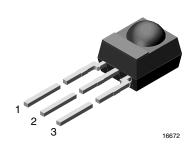


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IR Receiver Modules for Remote Control Systems



MECHANICAL DATA

Pinning for TSOP44..., TSOP48...:

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

Pinning for TSOP22.., TSOP24..:

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

FEATURES

- Low supply current
- · Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- · Improved shielding against EMI
- Supply voltage: 2.7 V to 5.5 V
- · Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912





GREEN (5-2008)

DESCRIPTION

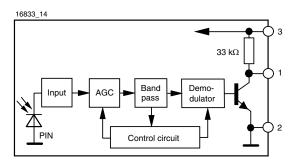
These products are miniaturized receivers for infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

The demodulated output signal can be directly decoded by a microprocessor. The TSOP22.., TSOP48.. are compatible with all common IR remote control data formats. The TSOP24.., TSOP44.. are optimized to suppress almost all spurious pulses from energy saving fluorescent lamps but will also suppress some data signals.

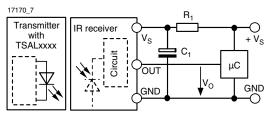
This component has not been qualified according to automotive specifications.

PARTS TABLE					
CARRIER FREQUENCY	STANDARD APPLICATIONS (AGC2)		VERY NOISY ENVIRONMENTS (AGC4)		
	PINNING				
	1 = OUT, 2 = GND, 3 = V _S	1 = OUT, 2 = V _S , 3 = GND	1 = OUT, 2 = GND, 3 = V _S	1 = OUT, 2 = V _S , 3 = GND	
30 kHz	TSOP4830	TSOP2230	TSOP4430	TSOP2430	
33 kHz	TSOP4833	TSOP2233	TSOP4433	TSOP2433	
36 kHz	TSOP4836	TSOP2236	TSOP4436	TSOP2436	
38 kHz	TSOP4838	TSOP2238	TSOP4438	TSOP2438	
40 kHz	TSOP4840	TSOP2240	TSOP4440	TSOP2440	
56 kHz	TSOP4856	TSOP2256	TSOP4456	TSOP2456	

BLOCK DIAGRAM



APPLICATION CIRCUIT



The external components R_1 and C_1 are optional to improve the robustness against electrical overstress (typical values are R_1 = 100 Ω , C_1 = 0.1 μ F).

The output voltage $V_{\rm O}$ should not be pulled down to a level below 1 V by the external circuit.

The capacitive load at the output should be less than 2 nF.



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ABSOLUTE MAXIMUM RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		Vs	- 0.3 to + 6	V
Supply current		I _S	5	mA
Output voltage		Vo	- 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		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
Cupply ourrent	$E_{V} = 0, V_{S} = 5 V$	I _{SD}	0.65	0.85	1.05	mA
Supply current	E _v = 40 klx, sunlight	I _{SH}		0.95		mA
Supply voltage		Vs	2.7		5.5	V
Transmission distance	E_{v} = 0, test signal see fig. 1, IR diode TSAL6200, I_{F} = 400 mA	d		45		m
Output voltage low	$I_{OSL} = 0.5 \text{ mA}, E_e = 0.7 \text{ mW/m}^2,$ test signal see fig. 1	V _{OSL}			100	mV
Minimum irradiance	Pulse width tolerance: t_{pi} - $5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1	E _{e min.}		0.17	0.35	mW/m²
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	Ψ1/2		± 45		deg

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

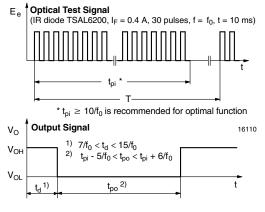


Fig. 1 - Output Active Low

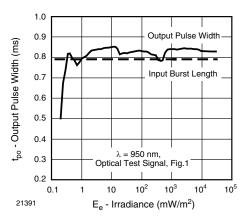


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

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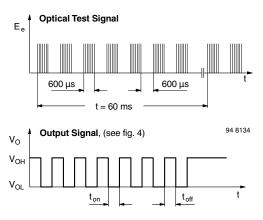


Fig. 3 - Output Function

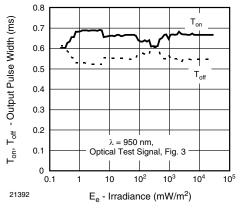


Fig. 4 - Output Pulse Diagram

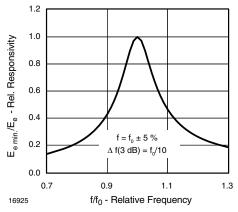


Fig. 5 - Frequency Dependence of Responsivity

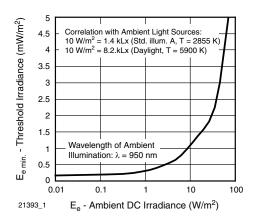


Fig. 6 - Sensitivity in Bright Ambient

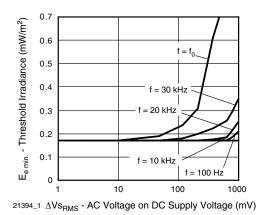


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

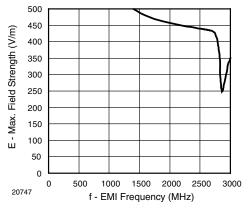


Fig. 8 - Sensitivity vs. Electric Field Disturbances

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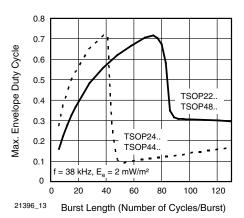


Fig. 9 - Max. Envelope Duty Cycle vs. Burst Length

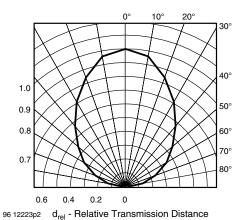


Fig. 12 - Horizontal Directivity

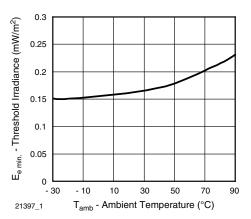


Fig. 10 - Sensitivity vs. Ambient Temperature

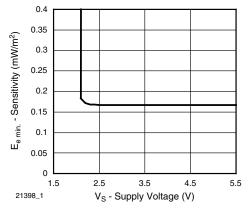


Fig. 13 - Sensitivity vs. Supply Voltage

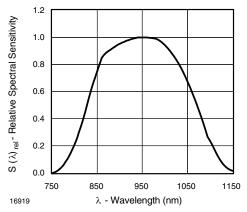


Fig. 11 - Relative Spectral Sensitivity vs. Wavelength

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SUITABLE DATA FORMAT

These products 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 IR receiver 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
- Modulated IR signals from common fluorescent lamps (example of noise pattern is shown in fig. 14 or fig. 15)

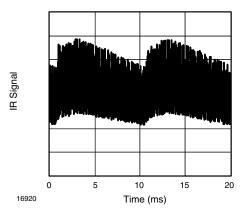


Fig. 14 - IR Signal from Fluorescent Lamp with Low Modulation

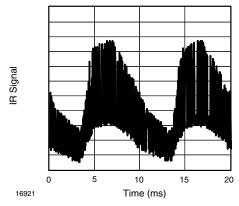


Fig. 15 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP22, TSOP48	TSOP24, TSOP44
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 ≥ 12 cycles	10 to 35 cycles ≥ 12 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	800	1300
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	yes
Recommended for Sharp code	yes	yes
Suppression of interference from fluorescent lamps	Most common disturbance signals are suppressed	Even extreme disturbance signals are suppressed

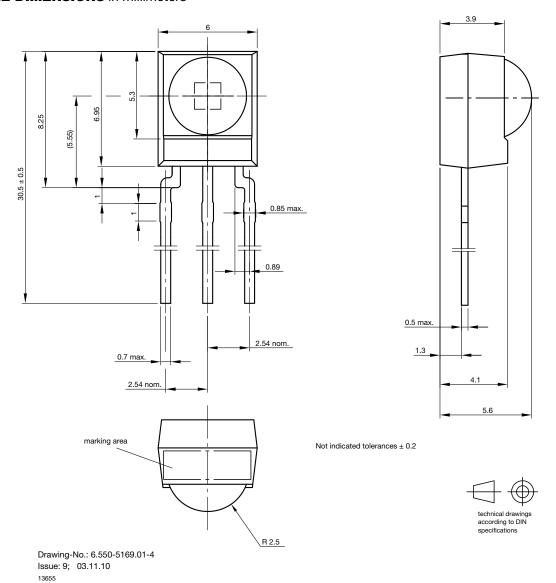
Note

• For data formats with short bursts please see the datasheet of TSOP23.., TSOP43..



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PACKAGE DIMENSIONS in millimeters





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