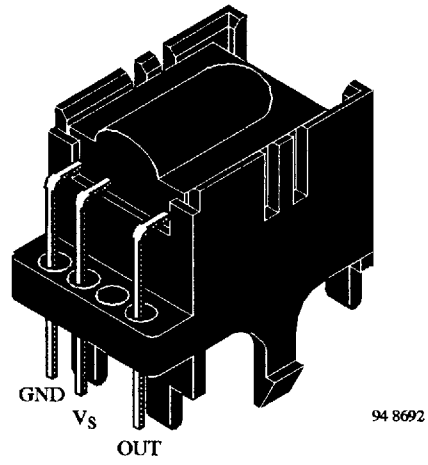
# Photo Modules for PCM Remote Control Systems

## Special series with short integration time for short burst codes or enhanced data rates

## Available types for different carrier frequencies

| Type | $f_0$ | Type | $f_0$ |
|---|---|---|---|
| TFMT 1300 | 30 kHz | TFMT 1330 | 33 kHz |
| TFMT 1360 | 36 kHz | TFMT 1370 | 36.7 kHz |
| TFMT 1380 | 38 kHz | TFMT 1400 | 40 kHz |
| TFMT 1560 | 56 kHz | | |



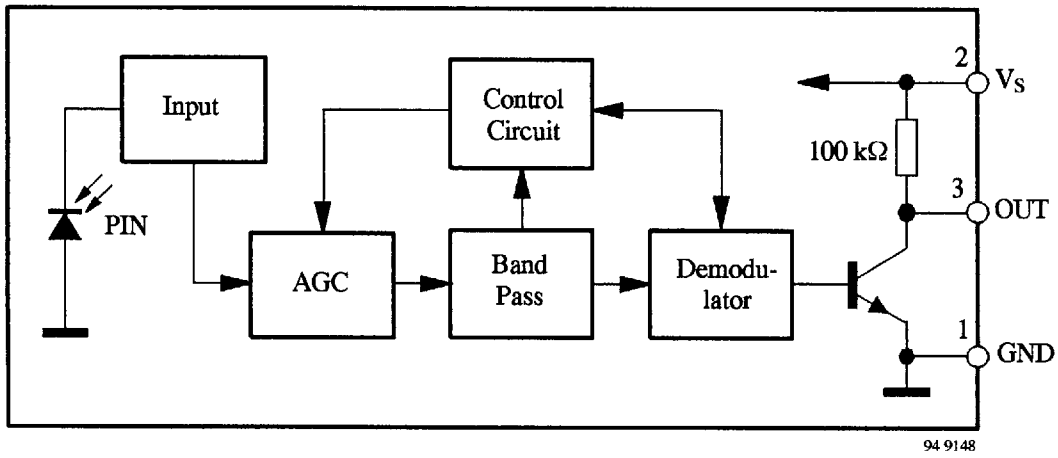

## Description

The TFMT 1..0 - 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

- Receiver module for transmission codes with short bursts (N ≧ 6 pulses per bit)
- Photo detector and preamplifier in one package
- Output active low (active high modules: TFMT 1..9)
- Internal filter for PCM frequency
- High immunity against ambient light, optimized against burst noise
- Improved shielding against electric field disturbance
- 5 Volt supply voltage, low power consumption
- TTL and CMOS compatibility
- Low power consumption (typical 2.5 mW)
- 2.4 kbit/s data transmission rate possible (N=6, $f_0$=56 kHz)

## Block Diagram



## Absolute Maximum Ratings

$T_{amb}$ = 25°C

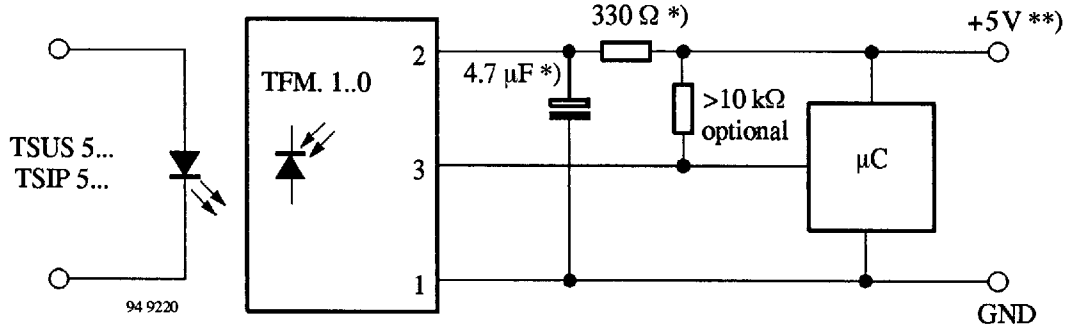
| Parameter | Test Conditions | Symbol | Value | Unit |
|---|---|---|---|---|
| Supply Voltage | (Pin 2) | $V_S$ | -0.3...6.0 | V |
| Supply Current | (Pin 2) | $I_S$ | 5 | mA |
| Output Voltage | (Pin 3) | $V_O$ | -0.3...6.0 | V |
| Output Current | (Pin 3) | $I_O$ | 5 | mA |
| Junction Temperature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

## Basic Characteristics

$T_{amb}$ = 25°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 |
| Supply Current (Pin 2) | $V_S$ = 5 V, $E_v$ = 40 klx, sunlight | $I_{SH}$ | | 1.0 | | mA |
| Transmission Distance | $E_v$ = 0, Test signal see Fig.7, IR diode TSIP5201, $I_F$ = 1.5 A | d | | 32 | | m |
| Output Voltage Low (Pin 3) | $I_{OSL}$ = 0.5 mA, $E_e$ = 0.7 mW/m², f = $f_o$, Test signal see Fig.7 | $V_{OSL}$ | | | 250 | mV |
| Irradiance (30 - 40 kHz) | Test signal see Fig.7 | $E_{e\,min}$ | | 0.4 | 0.6 | mW/m² |
| Irradiance (56 kHz) | Test signal see Fig.7 | $E_{e\,min}$ | | 0.45 | 0.7 | mW/m² |
| Irradiance | Test signal see Fig.7 | $E_{e\,max}$ | 20 | | | W/m² |
| Directivity | Angle of half transmission distance | $\varphi_{1/2}$ | | ±55 | | deg |

## Application Circuit




*) only necessary to supress power supply disturbances
**) tolerated supply voltage range : 4.5 V< $V_S$ <5.5 V

## Typical Characteristics ($T_{amb}$ = 25°C unless otherwise specified)

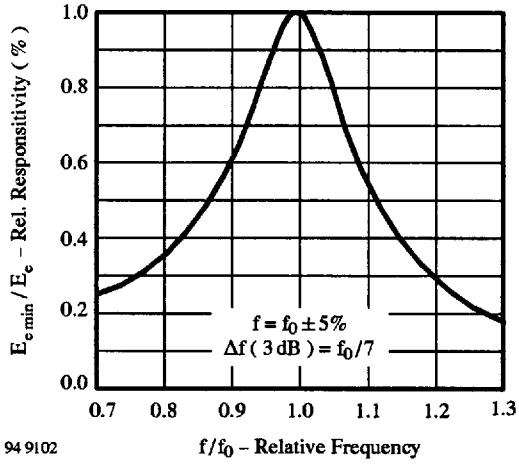



**Figure 1 : Frequency Dependence of Responsivity**

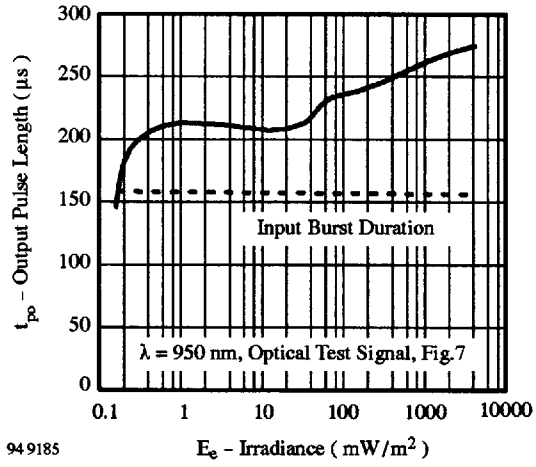



**Figure 2 : Sensitivity in Dark Ambient**

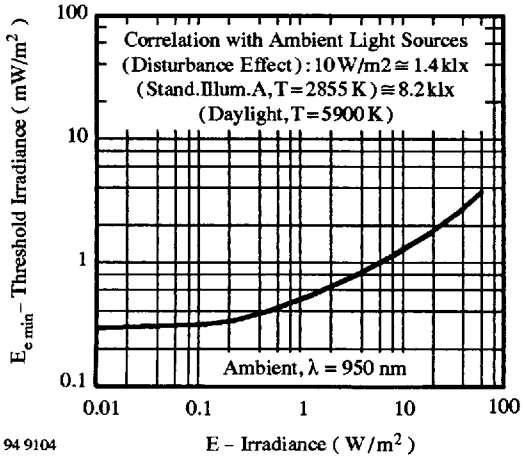



**Figure 3 : Sensitivity in Bright Ambient**

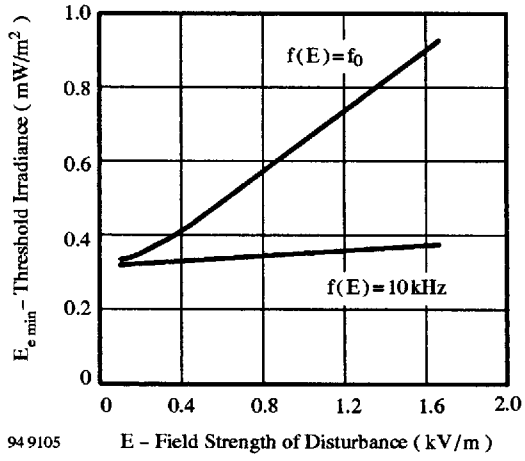



**Figure 4 : Sensitivity vs. Electric Field Disturbances**

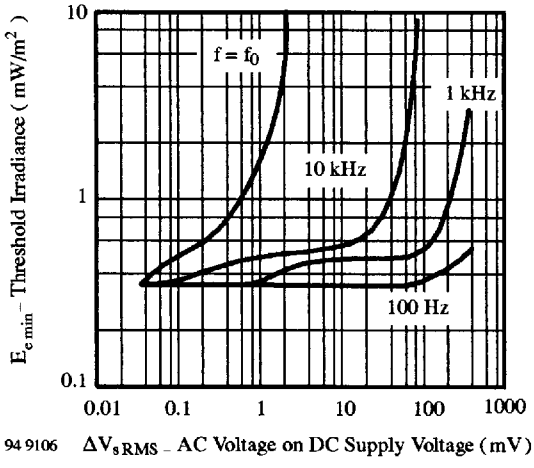



**Figure 5 : Sensitivity vs. Supply Voltage Disturbances**

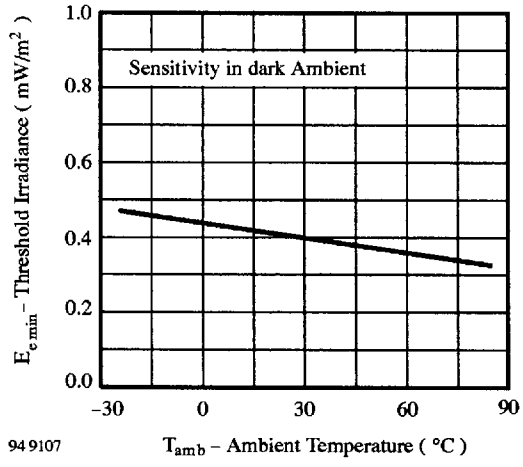
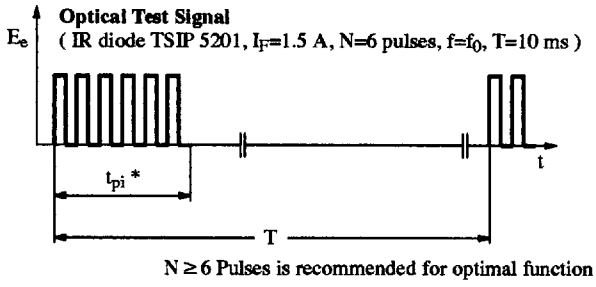



**Figure 6 : Sensitivity vs. Ambient Temperature**




N ≥ 6 Pulses is recommended for optimal function

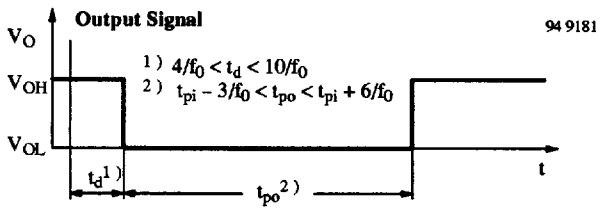
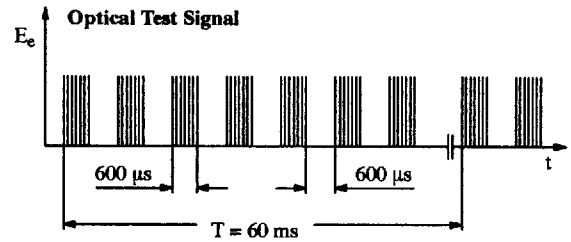



**Figure 7 : Output Function**



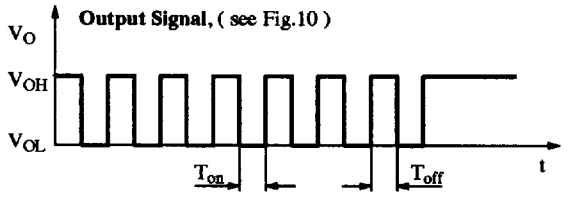




**Figure 8 : Output Function**

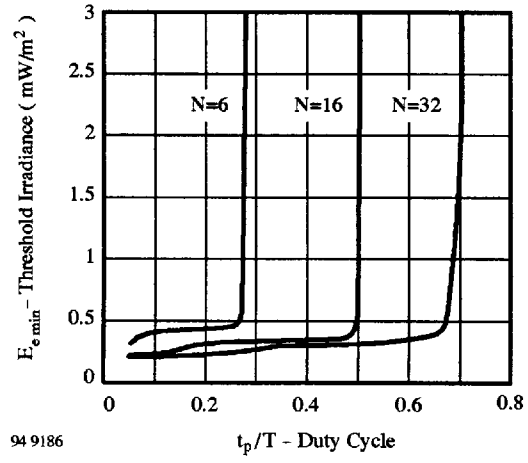



**Figure 9 : Sensitivity vs. Duty Cycle**

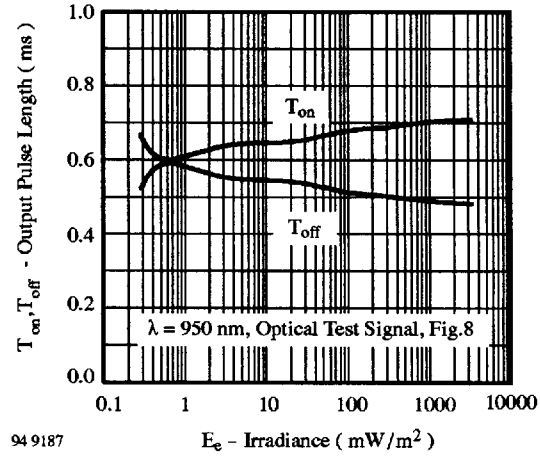



**Figure 10 : Output Pulse Diagram**

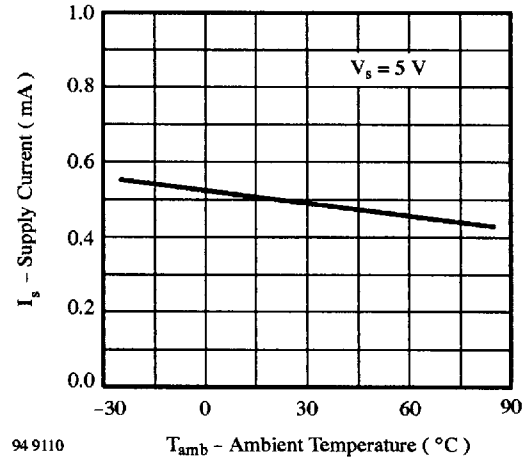



**Figure 11 : Supply Current vs. Ambient Temperature**

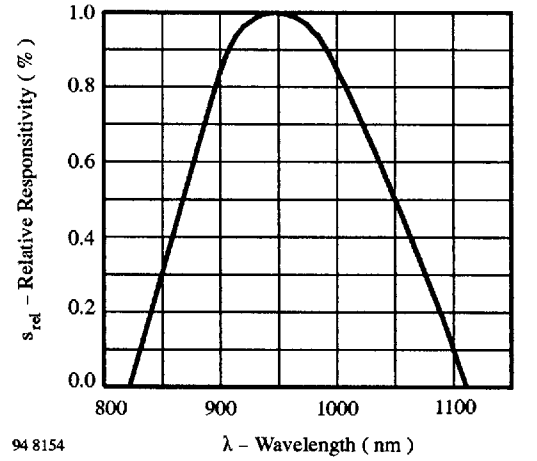



**Figure 12 : Spectral Response**

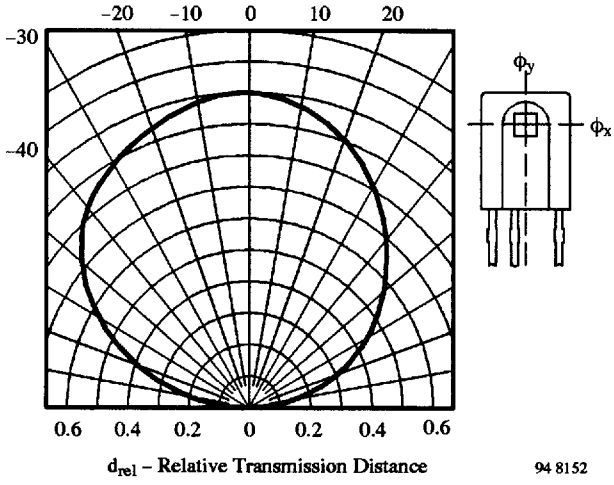



Figure 13 : Vertical Directivity $\varphi_y$

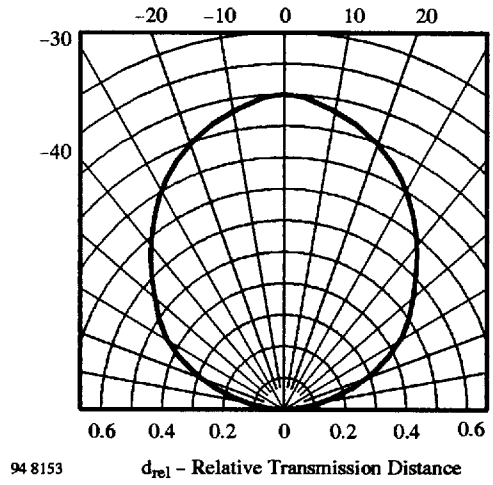
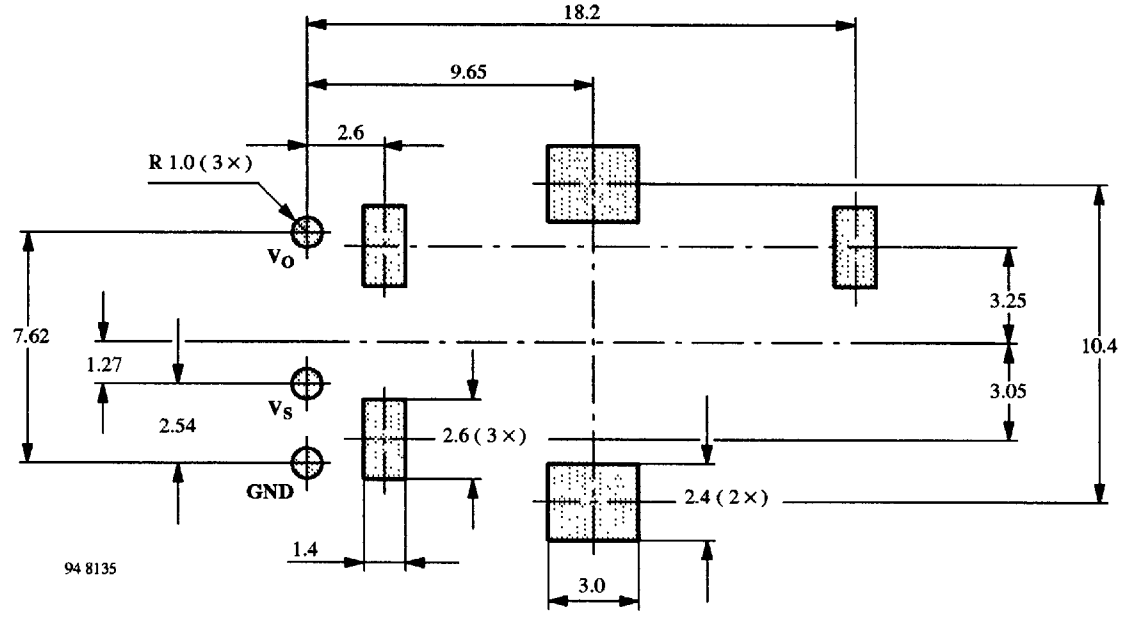



Figure 14 : Horizontal Directivity $\varphi_x$

## Board Hole Diagram (Solder side, dimensions in mm, tolerances ±0.3 mm)



## Dimensions in mm