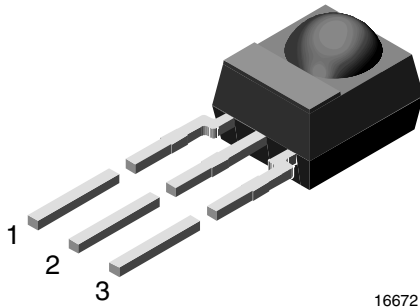


# IR Sensor Module for Remote Control Systems



## FEATURES

- Photo detector and preamplifier in one package
- AC coupled response from 30 kHz to 50 kHz, all data formats
- If the IR signal strength is less than 2 W/m<sup>2</sup> (distance more than 0.2 m with a typical IR remote control), the frequency range is up to 55 kHz
- If the IR signal strength is less than 15 mW/m<sup>2</sup> (distance more than 2.5 m with a typical IR remote control), the frequency range is up to 60 kHz
- 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.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



## MECHANICAL DATA

### Pinning:

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

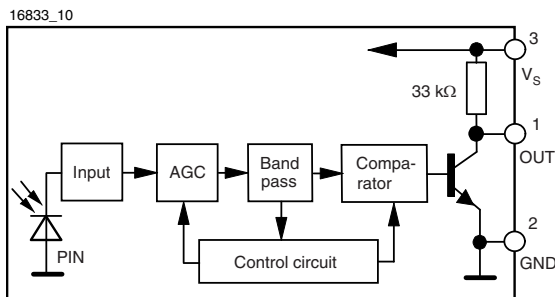
## DESCRIPTION

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.

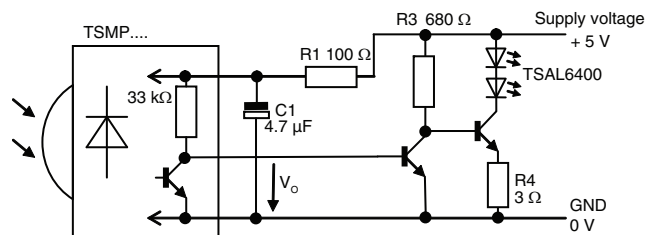
This component has not been qualified according to automotive specifications.

| PARTS TABLE       |                            |
|-------------------|----------------------------|
| CARRIER FREQUENCY | CODE LEARNING APPLICATIONS |
| 38 kHz            | TSMP4138                   |

## BLOCK DIAGRAM



## APPLICATION CIRCUIT



Recommended circuit for best sensitivity of the TSMP... in repeater applications. It limits the output voltage swing V<sub>O</sub> to about 0.7 V in order to avoid internal coupling.  
22638-1



| 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           | $T_{amb} \leq 85\text{ °C}$           | $P_{tot}$   | 10                       | mW   |
| Soldering temperature       | $t \leq 10\text{ s}$ , 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 ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified) |  |                   |      |          |      |                 |
|---|--|-------------------|------|----------|------|-----------------|
| PARAMETER   | TEST CONDITION   | SYMBOL            | MIN. | TYP.     | MAX. | UNIT            |
| Supply current (pin 3)  | $E_v = 0, V_S = 5\text{ V}$  | $I_{SD}$          | 0.55 | 0.7      | 0.9  | mA              |
|   | $E_v = 40\text{ klx}$ , sunlight   | $I_{SH}$          |      | 0.8      |      | mA              |
| Supply voltage  |  | $V_S$             | 2.5  |          | 5.5  | V               |
| Transmission distance   | $E_v = 0$ , test signal see fig. 1, IR diode TSAL6200, $I_F = 400\text{ mA}$   | $d$               |      | 20       |      | m               |
| Output voltage low (pin 1)  | $I_{OSL} = 0.5\text{ mA}$ , $E_e = 0.7\text{ mW/m}^2$ , test signal see fig. 1 | $V_{OSL}$         |      |          | 100  | mV              |
| Minimum irradiance  | Less than 5 missing or 5 additional sub carrier pulses related to one burst    | $E_e\text{ min.}$ |      | 0.6      | 1.2  | $\text{mW/m}^2$ |
| Maximum irradiance  | Less than 5 missing or 5 additional sub carrier pulses related to one burst    | $E_e\text{ max.}$ | 30   |          |      | $\text{W/m}^2$  |
| Directivity   | Angle of half transmission distance  | $\phi_{1/2}$      |      | $\pm 45$ |      | deg             |

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

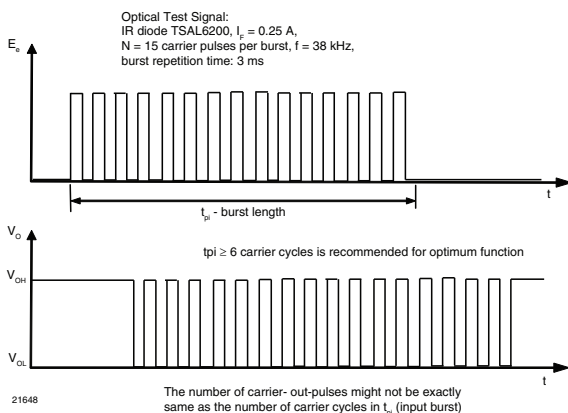


Fig. 1 - Output Function

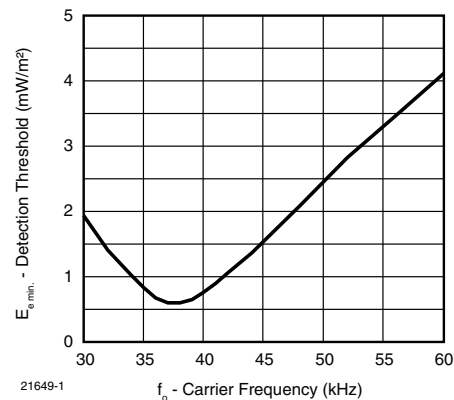


Fig. 2 - Frequency Dependence of Sensitivity

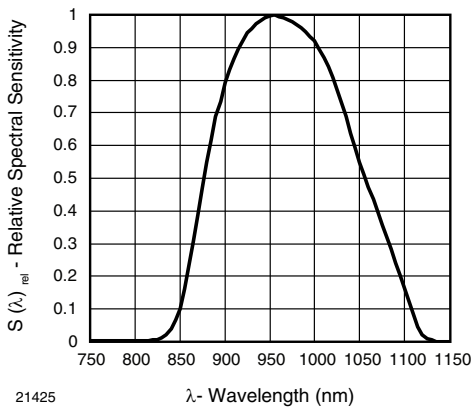


Fig. 3 - Relative Spectral Sensitivity vs. Wavelength

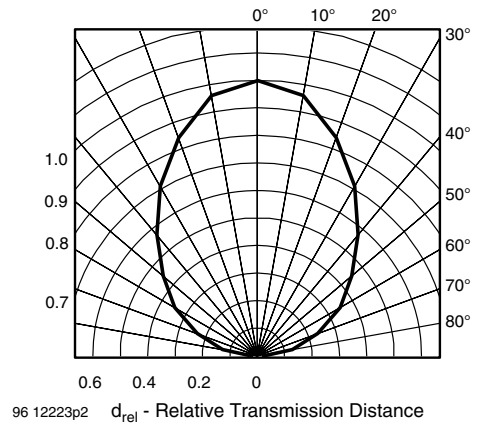
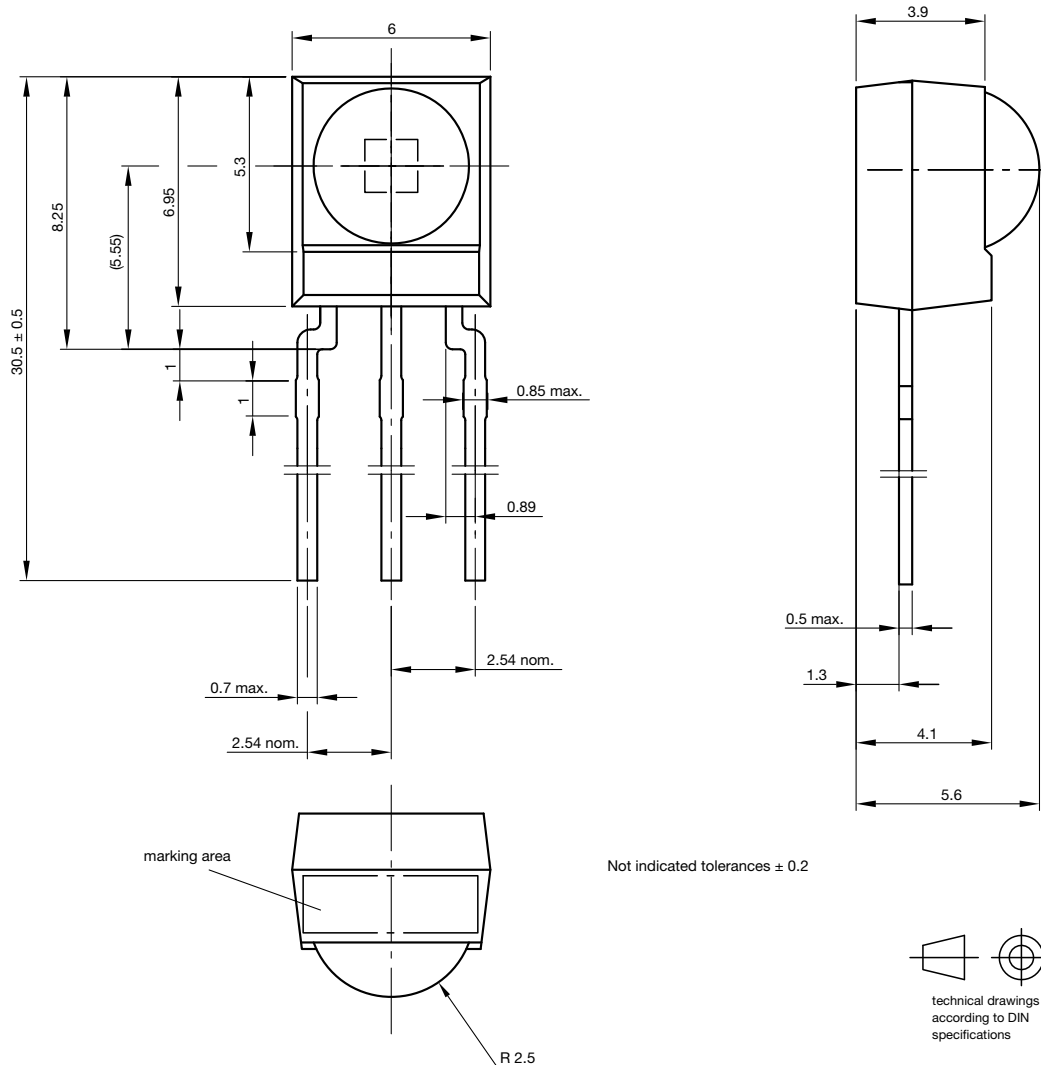


Fig. 4 - Horizontal Directivity

**PACKAGE DIMENSIONS** in millimeters



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