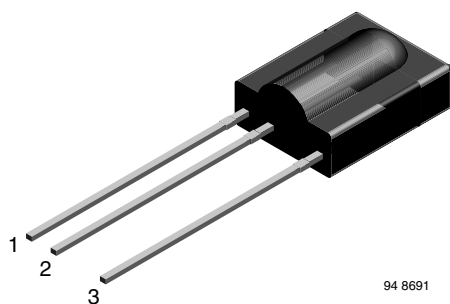


# IR Sensor Module for Remote Control Systems



## MECHANICAL DATA

### Pinning:

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

## FEATURES

- Photo detector and preamplifier in one package
- AC coupled response from 30 kHz to 55 kHz, all data formats
- If the IR signal strength is less than 300 mW/m<sup>2</sup> (distance more than 0.6 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)



## DESCRIPTION

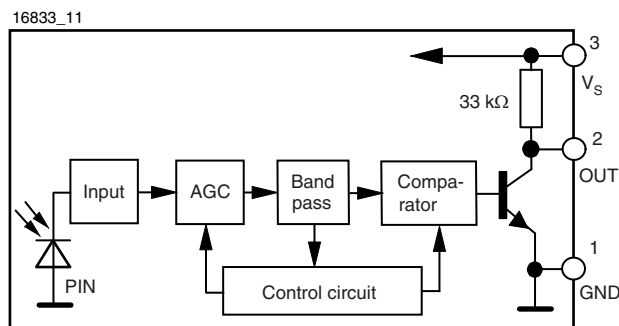
The TSMP1138 is a miniaturized sensor for receiving the modulated signal of infrared remote control systems. A PIN diode and preamplifier are assembled on a lead frame, the epoxy package is designed as an IR filter. The modulated output signal, carrier out, can be used for repeater applications and code learning applications.

This component has not been qualified according to automotive specifications.

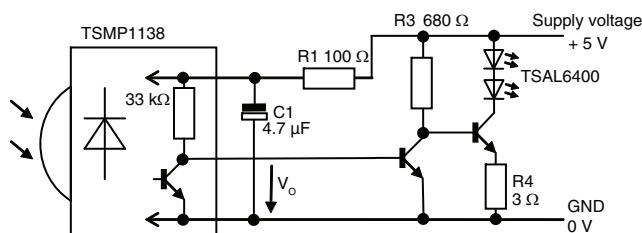
## PARTS TABLE

Carrier frequency	38 kHz	TSMP1138
Package		Cast
Pinning		1 = GND, 2 = Carrier OUT, 3 = $V_S$
Dimensions (mm)		10.0 W x 12.5 H x 5.8 D
Mounting		Leaded
Application		Repeater

## BLOCK DIAGRAM



## APPLICATION CIRCUIT



Recommended circuit for best sensitivity of the TSOP9xx38 in repeater applications. It limits the output voltage swing  $V_O$  to about 0.7 V in order to avoid internal coupling.

**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 2)		$V_O$	-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 2)		$I_O$	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, $I_F = 400\text{ mA}$	$d$		30		m
Output voltage low (pin 2)	$I_{OSL} = 0.5\text{ mA}$ , $E_e = 0.7\text{ mW/m}^2$ , 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	$E_e\text{ min.}$		0.5	1	mW/m <sup>2</sup>
Maximum irradiance	Less than 5 missing or 5 additional sub carrier pulses related to one burst	$E_e\text{ max.}$	30			W/m <sup>2</sup>
Directivity	Angle of half transmission distance	$\phi_{1/2}$		$\pm 55$		deg

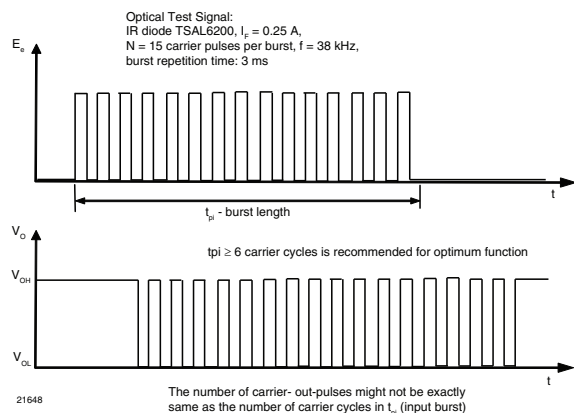
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)


Fig. 1 - Output Function

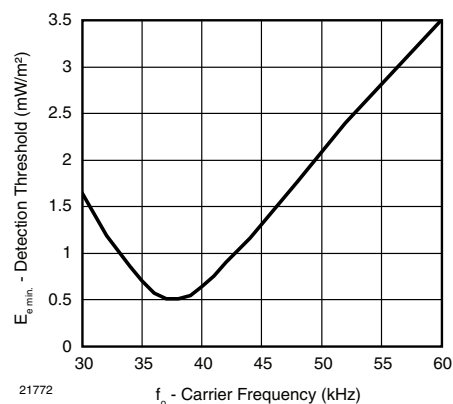


Fig. 2 - Frequency Dependence of Sensitivity

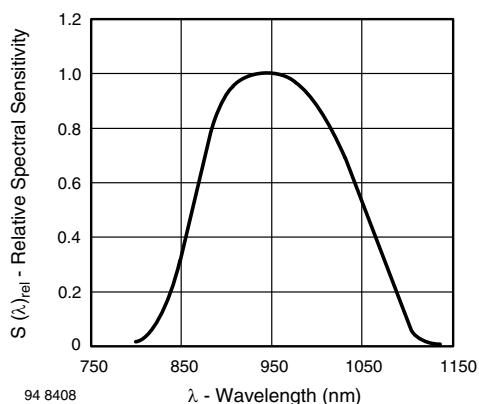


Fig. 3 - Relative Spectral Sensitivity vs. Wavelength

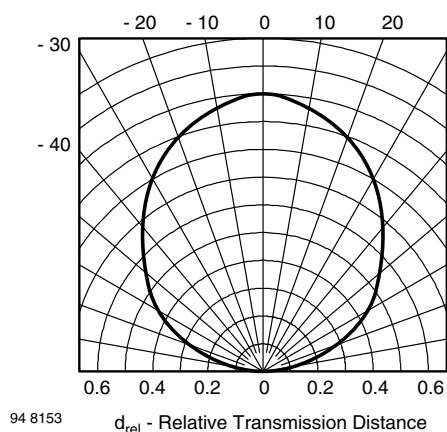


Fig. 4 - Horizontal Directivity  $\phi_x$

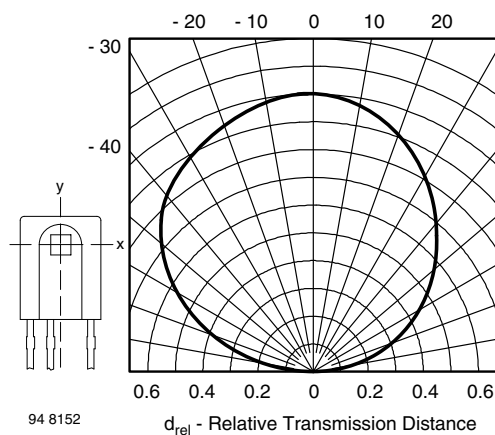
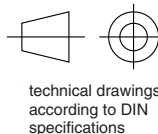
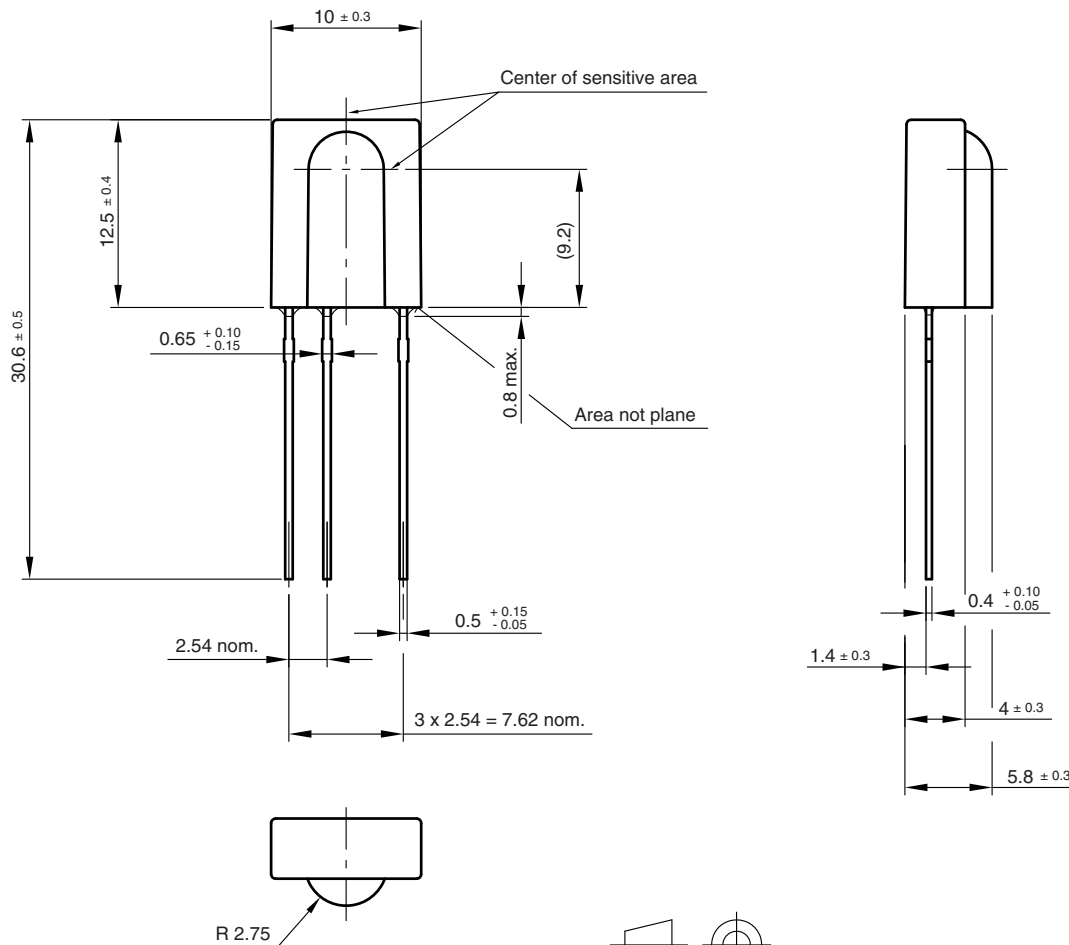


Fig. 5 - Vertical Directivity  $\phi_y$



**PACKAGE DIMENSIONS** in millimeters



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