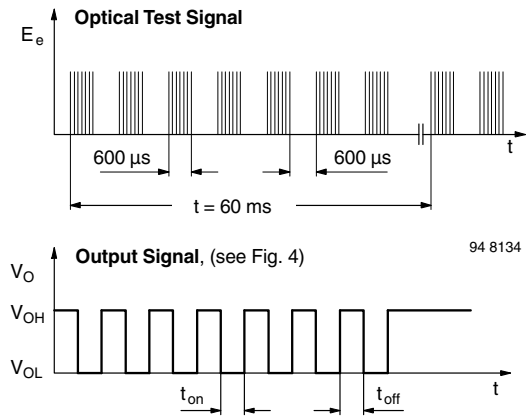


Fig. 3 - Test Signal

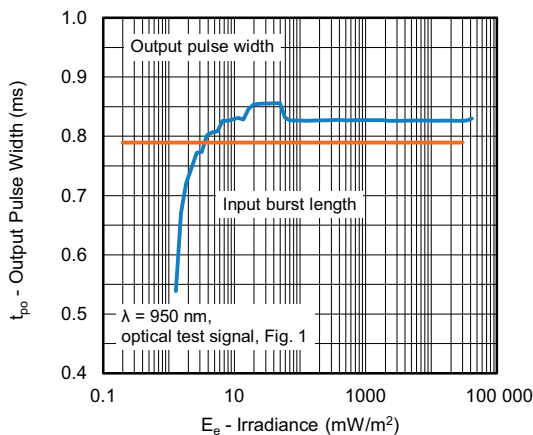


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

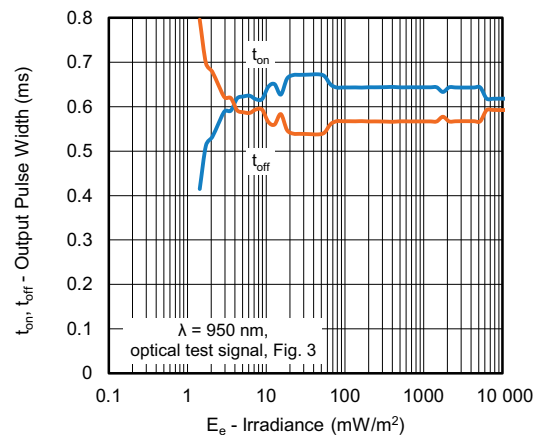


Fig. 4 - Output Pulse Diagram

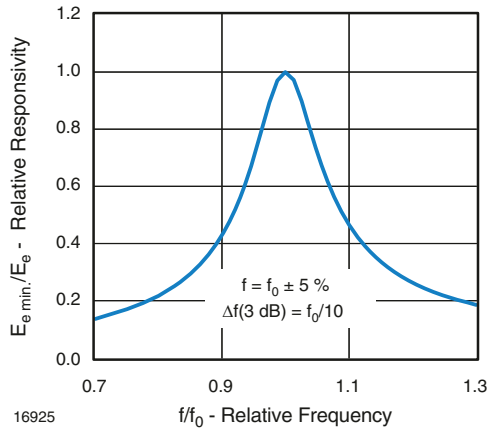


Fig. 5 - Frequency Dependence of Responsivity

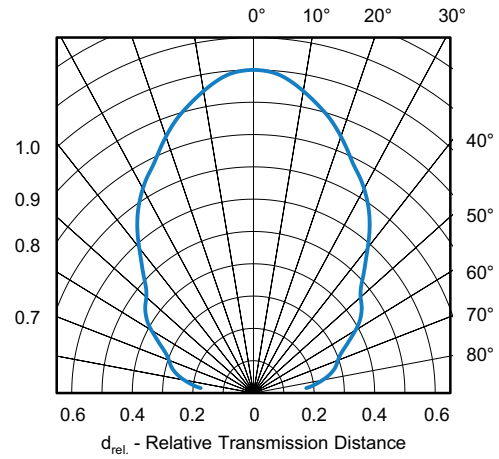


Fig. 8 - Directivity

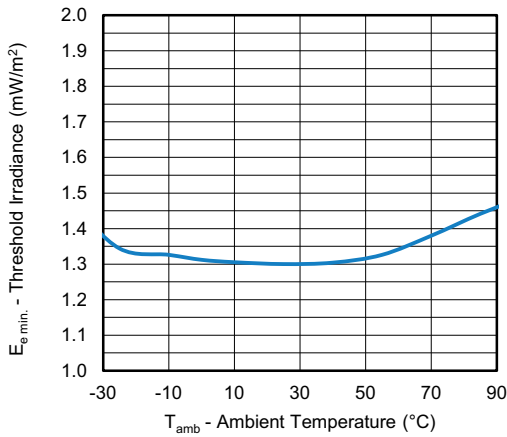


Fig. 6 - Sensitivity vs. Ambient Temperature

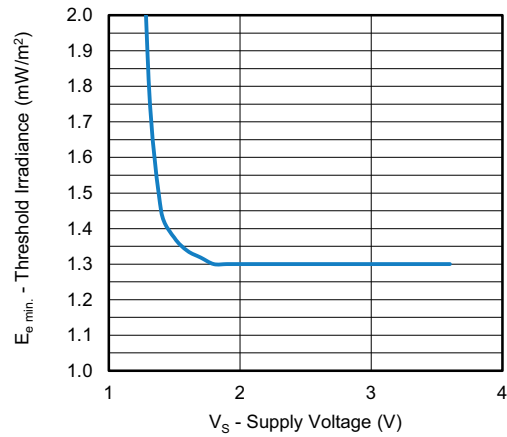


Fig. 9 - Sensitivity vs. Supply Voltage

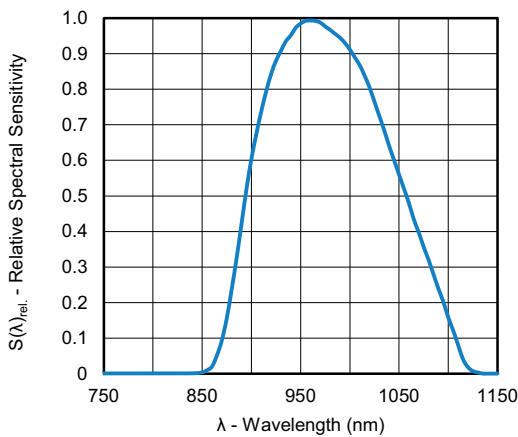
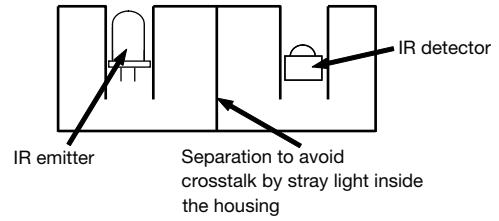


Fig. 7 - Relative Spectral Sensitivity vs. Wavelength



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.

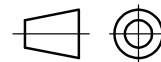
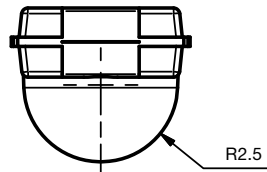
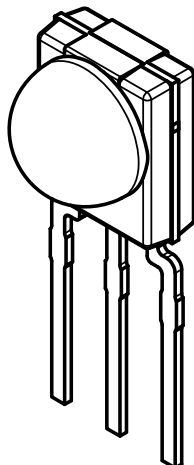
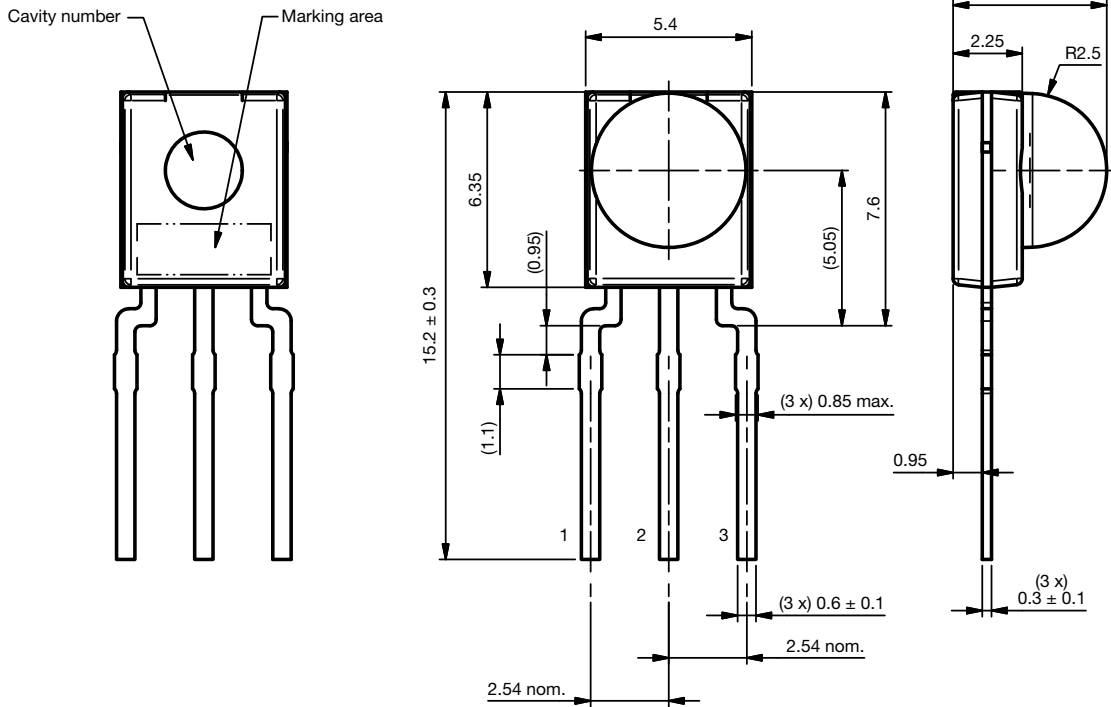
Example for a sensor hardware:



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

Cavity number      Marking area



Technical drawings according to DIN specifications

Not indicated tolerances ± 0.2

Drawing-No.: 6.550-5335.01-4  
Issue: 2; 02.07.19



**BULK PACKAGING**

Standard shipping for minimold is in conductive plastic bags. The packing quantity is determined by weight and the number of components per carton may vary by a maximum of  $\pm 0.3\%$ .

**ORDERING INFORMATION**

Examples: TSSP93038SS1ZA

For more information, see: [www.vishay.com/doc?80076](http://www.vishay.com/doc?80076)

**PACKAGING QUANTITY**

- 300 pieces per bag (each bag is individually boxed)
- 6 bags per carton



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