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### Vishay Semiconductors

# **IR Sensor Module for Remote Control Systems**



### **LINKS TO ADDITIONAL RESOURCES**















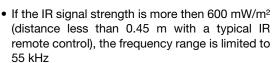
### **DESCRIPTION**

The TSMP4138 is a miniaturized sensor for receiving the modulated signal of infrared remote control systems. A pin diode and preamplifier are assembled on a lead frame, the epoxy package is designed as an IR filter. The modulated output signal, carrier out, can be used for repeater applications and code learning applications.

This component has not been qualified according to automotive specifications.

#### **FEATURES**

- Photo detector and preamplifier in one package
- AC coupled response from 30 kHz to 60 kHz, all data formats







**GREEN** 

(5-2008)

- · Improved shielding against electrical field
- disturbance
- AGC to suppress ambient noise
- · High sensitivity, long receiving range
- Supply voltage: 2.5 V to 5.5 V
- · Carrier out signal for IR repeater applications
- Material categorization: for definitions of compliance please see www.vishav.com/doc?99912

#### **MECHANICAL DATA**

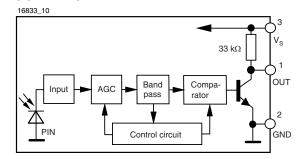
### Pinning:

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

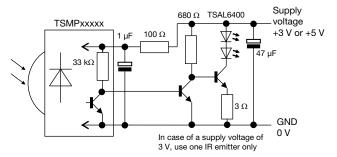
#### **ORDERING CODE**

TSMP4138 - 2160 pieces in tubes

#### **BLOCK DIAGRAM**



### **APPLICATION CIRCUIT**



Recommended circuit for best sensitivity in repeater applications. It limits the output voltage swing  $V_{\odot}$  to about 0.7 V in order to avoid internal coupling.

### End of Life May-2023 - Alternative Device: TSMP94100



### **TSMP4138**

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PARTS TABLE								
Carrier frequency	38 kHz	TSMP4138						
Package		Mold						
Pinning		1 = carrier OUT, 2 = GND, 3 = V <sub>S</sub>						
Dimensions (mm)		6.0 W x 6.95 H x 5.6 D						
Mounting		Leaded						
Application		Repeater						
Special options		<ul> <li>Narrow optical filter: <a href="www.vishay.com/doc?81590">www.vishay.com/doc?81590</a></li> <li>Wide optical filter: <a href="www.vishay.com/doc?82726">www.vishay.com/doc?82726</a></li> </ul>						

ABSOLUTE MAXIMUM RATINGS									
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT					
Supply voltage (pin 3)		V <sub>S</sub>	-0.3 to +6	V					
Supply current (pin 3)		I <sub>S</sub>	5	mA					
Output voltage (pin 1)		Vo	-0.3 to 5.5	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					
Soldering temperature	$t \le 10 \text{ s}, 1 \text{ mm from case}$	T <sub>sd</sub>	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

<b>ELECTRICAL AND OPTICAL CHARACTERISTICS</b> (T <sub>amb</sub> = 25 °C, unless otherwise specified)										
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT				
Supply current (pin 3)	$E_{v} = 0, V_{S} = 5 V$	I <sub>SD</sub>	0.55	0.7	0.9	mA				
Supply current (pin 3)	E <sub>v</sub> = 40 klx, sunlight	I <sub>SH</sub>	-	0.8	-	mA				
Supply voltage		Vs	2.5	-	5.5	V				
Transmission distance	$E_v = 0$ , test signal see Fig. 1, IR diode TSAL6200, $I_F = 50$ mA	d	-	9	-	m				
Output voltage low (pin 1)	$I_{OSL}$ = 0.5 mA, $E_e$ = 0.7 mW/m <sup>2</sup> , test signal see Fig. 1	V <sub>OSL</sub>	-	-	100	mV				
Minimum irradiance	Less than 5 missing or 5 additional sub carrier pulses related to one burst	E <sub>e min.</sub>	-	0.6	1.2	mW/m²				
Maximum irradiance	Less than 5 missing or 5 additional sub carrier pulses related to one burst	E <sub>e max.</sub>	30	-	-	W/m²				
Directivity	Angle of half transmission distance	Ψ1/2	-	± 45	-	deg				



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### **TYPICAL CHARACTERISTICS** (T<sub>amb</sub> = 25 °C, unless otherwise specified)

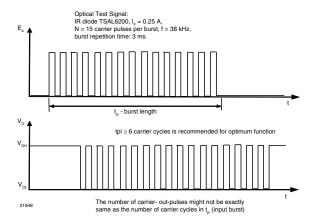


Fig. 1 - Output Function

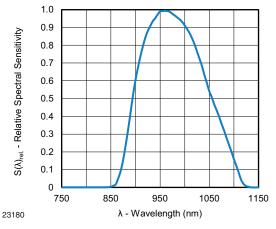


Fig. 3 - Relative Spectral Sensitivity vs. Wavelength

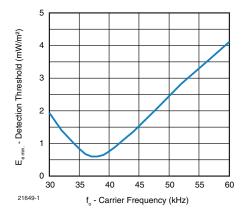


Fig. 2 - Frequency Dependence of Sensitivity

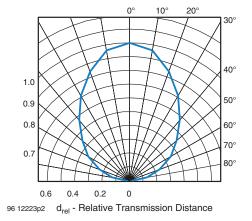


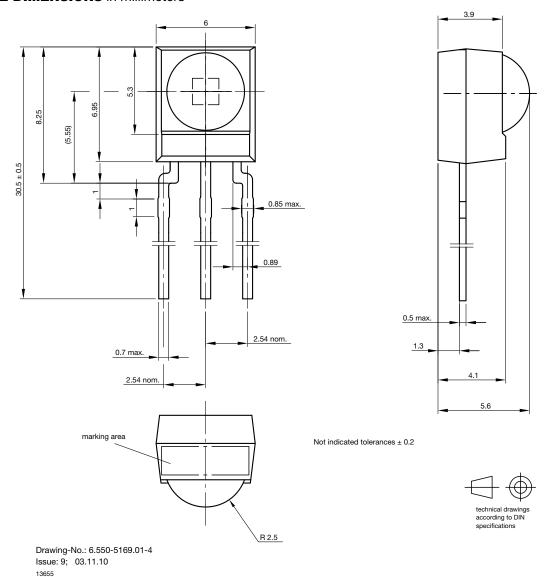
Fig. 4 - Horizontal Directivity



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### **PACKAGE DIMENSIONS** in millimeters





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