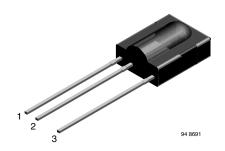
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IR Receiver Modules for Remote Control Systems



MECHANICAL DATA

Pinning:

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

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
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



DESCRIPTION

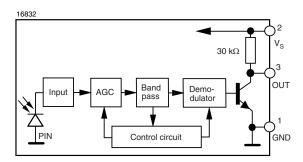
The TSOP312.., TSOP314.. series are miniaturized receivers for infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

The demodulated output signal can be directly decoded by a microprocessor. The TSOP312.. is compatible with all common IR remote control data formats. The TSOP314.. is optimized to suppress almost all spurious pulses from energy saving fluorescent lamps but will also suppress some data signals.

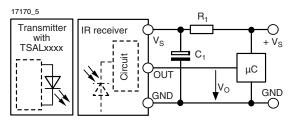
This component has not been qualified according to automotive specifications.

PARTS TABLE					
CARRIER FREQUENCY	STANDARD APPLICATIONS (AGC2/AGC8)	VERY NOISY ENVIRONMENTS (AGC4)			
30 kHz	TSOP31230	TSOP31430			
33 kHz	TSOP31233	TSOP31433			
36 kHz	TSOP31236	TSOP31436			
38 kHz	TSOP31238	TSOP31438			
40 kHz	TSOP31240	TSOP31440			
56 kHz	TSOP31256	TSOP31456			

BLOCK DIAGRAM



APPLICATION CIRCUIT



 $R_{_1}$ and $C_{_1}$ are recommended for protection against EOS. Components should be in the range of 33 Ω < $R_{_1}$ < 1 k $\Omega,$ $C_{_1}$ > 0.1 $\mu F.$

^{**} Please see document "Vishay Material Category Policy": www.vishay.com/doc?99902



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ABSOLUTE MAXIMUM RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT		
Supply voltage (pin 2)		Vs	- 0.3 to + 6.0	V		
Supply current (pin 2)		I _S	3	mA		
Output voltage (pin 3)		V _O	- 0.3 to (V _S + 0.3)	V		
Output current (pin 3)		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} ≤ 85 °C	P _{tot}	10	mW		
Soldering temperature	t ≤ 10 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 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current (pin 2)	$E_V = 0, V_S = 3.3 V$	I _{SD}	0.27	0.35	0.45	mA
	$E_v = 40 \text{ klx, sunlight}$	I _{SH}		0.45		mA
Supply voltage		Vs	2.5		5.5	V
Transmission distance	E_V = 0, test signal see fig. 1, IR diode TSAL6200, I_F = 250 mA	d		45		m
Output voltage low (pin 3)	$I_{OSL} = 0.5 \text{ mA}, E_e = 0.7 \text{ mW/m}^2,$ test signal see fig. 1	V _{OSL}			100	mV
Minimum irradiance	Pulse width tolerance: t_{pi} - 5/ f_0 < t_{po} < t_{pi} + 6/ f_0 , test signal see fig. 1	E _{e min.}		0.15	0.35	mW/m ²
Maximum irradiance	t_{pi} - 5/ f_o < t_{po} < t_{pi} + 6/ f_o , test signal see fig. 1	E _{e max.}	30			W/m ²
Directivity	Angle of half transmission distance	Φ1/2		± 45		deg

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

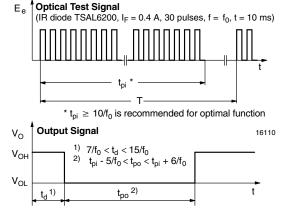


Fig. 1 - Output Active Low

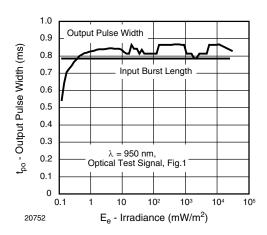


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

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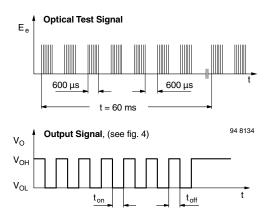


Fig. 3 - Output Function

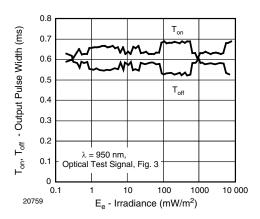


Fig. 4 - Output Pulse Diagram

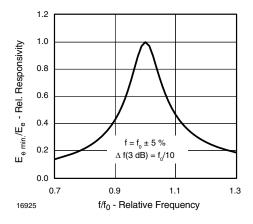


Fig. 5 - Frequency Dependence of Responsivity

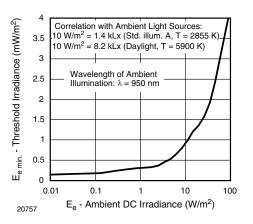


Fig. 6 - Sensitivity in Bright Ambient

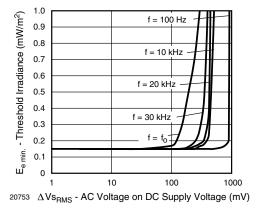


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

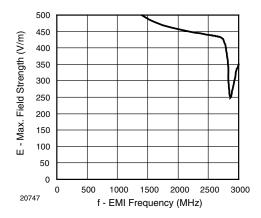


Fig. 8 - Sensitivity vs. Electric Field Disturbances



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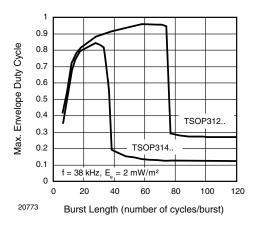


Fig. 9 - Maximum Envelope Duty Cycle vs. Burst Length

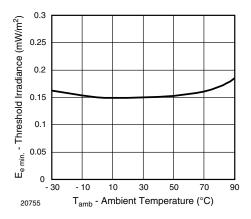


Fig. 10 - Sensitivity vs. Ambient Temperature

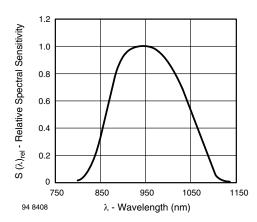


Fig. 11 - Relative Spectral Sensitivity vs. Wavelength

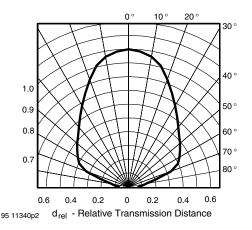


Fig. 12 - Horizontal Directivity

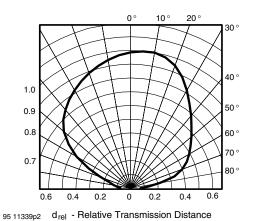


Fig. 13 - Vertical Directivity

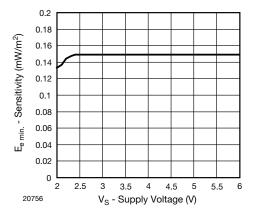


Fig. 14 - Sensitivity vs. Supply Voltage

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SUITABLE DATA FORMAT

The TSOP312.., TSOP314.. 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 TSOP312.., TSOP314.. 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 38 kHz or at any frequency
- Strongly or weakly modulated noise from fluorescent lamps with electronic ballasts (see figure 15 or figure 16)

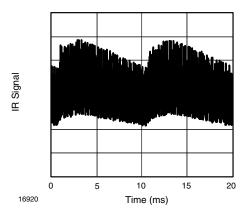


Fig. 15 - IR Signal from Fluorescent Lamp with Low Modulation

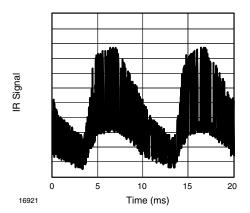


Fig. 16 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP312	TSOP314
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 ≥ 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
Recommended for NEC code	yes	yes
Recommended for RC5/RC6 code	yes	yes
Recommended for Sony code	yes	no
Recommended for Thomson 56 kHz code	yes	yes
Recommended for Mitsubishi code (38 kHz, preburst 8 ms, 16 bit)	yes	no
Recommended for Sharp code	yes	yes
Suppression of interference from fluorescent lamps	Most common disturbance signals are suppressed	Even extreme disturbance signals are suppressed

Note

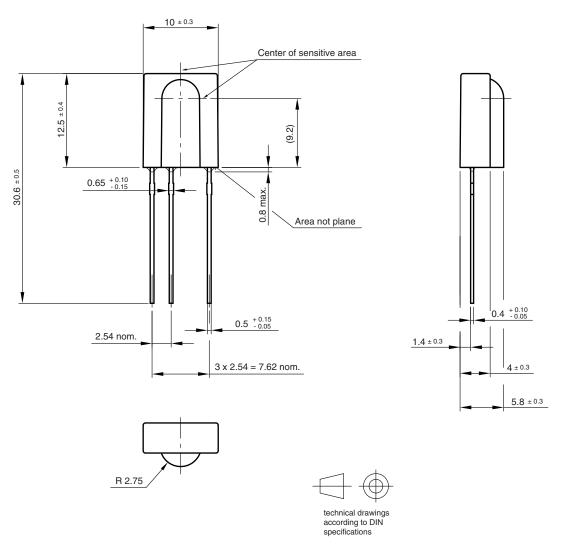
For data formats with short bursts please see the datasheet for TSOP311.., TSOP313..



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PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5095.01-4

Issue: 20; 15.03.10

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