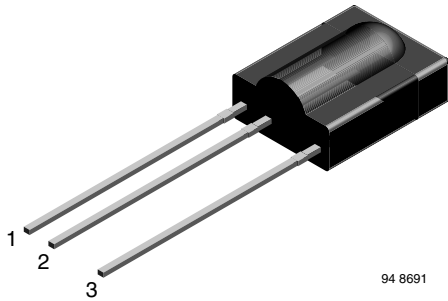


IR Receiver Modules for Remote Control Systems



94 8691

MECHANICAL DATA

Pinning:

1 = GND, 2 = V_S , 3 = Out

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



RoHS
COMPLIANT

DESCRIPTION

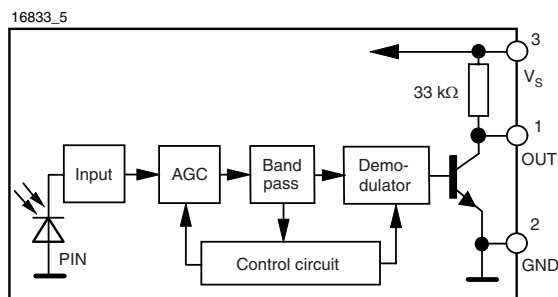
The TSOP112.. series are miniaturized receivers for infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

The demodulated output signal can be directly decoded by a microprocessor. The TSOP112.. is compatible with all common IR remote control data formats.

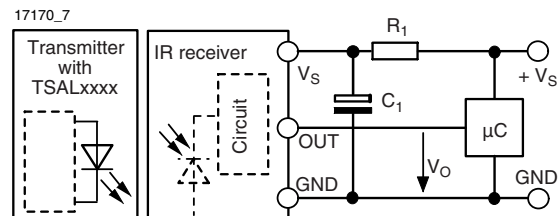
This component has not been qualified according to automotive specifications.

PARTS TABLE	
CARRIER FREQUENCY	STANDARD APPLICATIONS (AGC2/AGC8)
30 kHz	TSOP11230
33 kHz	TSOP11233
36 kHz	TSOP11236
36.7 kHz	TSOP11237
38 kHz	TSOP11238
40 kHz	TSOP11240
56 kHz	TSOP11256

BLOCK DIAGRAM



APPLICATION CIRCUIT



The external components R_1 and C_1 are optional to improve the robustness against electrical overstress (typical values are $R_1 = 100 \Omega$, $C_1 = 0.1 \mu F$).
The output voltage V_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.

ABSOLUTE MAXIMUM RATINGS (1)				
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	$T_{amb} \leq 85$ °C	P_{tot}	10	mW
Soldering temperature	$t \leq 10$ s, 1 mm from case	T_{sd}	260	°C

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)	$E_v = 0, V_S = 5$ V	I_{SD}	0.65	0.85	1.05	mA
	$E_v = 40$ klx, sunlight	I_{SH}		0.95		mA
Supply voltage		V_S	2.7		5.5	V
Transmission distance	$E_v = 0$, test signal see fig. 1, IR diode TSAL6200, $I_F = 400$ mA	d		40		m
Output voltage low (pin 1)	$I_{OSL} = 0.5$ mA, $E_e = 0.7$ 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	$E_e \text{ min.}$		0.3	0.45	mW/m ²
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$, test signal see fig. 1	$E_e \text{ max.}$	30			W/m ²
Directivity	Angle of half transmission distance	$\phi_{1/2}$		± 45		deg

Note

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

TYPICAL CHARACTERISTICS

$T_{amb} = 25$ °C, unless otherwise specified

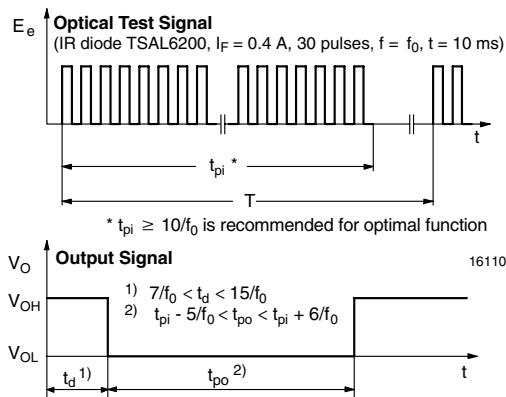


Fig. 1 - Output Active Low

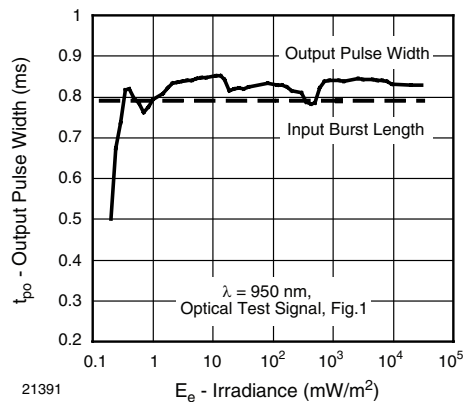


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

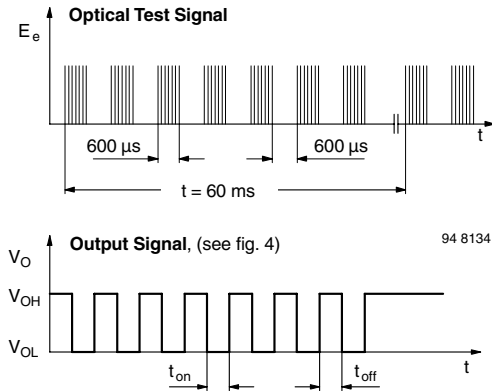


Fig. 3 - Output Function

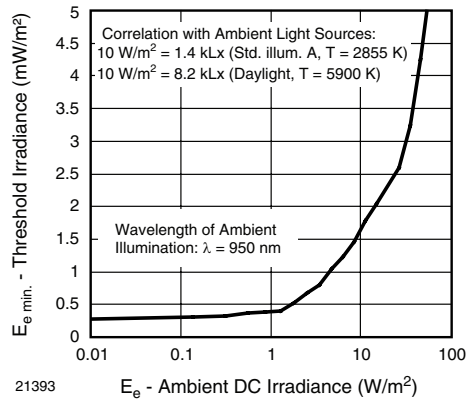


Fig. 6 - Sensitivity in Bright Ambient

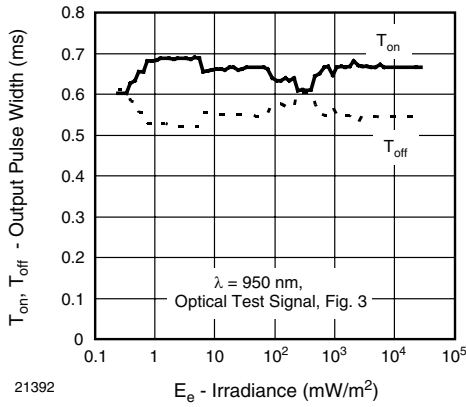


Fig. 4 - Output Pulse Diagram

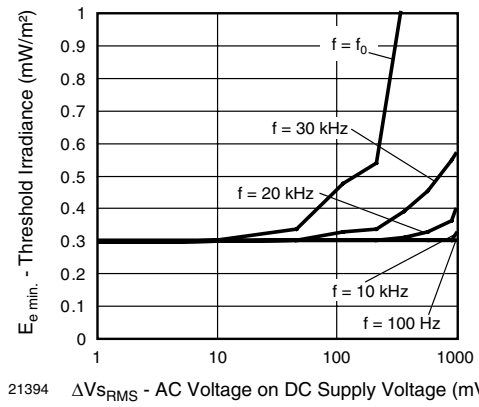


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

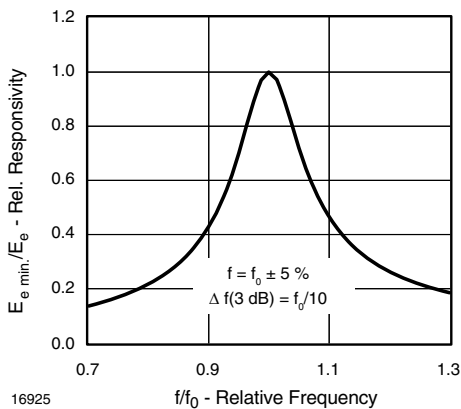


Fig. 5 - Frequency Dependence of Responsivity

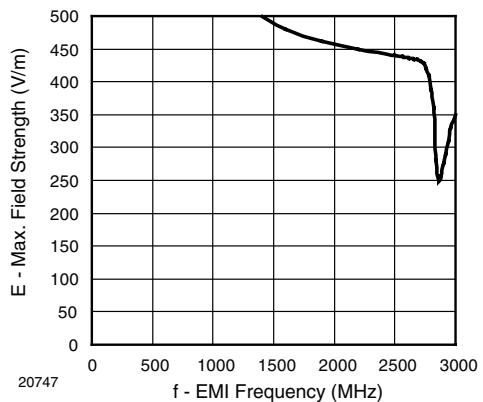
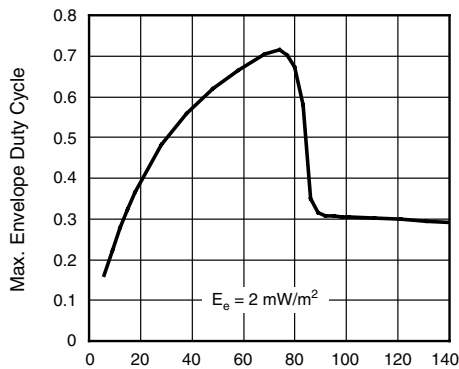


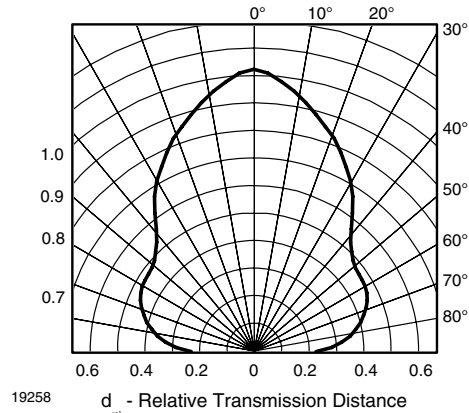
Fig. 8 - Sensitivity vs. Electric Field Disturbances

New TSOP112..

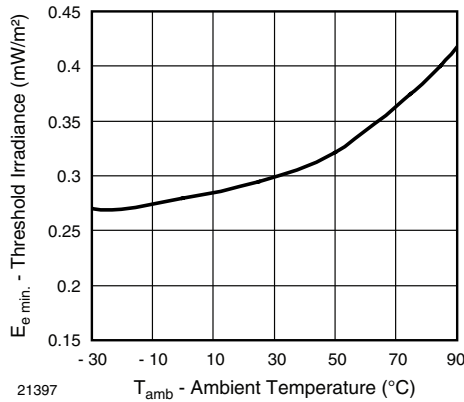
Vishay Semiconductors IR Receiver Modules for Remote Control Systems



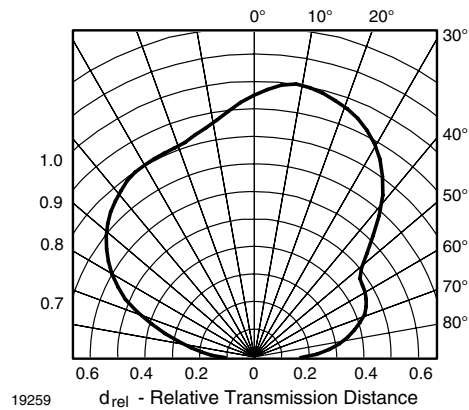
21396.2 Burst Length (Number of Cycles/Burst)
Fig. 9 - Max. Envelope Duty Cycle vs. Burst Length



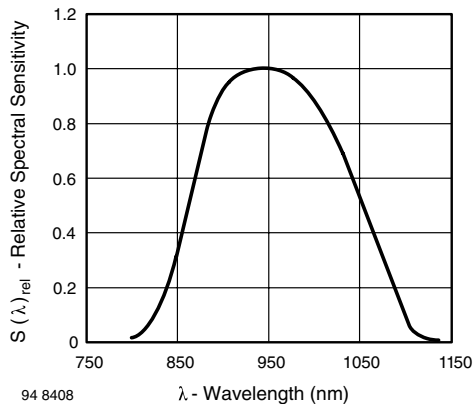
19258 d_{rel} - Relative Transmission Distance
Fig. 12 - Horizontal Directivity



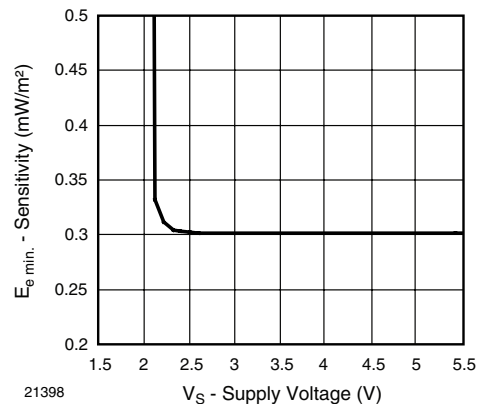
21397 T_{amb} - Ambient Temperature (°C)
Fig. 10 - Sensitivity vs. Ambient Temperature



19259 d_{rel} - Relative Transmission Distance
Fig. 13 - Vertical Directivity



94 8408 λ - Wavelength (nm)
Fig. 11 - Relative Spectral Sensitivity vs. Wavelength



21398 V_S - Supply Voltage (V)
Fig. 14 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

The TSOP112 series is 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 TSOP112.. 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)

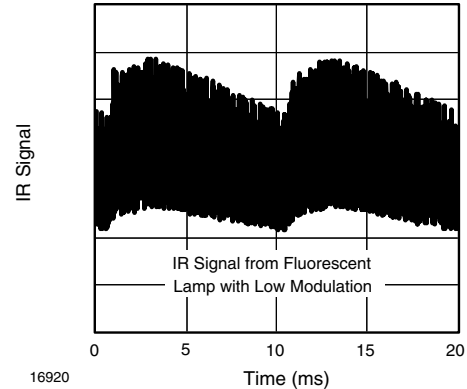


Fig. 15 - IR Signal from Fluorescent Lamp with Low Modulation

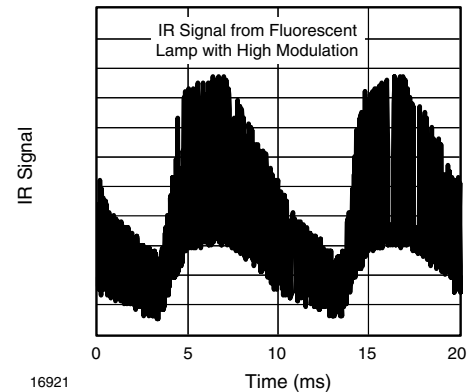


Fig. 16 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP112..
Minimum burst length	10 cycles/burst
After each burst of length a minimum gap time is required of	10 to 70 cycles ≥ 12 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 4 x burst length
Maximum number of continuous short bursts/second	800
Recommended for NEC code	Yes
Recommended for RC5/RC6 code	Yes
Recommended for Sony code	Yes
Recommended for Thomson 56 kHz code	Yes
Recommended for Mitsubishi code (38 kHz, preburst 8 ms, 16 bit)	Yes
Recommended for Sharp code	Yes
Suppression of interference from fluorescent lamps	Most common disturbance signals are suppressed

Note

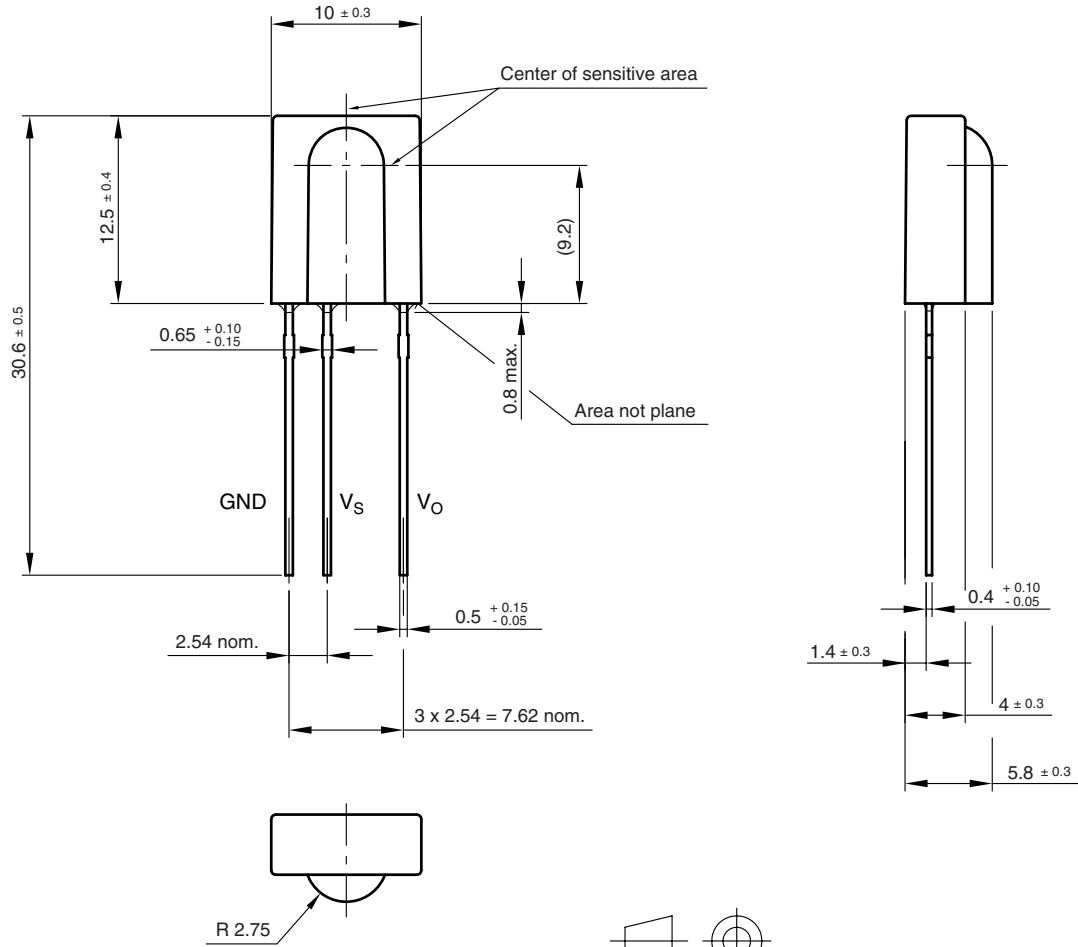
For data formats with short bursts please see the datasheet of TSOP311.., TSOP313..

New TSOP112..

Vishay Semiconductors IR Receiver Modules for Remote Control Systems



PACKAGE DIMENSIONS in millimeters



technical drawings according to DIN specifications

Drawing-No.: 6.550-5095.01-4
Issue: 19; 16.12.08
96 12116



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