

## Photo Modules for PCM Remote Control Systems

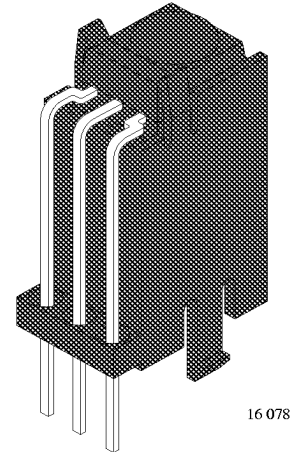
### Available types for different carrier frequencies

| Type       | fo     | Type       | fo       |
|------------|--------|------------|----------|
| TSOP1830QJ | 30 kHz | TSOP1833QJ | 33 kHz   |
| TSOP1836QJ | 36 kHz | TSOP1837QJ | 36.7 kHz |
| TSOP1838QJ | 38 kHz | TSOP1840QJ | 40 kHz   |
| TSOP1856QJ | 56 kHz |            |          |

### Description

The TSOP18..QJ – 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 reliable function even in disturbed ambient and the protection against uncontrolled output pulses.



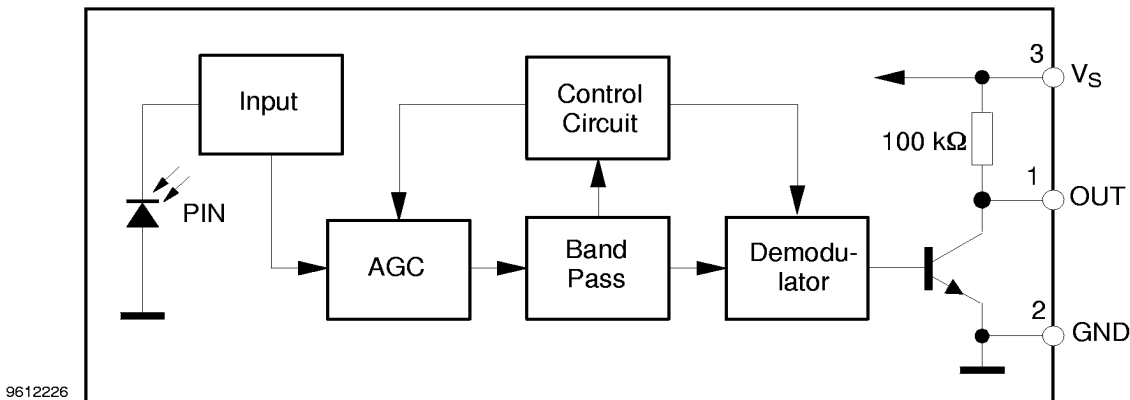
### Features

- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- TTL and CMOS compatibility
- Output active low
- Improved shielding against electrical field disturbance
- Suitable burst length  $\geq 6$  cycles/burst

### Special Features

- Small size package
- Enhanced immunity against all kinds of disturbance light
- No occurrence of disturbance pulses at the output
- Short settling time after power on ( $< 200\mu\text{s}$ )

### Block Diagram



### Absolute Maximum Ratings

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

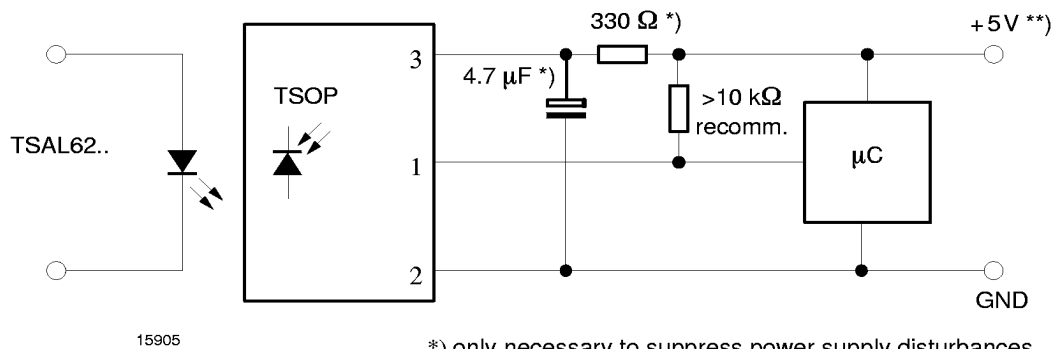
| Parameter                   | Test Conditions                       | Symbol    | Value      | Unit               |
|-----------------------------|---------------------------------------|-----------|------------|--------------------|
| Supply Voltage              | (Pin 3)                               | $V_S$     | -0.3...6.0 | V                  |
| Supply Current              | (Pin 3)                               | $I_S$     | 5          | mA                 |
| Output Voltage              | (Pin 1)                               | $V_O$     | -0.3...6.0 | V                  |
| Output Current              | (Pin 1)                               | $I_O$     | 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       | $t \leq 10\text{ s}$ , 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 3)     | $V_S = 5\text{ V}$ , $E_v = 0$  | $I_{SD}$     | 0.8 | 1        | 1.25 | mA              |
|                            | $V_S = 5\text{ V}$ , $E_v = 40\text{ klx}$ , sunlight   | $I_{SH}$     |     | 1.2      |      | mA              |
| Transmission Distance      | $E_v = 0$ , test signal see fig.6, IR diode TSAL6200, $I_F = 300\text{ mA}$                       | $d$          |     | 35       |      | m               |
| Output Voltage Low (Pin 1) | $I_{OSL} = 0.5\text{ mA}$ , $E_e = 0.7\text{ mW/m}^2$ , $f = f_o$                                 | $V_{OSL}$    |     |          | 250  | mV              |
| Irradiance (30 – 40 kHz)   | Pulse width tolerance:<br>$t_{pi} - 5/f_o < t_{po} < t_{pi} + 5/f_o$ ,<br>test signal (see fig.6) | $E_{e\ min}$ |     | 0.3      | 0.5  | $\text{mW/m}^2$ |
| Irradiance (56 kHz)        |   | $E_{e\ min}$ |     | 0.4      | 0.7  | $\text{mW/m}^2$ |
| Irradiance                 |   | $E_{e\ max}$ | 30  |          |      | $\text{W/m}^2$  |
| 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)

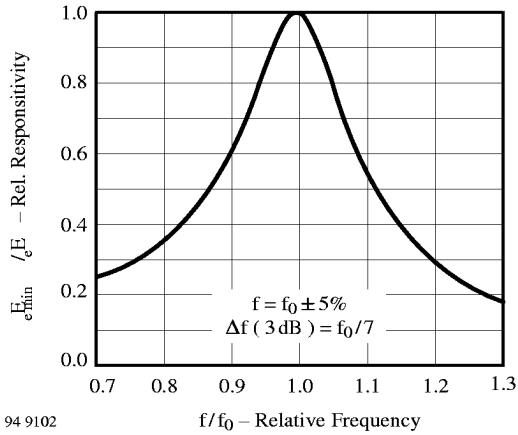


Figure 1. Frequency Dependence of Responsivity

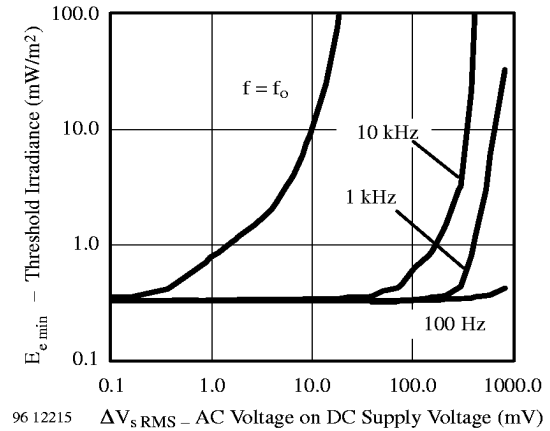


Figure 4. Sensitivity vs. Supply Voltage Disturbances

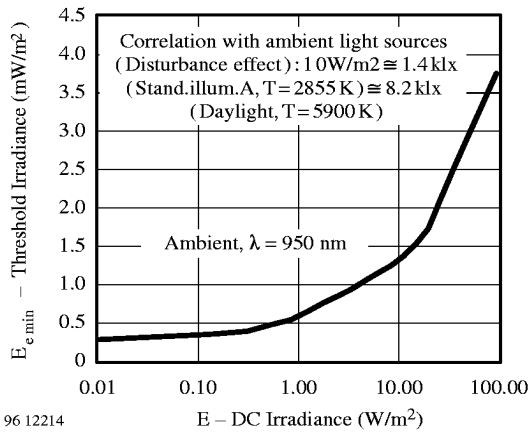


Figure 2. Sensitivity in Bright Ambient

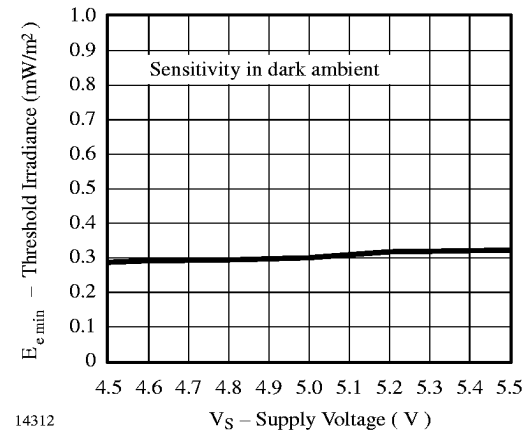


Figure 5. Sensitivity vs. Supply Voltage

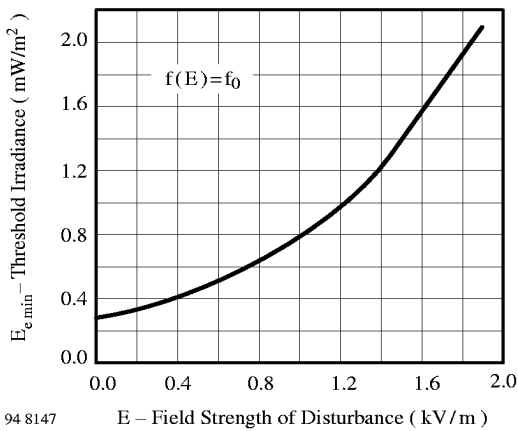


Figure 3. Sensitivity vs. Electric Field Disturbances

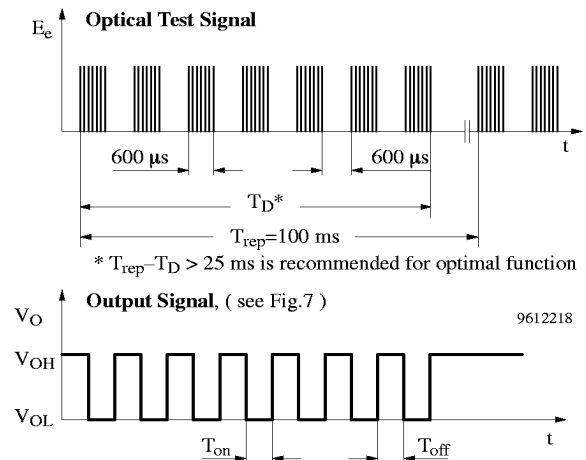


Figure 6. Output Function

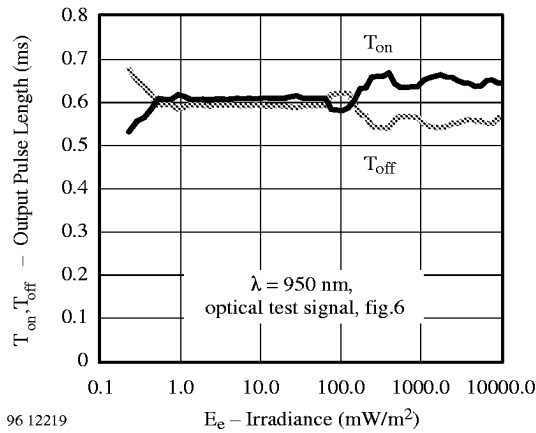


Figure 7. Output Pulse Diagram

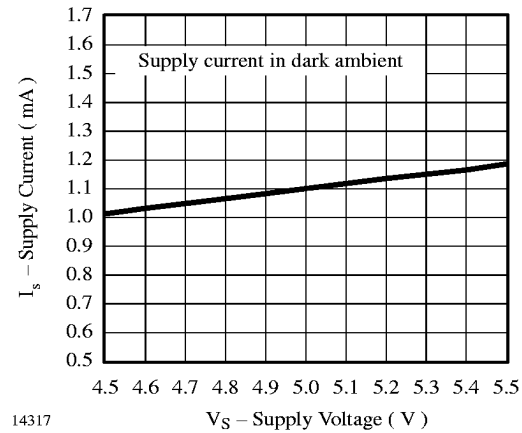


Figure 10. Supply Current vs. Supply Voltage

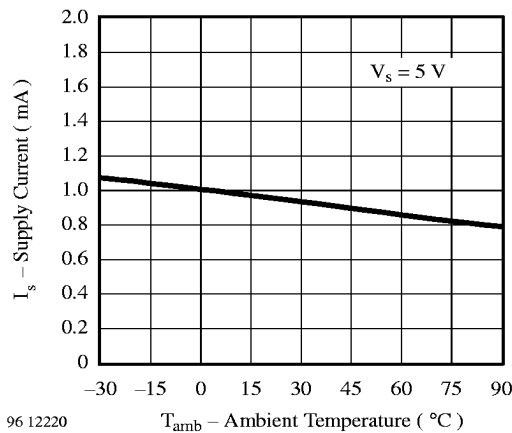


Figure 8. Supply Current vs. Ambient Temperature

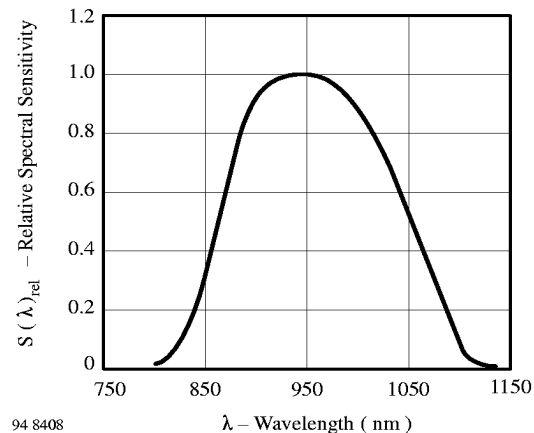


Figure 11. Relative Spectral Sensitivity vs. Wavelength

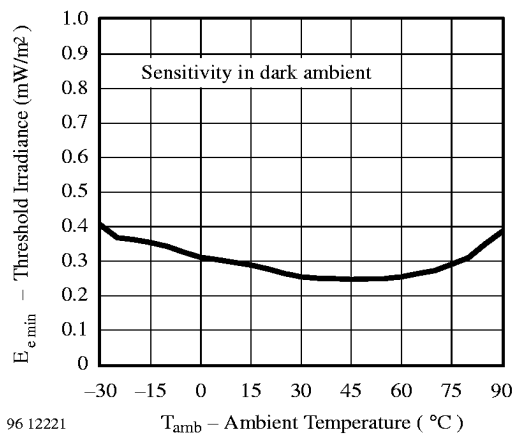


Figure 9. Sensitivity vs. Ambient Temperature

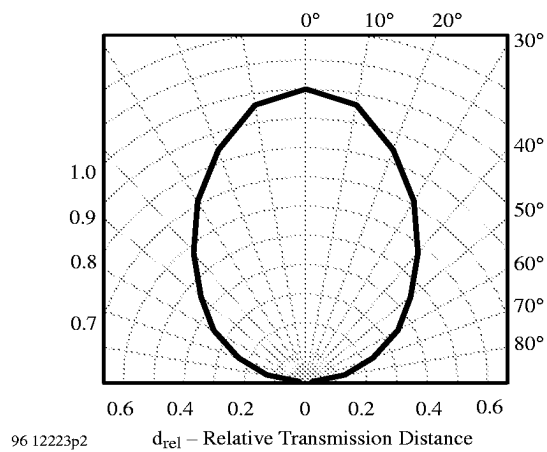


Figure 12. Directivity

