



## IR Receiver Modules for Remote Control Systems



### DESCRIPTION

The TSOP37S40 series are miniaturized SMD IR receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on a PCB, the epoxy package contains an IR filter.

The demodulated output signal can be directly connected to a microprocessor for decoding. The demodulated output signal can be directly decoded by a microprocessor. The TSOP37S40 is compatible with 12, 15, and 20 bit Sony codes. It is optimized to suppress almost all spurious pulses from energy saving fluorescent lamps but will also suppress some data signals.

These components have not been qualified according to automotive specifications.

### FEATURES

- Individual IC settings to reach maximum performance
- Immunity against noise (lamps, LCD TV, Wi-Fi)
- Low supply current
- Photo detector and preamplifier in one package
- Supply voltage: 2.0 V to 5.5 V
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



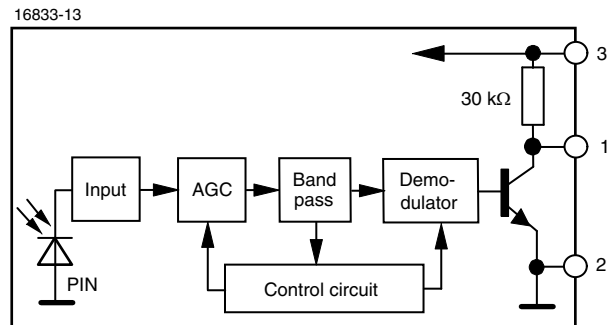
### LINKS TO ADDITIONAL RESOURCES



### DESIGN SUPPORT TOOLS

- [3D models](#)
- [Window size calculator](#)

### BLOCK DIAGRAM





# TSOP32S40F, TSOP34S40F

Vishay Semiconductors

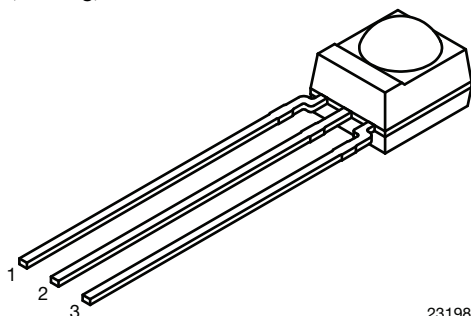
## MECHANICAL DATA

### Pinning for TSOP34S40F:

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

### Pinning for TSOP32S40F:

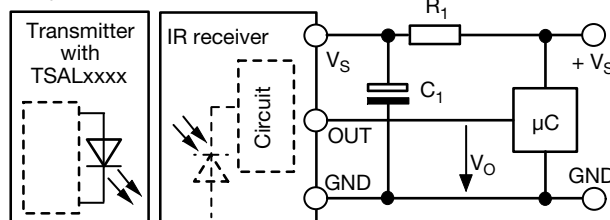
1 = OUT, 2 =  $V_S$ , 3 = GND



23198

## APPLICATION CIRCUIT

17170-14



$R_1$  and  $C_1$  recommended in case there are strong ripple or spikes on the supply line.

PARTS TABLE		SONY (AGC-S)	
AGC		TSOP34S40F <sup>(1)</sup>	TSOP32S40F <sup>(1)</sup>
Carrier frequency	40 kHz		
Package		Mold	
Pinning		1 = OUT, 2 = GND, 3 = $V_S$	1 = OUT, 2 = $V_S$ , 3 = GND
Dimensions (mm)		6.0 W x 6.95 H x 5.6 D	
Mounting		Leaded	
Best choice for		<sup>(1)</sup> Sony 12 bit, 15 bit, and 20 bit IR-codes	

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		$V_S$	-0.3 to +6	V
Supply current		$I_S$	3	mA
Output voltage		$V_O$	-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	$T_{amb} \leq 85$ °C	$P_{tot}$	10	mW
Soldering temperature	$t \leq 10$ 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 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	$E_v = 0, V_s = 3.3\text{ V}$	$I_{SD}$	0.25	0.35	0.45	mA
	$E_v = 40\text{ klx, sunlight}$	$I_{SH}$	-	0.45	-	mA
Supply voltage		$V_s$	2.0	-	5.5	V
Transmission distance	$E_v = 0$ , test signal see Fig. 1, IR diode TSAL6200, $I_F = 50\text{ mA}$	$d$	-	39	-	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: RC5 code	$E_e\text{ min.}$	-	0.05	0.1	$\text{mW/m}^2$
	Test signal: NEC code	$E_e\text{ min.}$	-	0.06	0.15	$\text{mW/m}^2$
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 5/f_0$ , test signal see Fig. 1	$E_e\text{ max.}$	30	-	-	$\text{W/m}^2$
Directivity	Angle of half transmission distance	$\phi_{1/2}$	-	$\pm 45$	-	$^{\circ}$

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

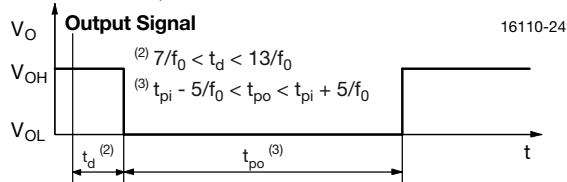
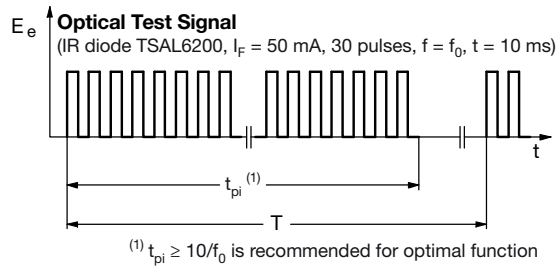


Fig. 1 - Output Active Low

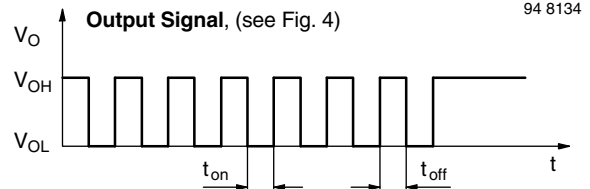
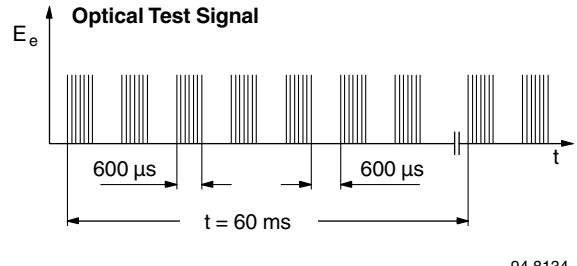


Fig. 3 - Output Function

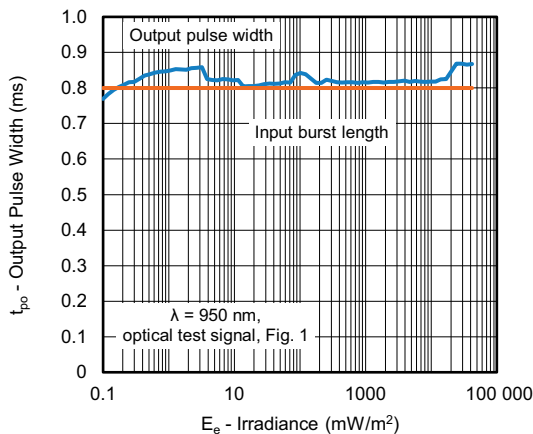


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

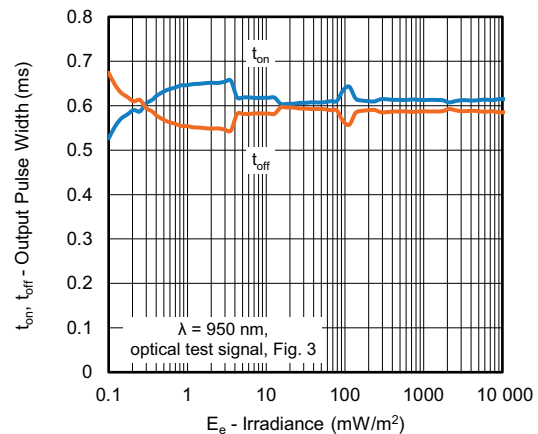


Fig. 4 - Output Pulse Diagram

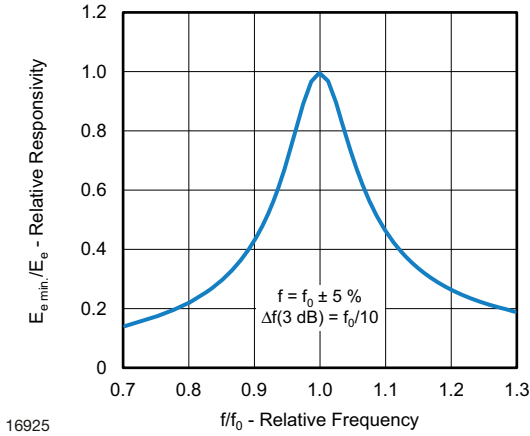


Fig. 5 - Frequency Dependence of Responsivity

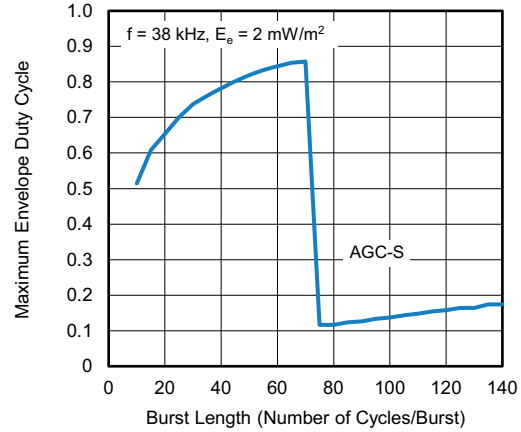


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

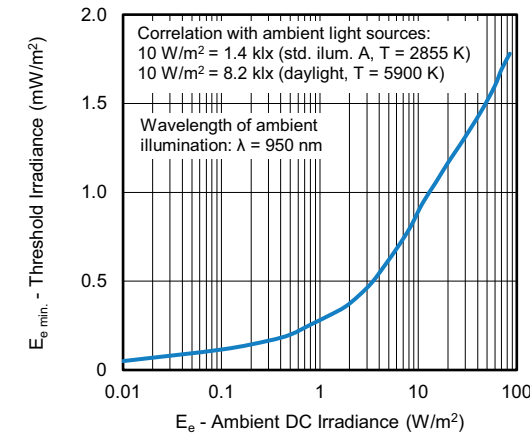


Fig. 6 - Sensitivity in Bright Ambient

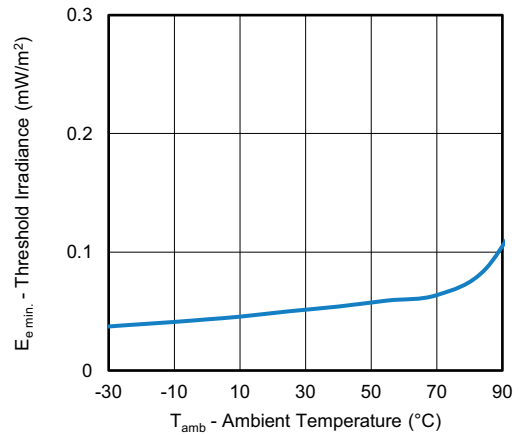


Fig. 9 - Sensitivity vs. Ambient Temperature

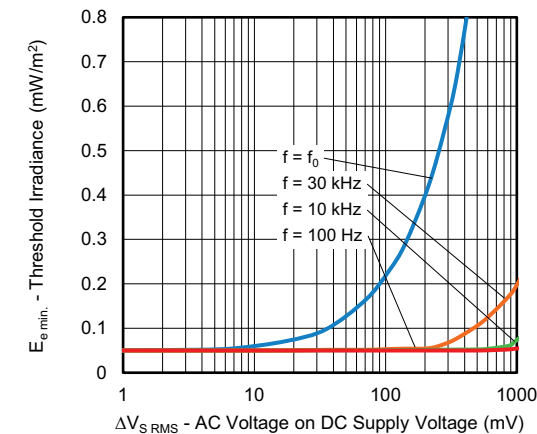


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

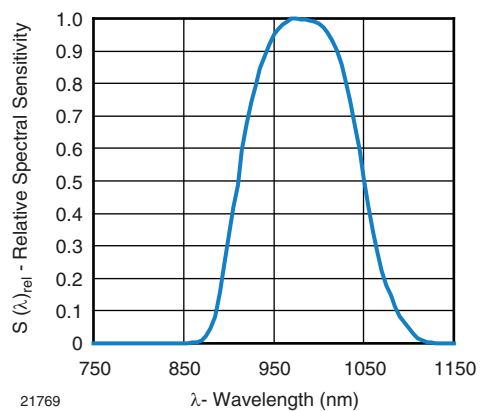


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

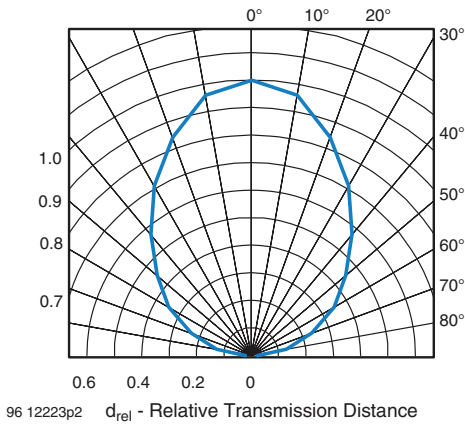


Fig. 11 - Horizontal Directivity

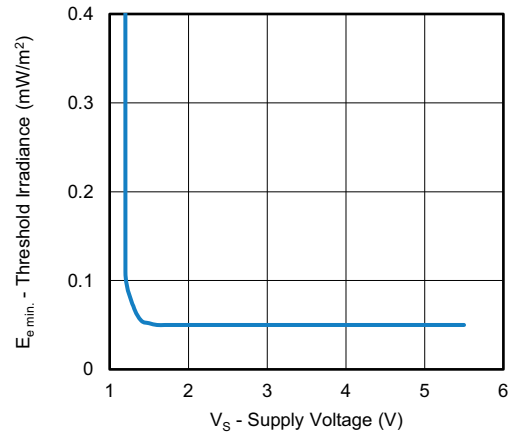


Fig. 12 - Sensitivity vs. Supply Voltage



**SUITABLE DATA FORMAT**

The TSOP32S40F, TSOP34S40F parts 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 (40 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the TSOP32S40F, TSOP34S40F 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 Fig. 13 or Fig. 14).

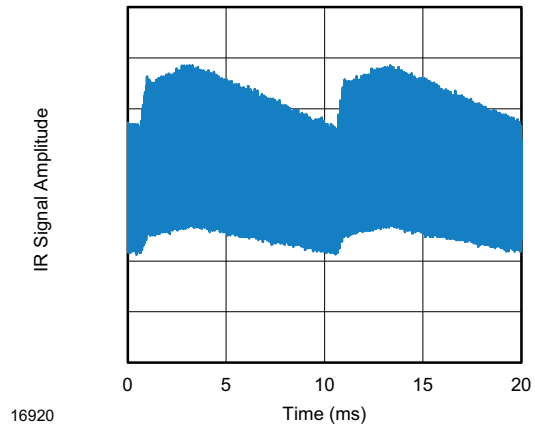


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

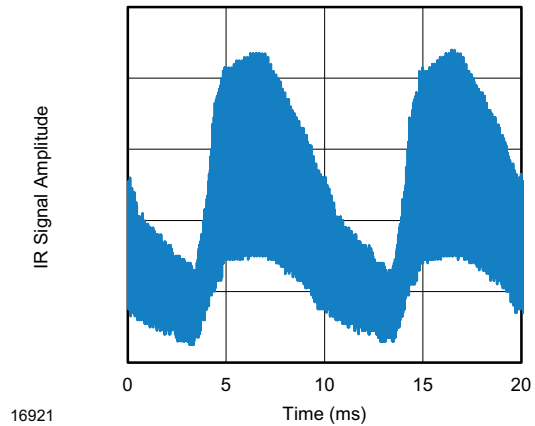
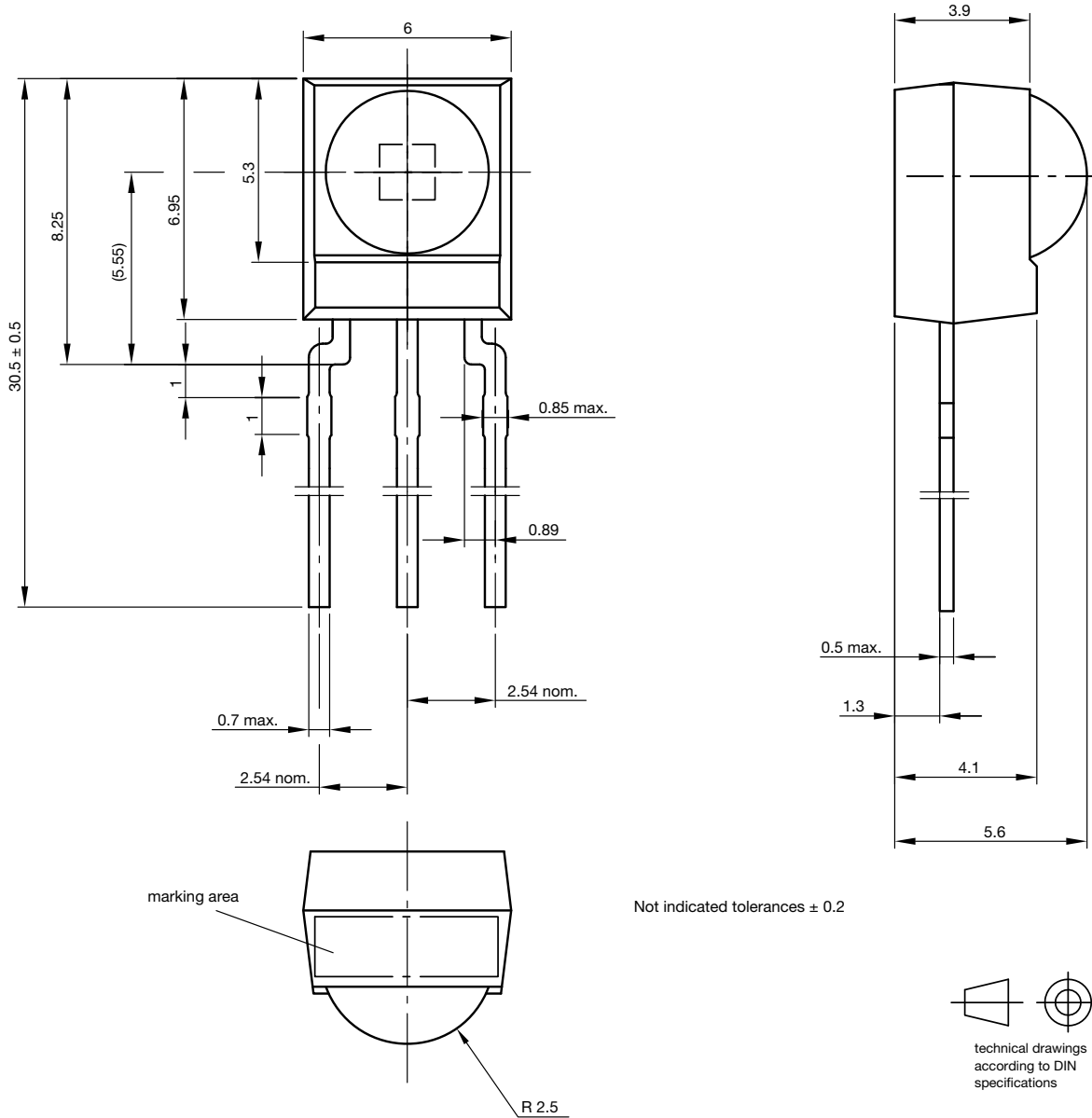


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

<b>TSOP32S40F, TSOP34S40F</b>	
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 > 9 x burst length
Maximum number of continuous short bursts/second	1700
Suppression of interference from fluorescent lamps	Most common disturbance patterns are suppressed



PACKAGE DIMENSIONS in millimeters



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13655



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