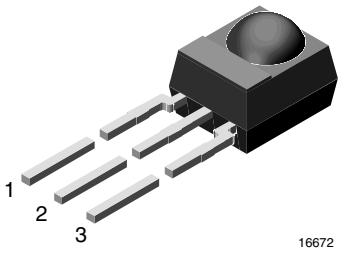
IR Receiver Modules for Remote Control Systems



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

Pb-free

e3

RoHS COMPLIANT

MECHANICAL DATA

Pinning

1 = OUT, 2 = GND, 3 = V_S

DESCRIPTION

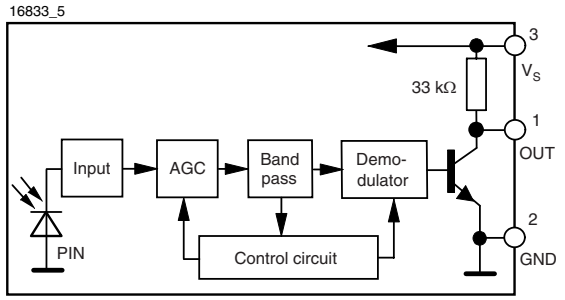
The TSOP48.., TSOP44.. series are miniaturized receivers for infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

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

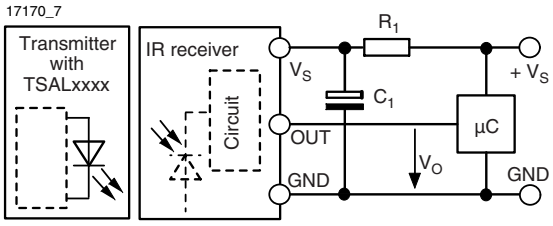
This component has not been qualified according to automotive specifications.

PARTS TABLE		
CARRIER FREQUENCY	STANDARD APPLICATIONS (AGC2/AGC8)	VERY NOISY ENVIROMENTS (AGC4)
30 kHz	TSOP4830	TSOP4430
33 kHz	TSOP4833	TSOP4433
36 kHz	TSOP4836	TSOP4436
36.7 kHz	TSOP4837	TSOP4437
38 kHz	TSOP4838	TSOP4438
40 kHz	TSOP4840	TSOP4440
56 kHz	TSOP4856	TSOP4456

BLOCK DIAGRAM



APPLICATION CIRCUIT



The external components R_1 and C_1 are optional to improve the robustnes against electrical overstress (typical values are R_1 = 100 Ω, C_1 = 0.1 µF).
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 ≤ 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 condtions 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		45		m
Output voltage low (pin 1)	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m², 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/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		± 45		deg

Note

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

TYPICAL CHARACTERISTICS

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

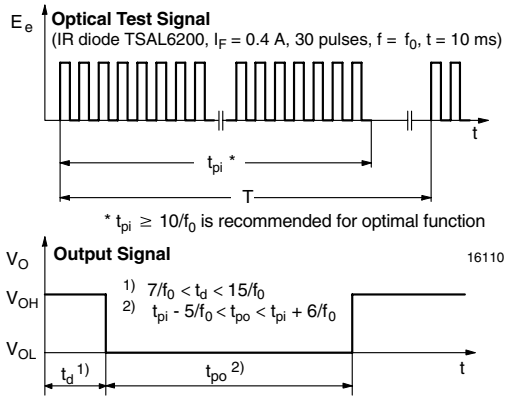


Fig. 1 - Output Active Low

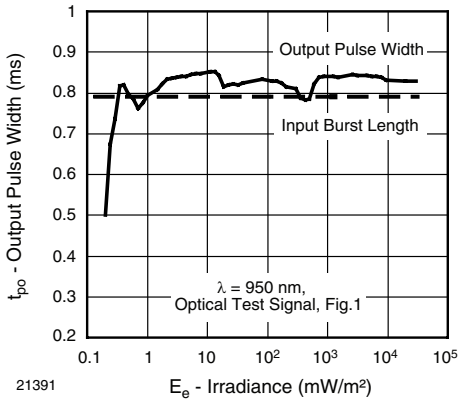


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

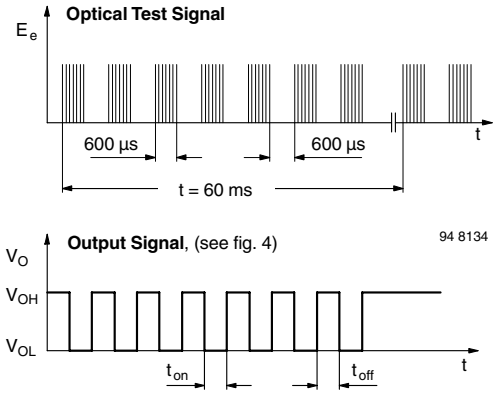


Fig. 3 - Output Function

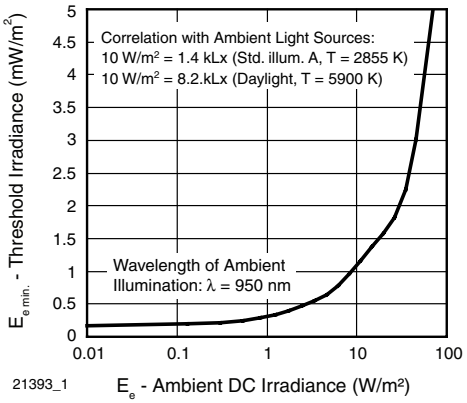


Fig. 6 - Sensitivity in Bright Ambient

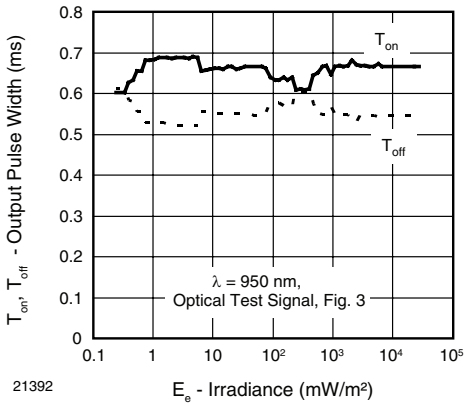


Fig. 4 - Output Pulse Diagram

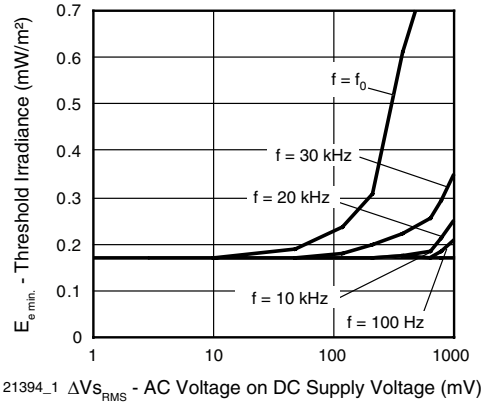


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

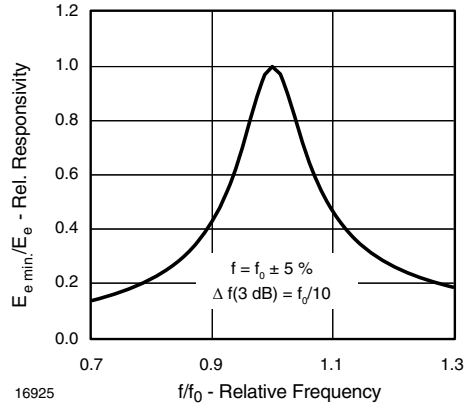


Fig. 5 - Frequency Dependence of Responsivity

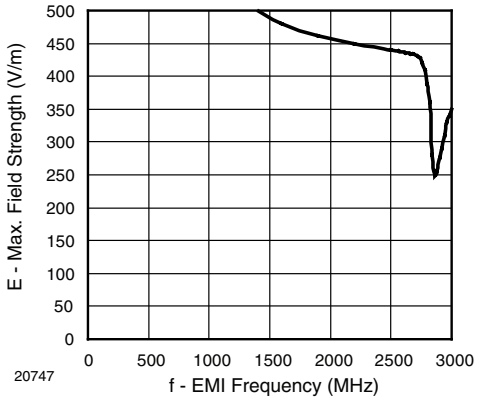


Fig. 8 - Sensitivity vs. Electric Field Disturbances

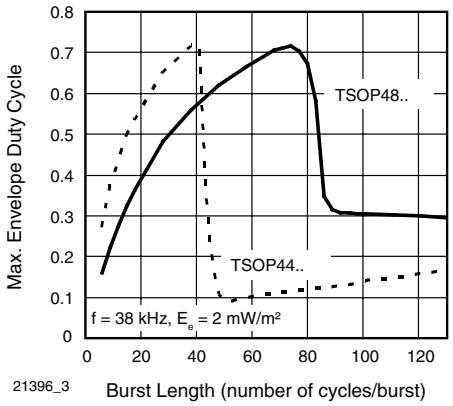


Fig. 9 - Max. Envelope Duty Cycle vs. Burst Length

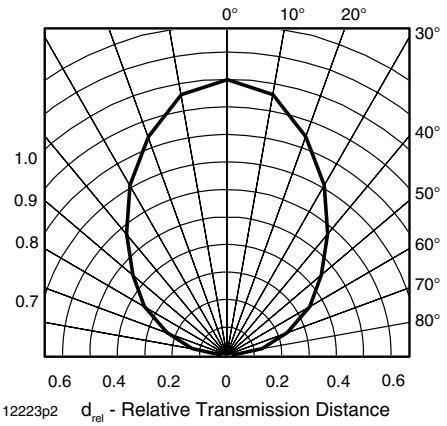


Fig. 12 - Horizontal Directivity

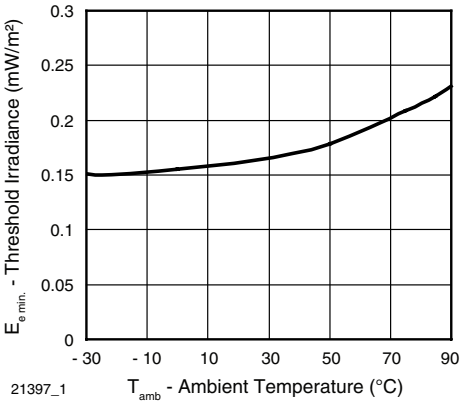


Fig. 10 - Sensitivity vs. Ambient Temperature

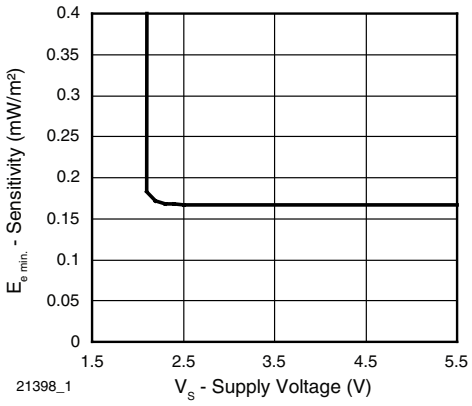


Fig. 13 - Sensitivity vs. Supply Voltage

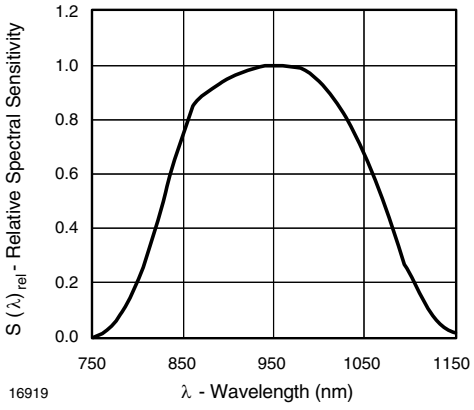


Fig. 11 - Relative Spectral Sensitivity vs. Wavelength

SUITABLE DATA FORMAT

The TSOP48.., TSOP44.. 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 TSOP48.., TSOP44.. 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 figure 14 or figure 15)

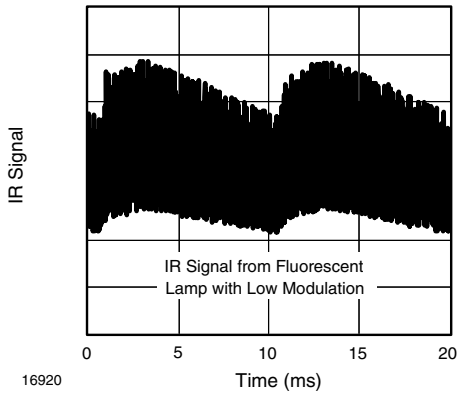


Fig. 14 - IR Signal from Fluorescent Lamp with Low Modulation

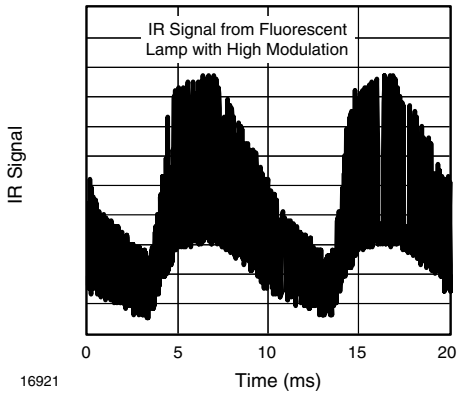


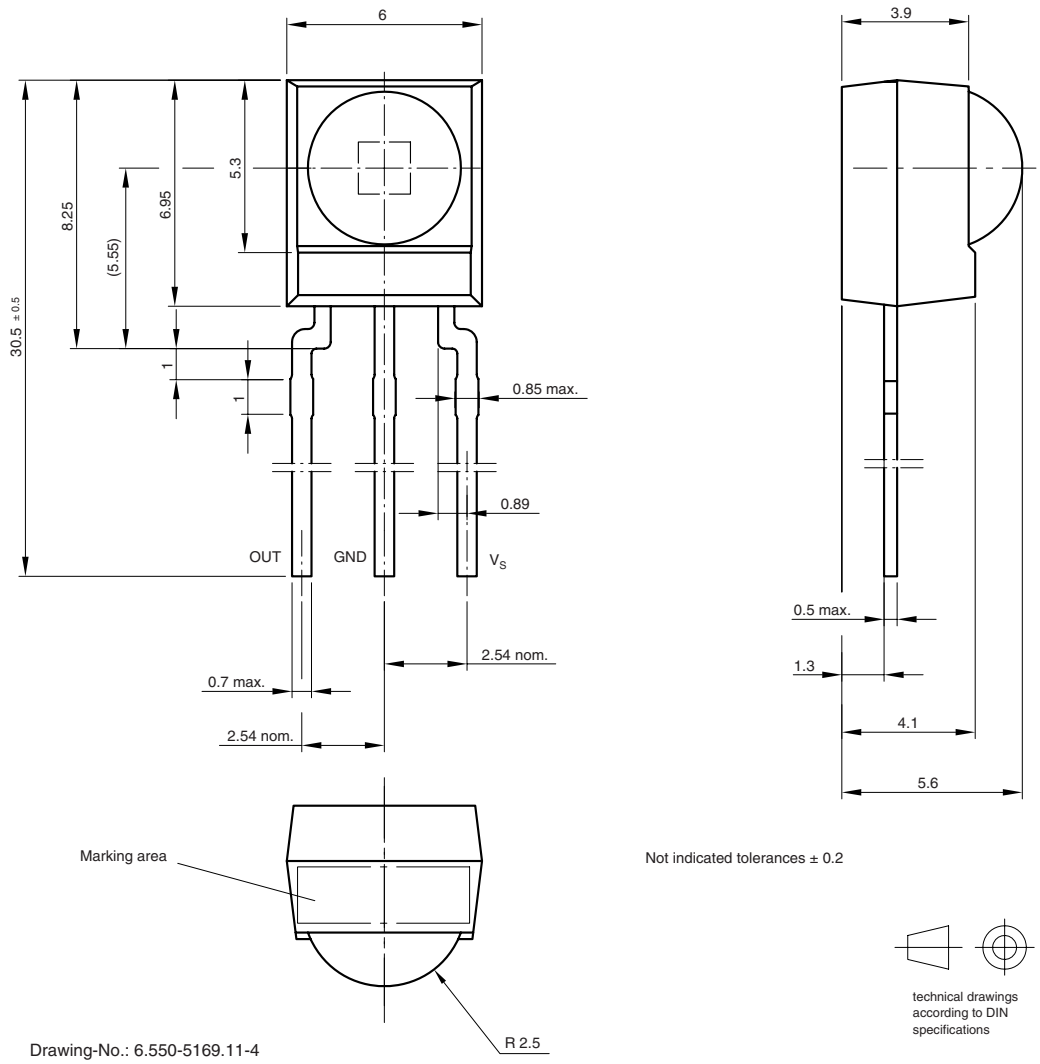
Fig. 15 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP48..	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 TSOP41.., TSOP43.. .

PACKAGE DIMENSIONS in millimeters



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