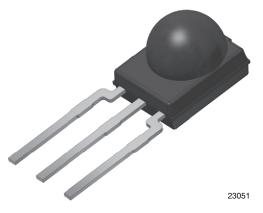
TSOP936..

www.vishay.com

Vishay Semiconductors

IR Receiver Modules for Remote Control Systems



LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The TSOP93... series devices are the latest generation miniaturized IR receiver modules for infrared remote control systems. These series provide improvements in sensitivity to remote control signals in dark ambient as well as in sensitivity in the presence of optical disturbances e.g. from CFLs.

The devices contain a PIN diode and a preamplifier assembled on a lead frame. The epoxy package contains an IR filter. The demodulated output signal can be directly connected to a microprocessor for decoding.

The TSOP936.., series devices are designed to receive long burst codes (10 or more carrier cycles per burst). The third digit designates the AGC level (AGC6) and the last two digits designate the band-pass frequency (see table below). The higher the AGC, the better noise is suppressed, but the lower the code compatibility. AGC6 provides maximized noise suppression. Generally, we advise to select the highest AGC that satisfactorily receives the desired remote code.

These components have not been qualified to automotive specifications.

FEATURES

- Improved dark sensitivity
- · Improved immunity against optical noise
- Very low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.0 V to 3.6 V
- Insensitive to supply voltage ripple and noise
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

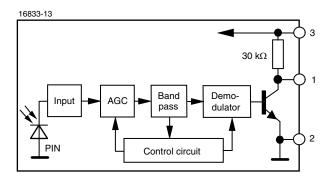
MECHANICAL DATA

1 = OUT, 2 = GND, 3 = V_S

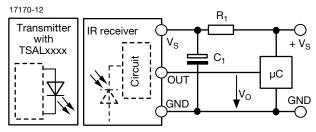
ORDERING CODE

TSOP936.. - 1800 pieces in bags

BLOCK DIAGRAM



APPLICATION CIRCUIT



 $\rm R_1$ and $\rm C_1$ recommended to reduce supply ripple for $\rm V_S$ < 2.2 V

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RoHS

COMPLIANT

HALOGEN

GREEN

(5-2008)



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TSOP936..

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PARTS TABLE					
AGC		MAXIMIZED NOISE SUPPRESSION (AGC6)			
O-min formula	30 kHz	TSOP93630			
	33 kHz	TSOP93633			
	36 kHz	TSOP93636 ⁽⁵⁾⁽⁶⁾			
Carrier frequency	38 kHz	TSOP93638 ⁽³⁾⁽⁴⁾⁽¹¹⁾			
	40 kHz	TSOP93640			
	56 kHz	TSOP93656			
Package		Minimold			
Pinning		1 = OUT, 2 = GND, 3 = V _S			
Dimensions (mm)		5.4 W x 6.35 H x 4.9 D			
Mounting		Leaded			
Application		Remote control			
Best choice for		 (1) Cisco (2) MCIR (3) Mitsubishi (4) NEC (5) Panasonic (6) RC-5 (7) RC-6 (8) RCA (9) r-step (10) Sejin 4PPM (11) Sharp (12) Sony 			
Special options		 Narrow optical filter: <u>www.vishay.com/doc?81590</u> Wide optical filter: <u>www.vishay.com/doc?82726</u> 			

Notes

30 kHz and 33 kHz only available on written request

• See datasheet for TSOP932.., TSOP934.. for preferred devices for ⁽¹⁾⁽²⁾⁽⁷⁾⁽⁸⁾⁽⁹⁾⁽¹⁰⁾⁽¹²⁾

ABSOLUTE MAXIMUM RATINGS								
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT				
Supply voltage		Vs	-0.3 to +3.6	V				
Supply current		I _S	3	mA				
Output voltage		Vo	-0.3 to (V _S + 0.3)	V				
Output current		Ι _Ο	5	mA				
Junction temperature		Tj	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	°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 aurrent	$E_v = 0, V_S = 3.3 V$	I _{SD}	0.25	0.37	0.45	mA
Supply current	E _v = 40 klx, sunlight	I _{SH}	-	0.50	-	mA
Supply voltage		V _S	2.0	-	3.6	V
Transmission distance	$E_v = 0$, test signal see Fig. 1, IR diode TSAL6200, I _F = 50 mA	d	-	32	-	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	Test signal: NEC code	E _{e min.}	-	0.07	0.15	mW/m ²
Maximum irradiance	$\begin{array}{c} t_{pi} \text{ - } 5/f_0 < t_{po} < t_{pi} + 6/f_0, \\ \text{test signal see Fig. 1} \end{array}$	E _{e max.}	30	-	-	W/m ²
Directivity	Angle of half transmission distance	Φ1/2	-	± 45	-	0

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

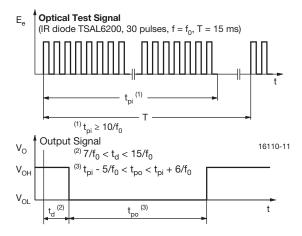


Fig. 1 - Output Delay and Pulse-Width

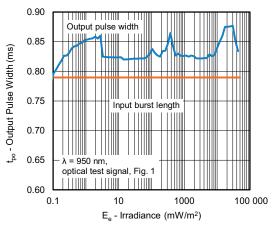
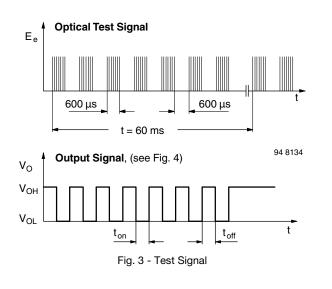


Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient



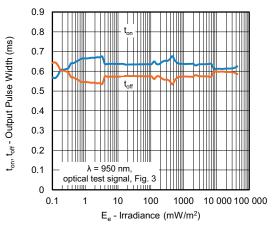


Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

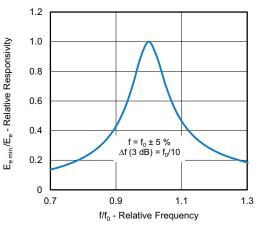
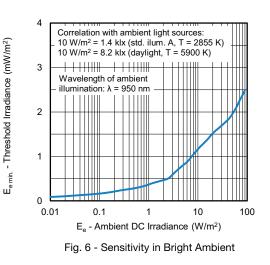


Fig. 5 - Frequency Dependence of Responsivity



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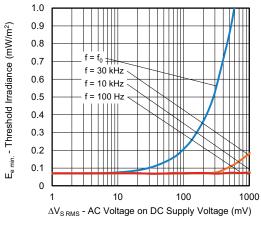


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

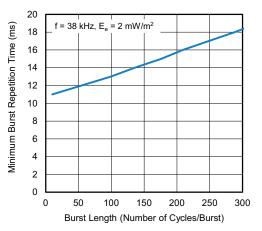


Fig. 8 - Minimum Burst Repetition Time vs. Burst Length

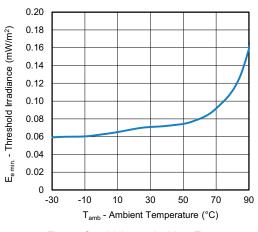


Fig. 9 - Sensitivity vs. Ambient Temperature

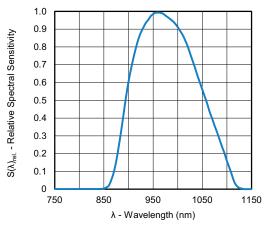
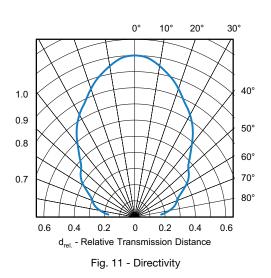
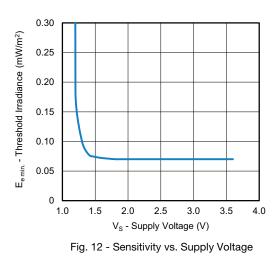


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength





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SUITABLE DATA FORMAT

This series is designed to suppress spurious output pulses due to noise or disturbance signals. The devices can distinguish data signals from noise due to differences in frequency, burst length, and envelope duty cycle. The data signal should be close to the device's band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the product in the presence of a disturbance, the sensitivity of the receiver is automatically reduced by the AGC to insure that no spurious pulses are present at the receiver's output. Some examples which are suppressed are:

- DC light (e.g. from tungsten bulbs sunlight)
- · Continuous signals at any frequency
- Strongly or weakly modulated patterns from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14)

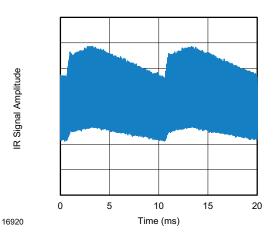


Fig. 13 - IR Emission from Fluorescent Lamp With Low Modulation

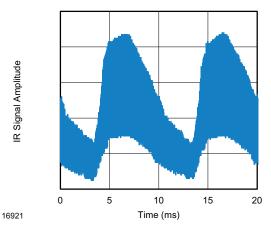


Fig. 14 - IR Emission from Fluorescent Lamp With High Modulation

	TSOP936		
Minimum burst length	10 cycles/burst		
Minimum gap time between bursts	≥ 13 cycles		
Minimum idle period between data frames	12 ms		
RC-5 code	Preferred		
RC-6 code	Yes		
NEC code	Preferred		
r-step code 56 kHz	Yes		
Sony code	No		
RCA 56 kHz code	Yes		
Mitsubishi code 38 kHz	Preferred		
Suppression of interference from fluorescent lamps	Fig. 13 and Fig. 14		

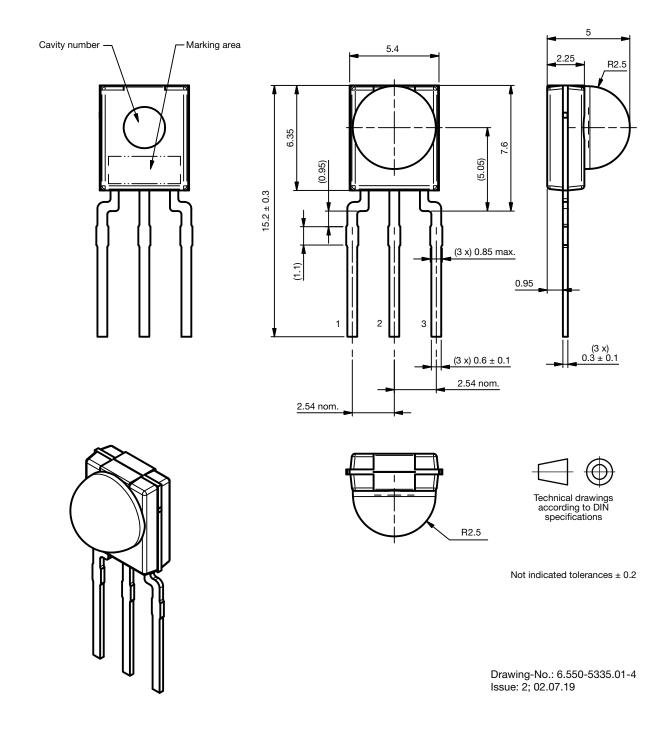
Note

• For data formats with short bursts please see the datasheet for TSOP933.., TSOP935...





PACKAGE DIMENSIONS in millimeters





BULK PACKAGING

Standard shipping for minimold is in conductive plastic bags. The packing quantity is determined by weight and the number of components per carton may vary by a maximum of ± 0.3 %.

ORDERING INFORMATION

Examples: TSOP93638

TSOP93656VI1

TSOP93638SS1F

For more information, see: www.vishay.com/doc?80076

PACKAGING QUANTITY

- 300 pieces per bag (each bag is individually boxed)
- 6 bags per carton



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