

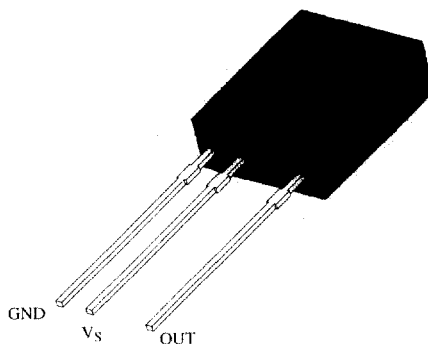
## Photo Modules for PCM Remote Control Systems

### Available types for different carrier frequencies

Type	$f_0$	Type	$f_0$
TSOP1130	30 kHz	TSOP1133	33 kHz
TSOP1136	36 kHz	TSOP1137	36.7 kHz
TSOP1138	38 kHz	TSOP1140	40 kHz
TSOP1156	56 kHz		

### Description

The TSOP11.. - series are miniaturized receivers for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter. The demodulated output signal can directly be decoded by a microprocessor. The main benefit is the operation with short burst transmission codes (e.g. RECS 80) and high data rates.



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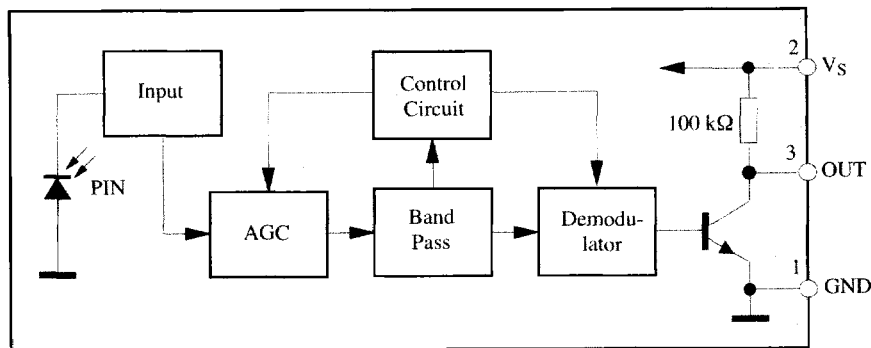
### Features

- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against electrical field disturbance
- TTL and CMOS compatibility
- Output active low
- Low power consumption
- High immunity against ambient light

### Special Features

- Enhanced data rate of 2400 bit/s
- Operation with short bursts possible (≥6 cycles/burst)

### Block Diagram



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## Absolute Maximum Ratings

$T_{amb} = 25^{\circ}\text{C}$

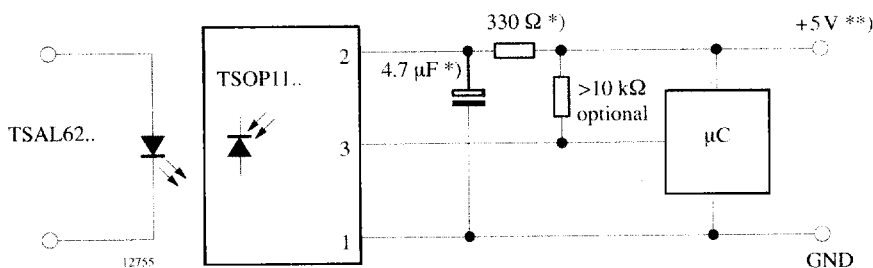
Parameter	Test Conditions	Symbol	Value	Unit
Supply Voltage	(Pin 2)	$V_S$	-0.3...6.0	V
Supply Current	(Pin 2)	$I_S$	5	mA
Output Voltage	(Pin 3)	$V_O$	-0.3...6.0	V
Output Current	(Pin 3)	$I_O$	5	mA
Junction Temperature		$T_j$	100	$^{\circ}\text{C}$
Storage Temperature Range		$T_{stg}$	-25...+85	$^{\circ}\text{C}$
Operating Temperature Range		$T_{amb}$	-25...+85	$^{\circ}\text{C}$
Power Consumption	( $T_{amb} \leq 85^{\circ}\text{C}$ )	$P_{tot}$	50	mW
Soldering Temperature	$t \leq 10$ s, 1 mm from case	$T_{sd}$	260	$^{\circ}\text{C}$

## Basic Characteristics

$T_{amb} = 25^{\circ}\text{C}$

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Supply Current (Pin 2)	$V_S = 5$ V, $E_v = 0$	$I_{SD}$	0.4	0.5	0.8	mA
	$V_S = 5$ V, $E_v = 40$ klx, sunlight	$I_{SH}$		1		mA
Transmission Distance	$E_v = 0$ , test signal see fig.8, IR diode TSIP5201, $I_F = 0.4$ A	d		35		m
Output Voltage Low (Pin 3)	$I_{OSL} = 0.5$ mA, $E_c = 0.7$ mW/m <sup>2</sup> , $f = f_0$ , test signal see fig.7	$V_{OSL}$			250	mV
Irradiance (30 – 40 kHz)	Test signal see fig.7	$E_c \text{ min}$		0.4	0.6	mW/m <sup>2</sup>
	Test signal see fig.8	$E_c \text{ min}$		0.35	0.5	mW/m <sup>2</sup>
Irradiance (56 kHz)	Test signal see fig.7	$E_c \text{ min}$		0.45	0.7	mW/m <sup>2</sup>
	Test signal see fig.8	$E_c \text{ min}$		0.40	0.6	mW/m <sup>2</sup>
Irradiance	Test signal see fig.7	$E_c \text{ max}$	30			W/m <sup>2</sup>
Directivity	Angle of half transmission distance	$\Phi_{1/2}$		$\pm 45$		deg

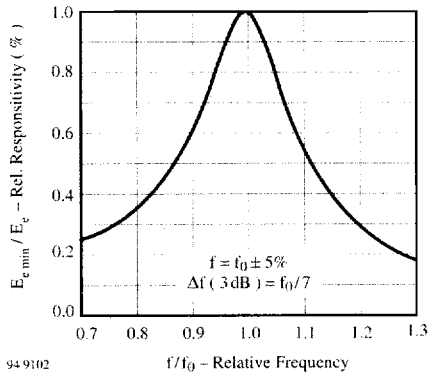
## Application Circuit



\*) only necessary to suppress power supply disturbances

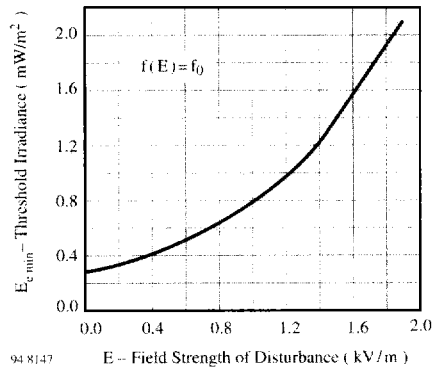
\*\*\*) tolerated supply voltage range :  $4.5\text{V} < V_S < 5.5\text{V}$

**Typical Characteristics** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise specified)



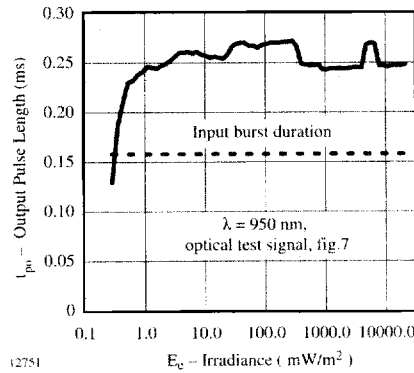
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Figure 1. Frequency Dependence of Responsivity



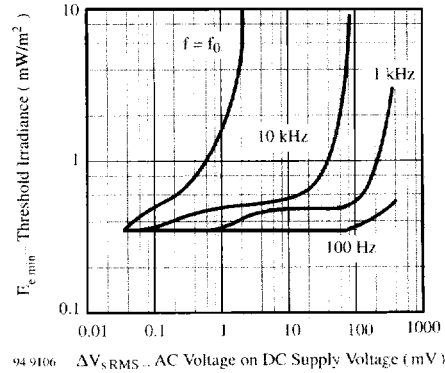
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Figure 4. Sensitivity vs. Electric Field Disturbances



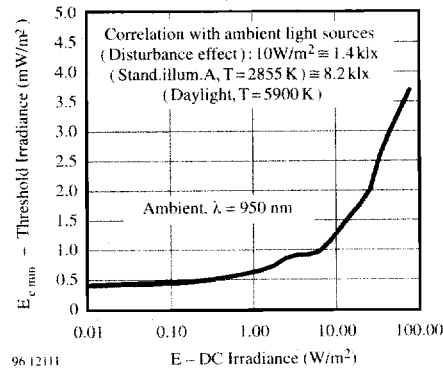
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Figure 2. Pulse Length and Sensitivity in Dark Ambient



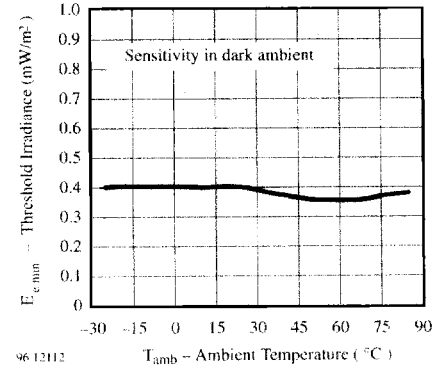
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Figure 5. Sensitivity vs. Supply Voltage Disturbances



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Figure 3. Sensitivity in Bright Ambient



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Figure 6. Sensitivity vs. Ambient Temperature

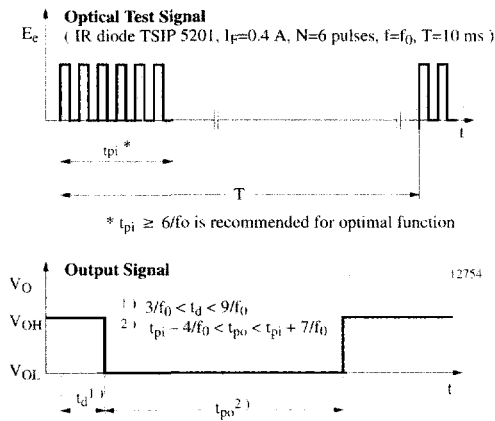


Figure 7. Output Function

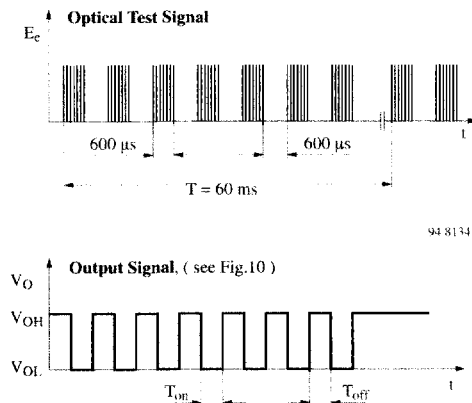


Figure 8. Output Function

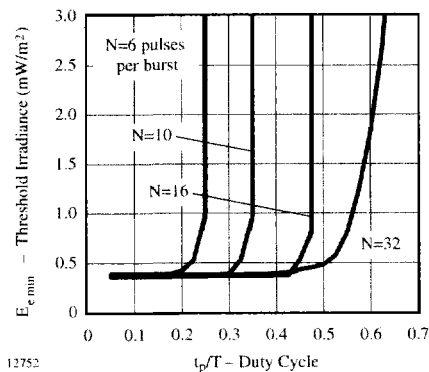


Figure 9. Sensitivity vs. Duty Cycle

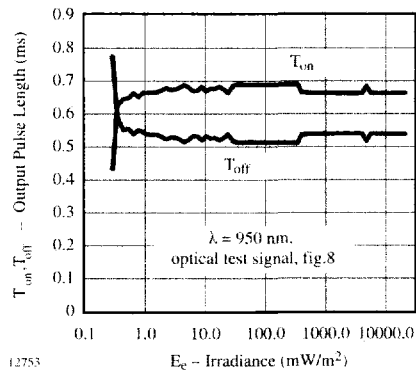


Figure 10. Output Pulse Diagram

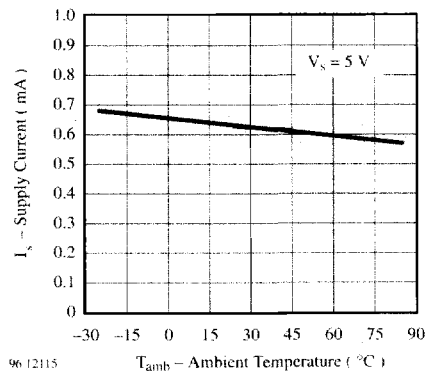


Figure 11. Supply Current vs. Ambient Temperature

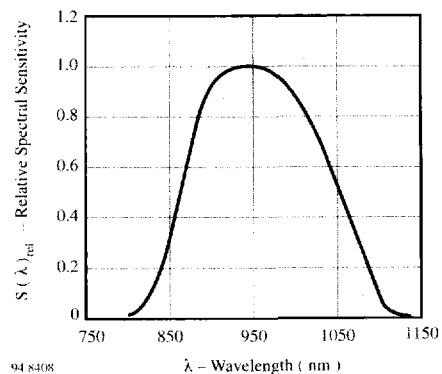


Figure 12. Relative Spectral Sensitivity vs. Wavelength

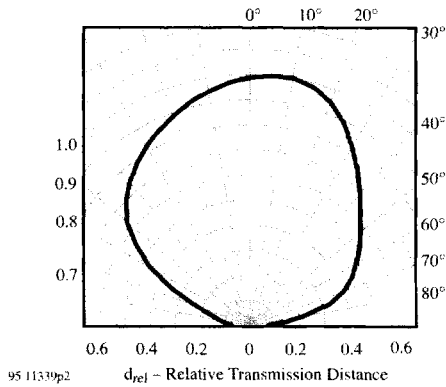


Figure 13. Vertical Directivity  $\phi_y$

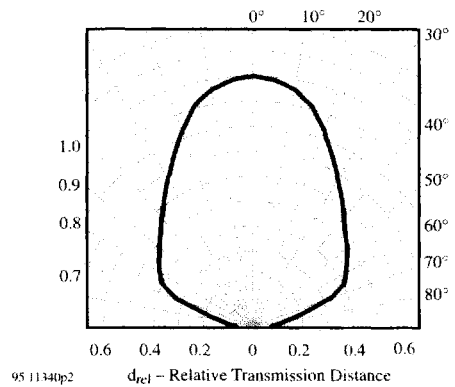


Figure 14. Horizontal Directivity  $\phi_x$

**Dimensions in mm**

