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IR Receiver Modules for Remote Control Systems



MECHANICAL DATA

Pinning: 1 = OUT, 2 = GND, 3 = V_S

FEATURES

- Very low supply current
- · Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- · Insensitive to supply voltage ripple and noise
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

DESCRIPTION

The TSOP382.., TSOP384.. series are miniaturized receivers for infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

The demodulated output signal can be directly decoded by a microprocessor. The TSOP382.. is compatible with all common IR remote control data formats. The TSOP384.. is optimized to suppress almost all spurious pulses from energy saving fluorescent lamps but will also suppress some data signals.

This component has not been qualified according to automotive specifications.

PARTS TABLE					
CARRIER FREQUENCY	STANDARD APPLICATIONS (AGC2/AGC8)	VERY NOISY ENVIRONMENTS (AGC4)			
30 kHz	TSOP38230	TSOP38430			
33 kHz	TSOP38233	TSOP38433			
36 kHz	TSOP38236	TSOP38436			
38 kHz	TSOP38238	TSOP38438			
40 kHz	TSOP38240	TSOP38440			
56 kHz	TSOP38256	TSOP38456			

BLOCK DIAGRAM



APPLICATION CIRCUIT



 $\rm R_1$ and $\rm C_1$ are recommended for protection against EOS. Components should be in the range of 33 Ω < $\rm R_1$ < 1 k\Omega, $\rm C_1>0.1~\mu F.$





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ABSOLUTE MAXIMUM RATINGS ⁽¹⁾							
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT			
Supply voltage (pin 3)		Vs	- 0.3 to + 6.0	V			
Supply current (pin 3)		ا _S	3	mA			
Output voltage (pin 1)		Vo	- 0.3 to (V _S + 0.3)	V			
Output current (pin 1)		Ι _Ο	5	mA			
Junction temperature		Тj	100	°C			
Storage temperature range		T _{stg}	- 25 to + 85	°C			
Operating temperature range		T _{amb}	- 25 to + 85	°C			
Power consumption	$T_{amb} \le 85 \ ^{\circ}C$	P _{tot}	10	mW			
Soldering temperature	$t \le 10$ s, 1 mm from case	T _{sd}	260	۵°			

Note

(1) 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 ⁽¹⁾						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current (pin 3)	$E_v = 0, V_S = 3.3 V$	I _{SD}	0.27	0.35	0.45	mA
	$E_v = 40$ klx, sunlight	I _{SH}		0.45		mA
Supply voltage		Vs	2.5		5.5	V
Transmission distance	$ E_v = 0, \mbox{ test signal see fig. 1,} \\ IR \mbox{ diode TSAL6200,} \\ I_F = 250 \mbox{ mA} $	d		45		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	$\begin{array}{l} \mbox{Pulse width tolerance:} \\ t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o, \\ \mbox{test signal see fig. 1} \end{array}$	E _{e min.}		0.15	0.35	mW/m²
Maximum irradiance	$\begin{array}{c} t_{pi} \text{ - } 5/f_o < t_{po} < t_{pi} + 6/f_o, \\ \text{test signal see fig. 1} \end{array}$	E _{e max} .	30			W/m ²
Directivity	Angle of half transmission distance	Φ1/2		± 45		deg

Note

⁽¹⁾ $T_{amb} = 25 \text{ °C}$, unless otherwise specified

TYPICAL CHARACTERISTICS

 $T_{amb} = 25 \ ^{\circ}C$, unless otherwise specified





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Optical Test Signal

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Fig. 3 - Output Function











0 500 1000 1500 2000 2500 3000 20747 f - EMI Frequency (MHz)

Fig. 8 - Sensitivity vs. Electric Field Disturbances



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Fig. 9 - Max. Envelope Duty Cycle vs. Burst Length







10° 20° 0 30° 40° 1.0 50° 0.9 0.8 60° 70° 0.7 80° 0.6 0.4 0.2 0 0.2 0.4 0.6 19258 d_{rel} - Relative Transmission Distance

Fig. 12 - Horizontal Directivity



Fig. 13 - Vertical Directivity



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SUITABLE DATA FORMAT

The TSOP382.., TSOP384.. series are designed to suppress spurious output pulses due to noise or disturbance signals. Data and disturbance signals can be distinguished by the devices according to carrier frequency, burst length and envelope duty cycle. The data signal should be close to the band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the TSOP382.., TSOP384.. in the presence of a disturbance signal, the sensitivity of the receiver is reduced to insure that no spurious pulses are present at the output. Some examples of disturbance signals which are suppressed are:

- DC light (e.g. from tungsten bulb or sunlight)
- · Continuous signals at any frequency
- Strongly or weakly modulated noise from fluorescent lamps with electronic ballasts (see figure 15 or figure 16)







Fig. 16 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP382	TSOP384	
Minimum burst length	10 cycles/burst	10 cycles/burst	
After each burst of length a minimum gap time is required of	10 to 70 cycles \geq 10 cycles	10 to 35 cycles ≥ 10 cycles	
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 4 x burst length	35 cycles > 10 x burst length	
Maximum number of continuous short bursts/second	1800	1500	
Compatible to NEC code	yes	yes	
Compatible to RC5/RC6 code	yes	yes	
Compatible to Sony code	yes	no	
Compatible to Thomson 56 kHz code	yes	yes	
Compatible to Mitsubishi code (38 kHz, preburst 8 ms, 16 bit)	yes	no	
Compatible to Sharp code	yes	yes	
Suppression of interference from fluorescent lamps	Most common disturbance signals are suppressed	Even extreme disturbance signals are suppressed	

Note

For data formats with short bursts please see the datasheet for TSOP381.., TSOP383..



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PACKAGE DIMENSIONS in millimeters



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OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of Vishay Semiconductor GmbH to

- 1. Meet all present and future national and international statutory requirements.
- 2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

- 1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
- 2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
- 3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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