TEMIC
Semiconductors

Photo Module for PCM Remote Control Systems

Available types for different carrier frequencies

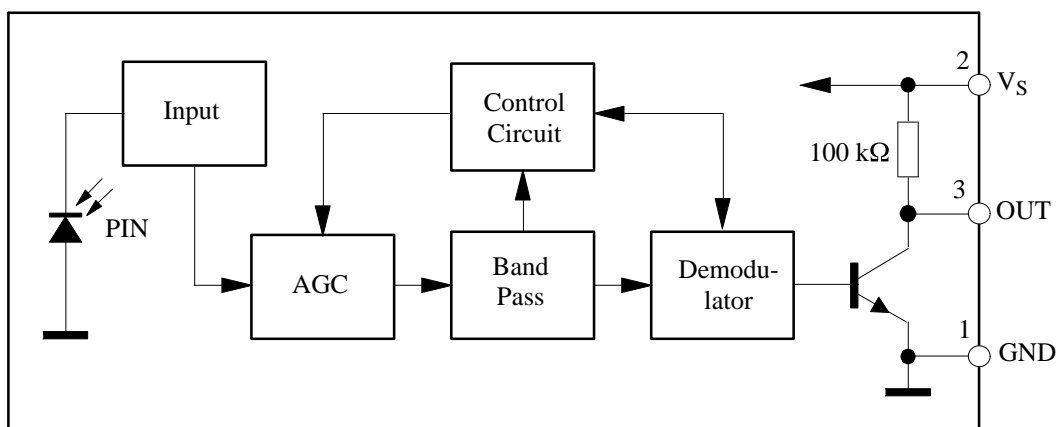| Type	f_0	Type	f_0
TFMS2300	30 kHz	TFMS2330	33 kHz
TFMS2360	36 kHz	TFMS2370	36.7 kHz
TFMS2380	38 kHz	TFMS2400	40 kHz
TFMS2560	56 kHz		
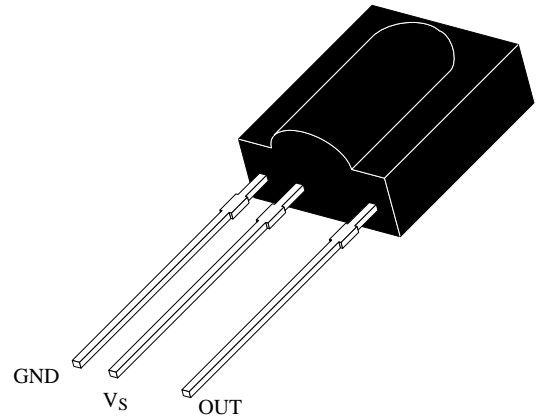
Description

The TFMS2..0 is a miniaturized receiver 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.

GND
Vs
OUT

94 8691

Features

- Photo detector and preamplifier in one package

- Receiver module for transmission codes with long bursts (N $\geqq$ 20 pulses per bit)

- Enhanced integration time against neon light disturbances

- Output active low

- Internal filter for PCM frequency

- Reduced duty cycle for improved immunity against switchmode fluorescent lamps

- Improved shielding against electric field disturbance

- 5 Volt supply voltage

- TTL and CMOS compatibility

- Low power consumption (typical 2.5 mW)

Block Diagram

Input

PIN

AGC

Control
Circuit

Band
Pass

Demodu-
lator

100 kΩ

2 V_S

3 OUT

1 GND

94 9148

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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	$(T_{amb} \leqq 85 °C)$	P_{tot}	50	mW
Soldering Temperature	$t \leqq 10 s$	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
	$V_S = 5 V$, $E_v = 40$ klx, sunlight	I_{SH}		1.0		mA
Transmission Distance	$E_v = 0$, test signal see fig.7, IR diode TSIP5201, $I_F = 0.4 A$	d		35		m
Output Voltage Low (Pin 3)	$I_{OSL} = 0.5$ mA, $E_e = 0.7$ mW/m^2, $f = f_o$, test signal see fig.7	V_{OSL}			250	mV
Irradiance	Test signal see fig.7	$E_{e\ min}$		0.35	0.5	mW/m^2
Irradiance	Test signal see fig.7	$E_{e\ max}$	20			W/m^2
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		±55		deg

Application Circuit

95 9684
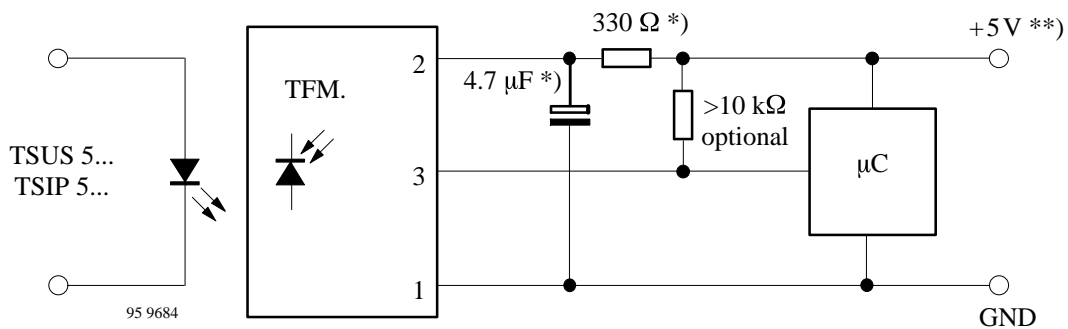
*) only necessary to suppress power supply disturbances
**) tolerated supply voltage range : $4.5 V < V_S < 5.5 V$

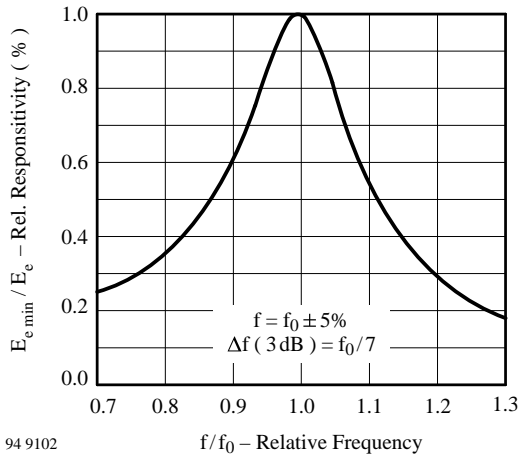## Typical Characteristics ($T_{amb} = 25°C$ unless otherwise specified)

94 9102 f/f_0 – Relative Frequency

Figure 1. Frequency Dependence of Responsivity

94 9105   E – Field Strength of Disturbance (kV/m)
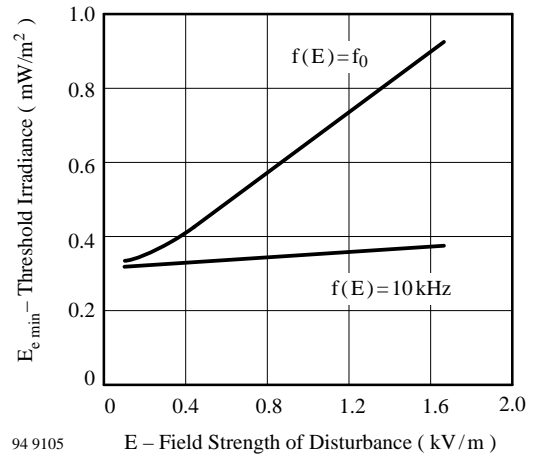
Figure 4. Sensitivity vs. Electric Field Disturbances

94 9103 E_e – Irradiance (mW/m^2)
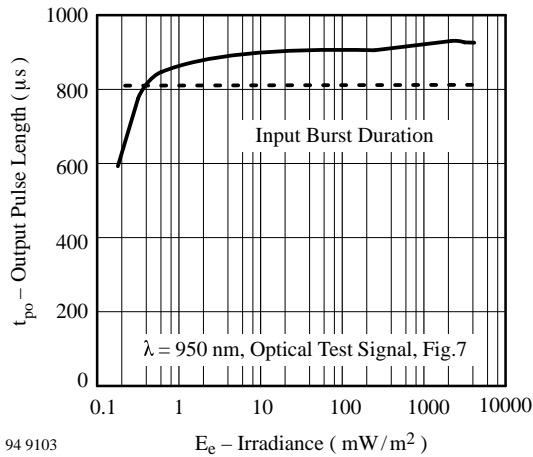
Figure 2. Sensitivity in Dark Ambient

94 9106 $\Delta V_{s\,RMS}$ – AC Voltage on DC Supply Voltage (mV)
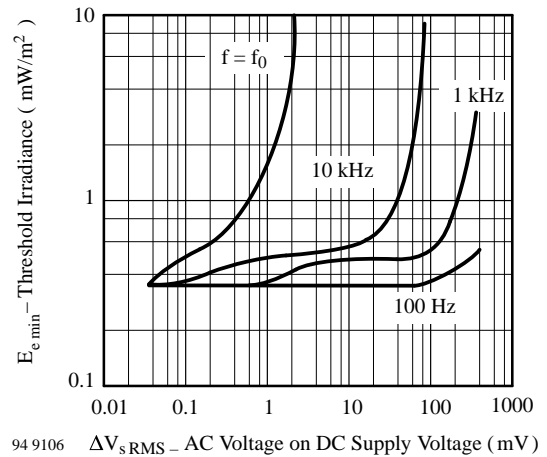
Figure 5. Sensitivity vs. Supply Voltage Disturbances

94 9104   E – Irradiance (W/m^2)
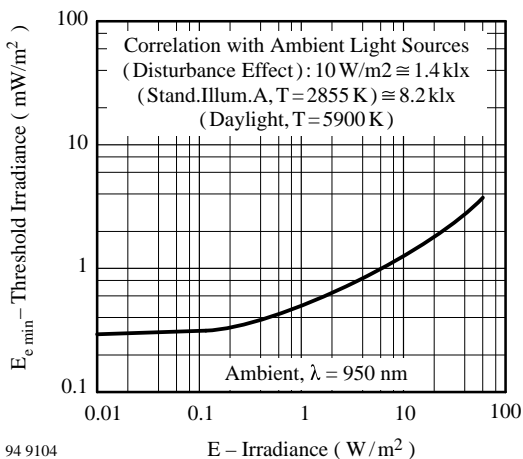
Figure 3. Sensitivity in Bright Ambient

94 9107 T_{amb} – Ambient Temperature (°C)
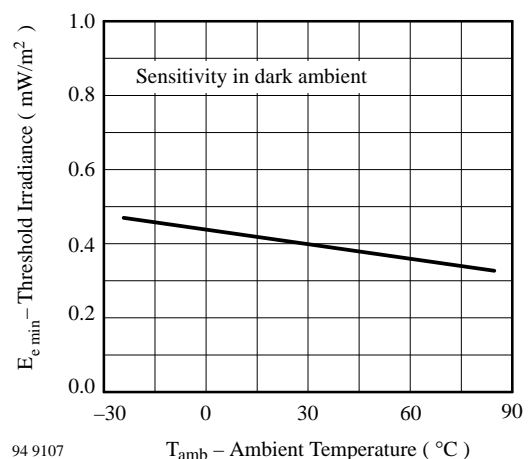
Figure 6. Sensitivity vs. Ambient Temperature

Optical Test Signal
E_e (IR diode TSIP 5201, I_F=0.4 A, N=30 pulses, f=f_0, T=10 ms)

t_{pi} *

T

N ≥ 20 Pulses is recommended for optimal function

Output Signal 96 12127

V_O

1) $11/f_0 \le t_d \le 19/f_0$
2) $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 8/f_0$

V_{OH}

V_{OL}

t_d 1) t_{po} 2)
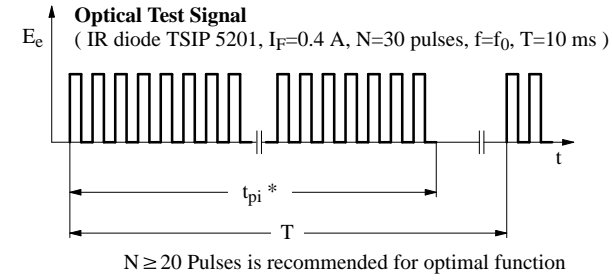
Figure 7. Output Function

Optical Test Signal

E_e

600 µs 600 µs

T = 60 ms

94 8134

Output Signal, (see Fig.10)

V_O

V_{OH}

V_{OL}

T_{on} T_{off}
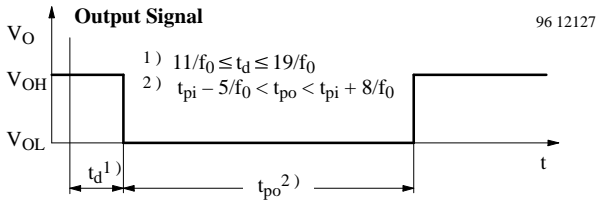
Figure 8. Output Function

T_{on}, T_{off} - Output Pulse Length (ms)

T_{on}

T_{off}

λ = 950 nm, Optical Test Signal, Fig.8

0.1 1 10 100 1000 10000

E_e – Irradiance (mW/m^2)

94 9109
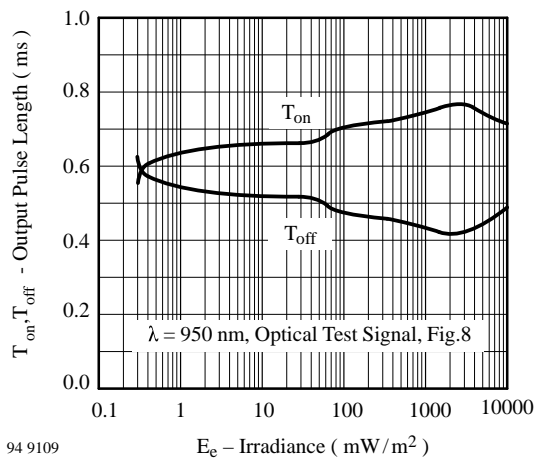
Figure 9. Output Pulse Diagram

I_s – Supply Current (mA)

V_s = 5 V

−30 0 30 60 90

T_{amb} – Ambient Temperature (°C)

94 9110
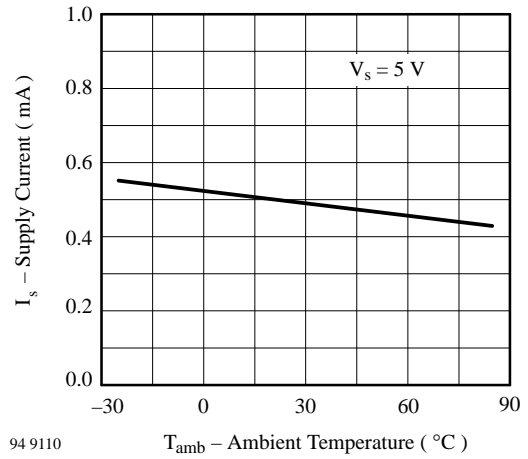
Figure 10. Supply Current vs. Ambient Temperature

$S (\lambda)_{rel}$ – Relative Spectral Sensitivity
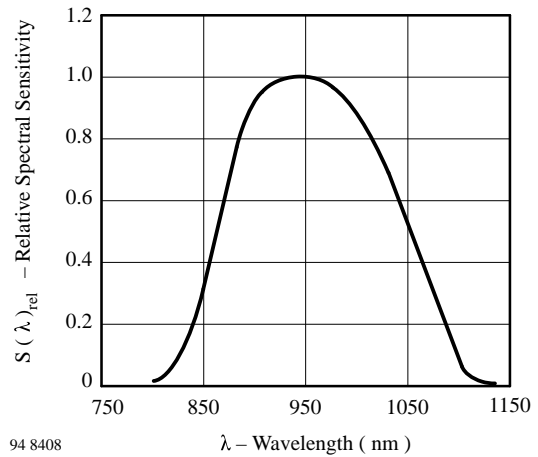
750 850 950 1050 1150

λ – Wavelength (nm)

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Figure 11. Spectral Response
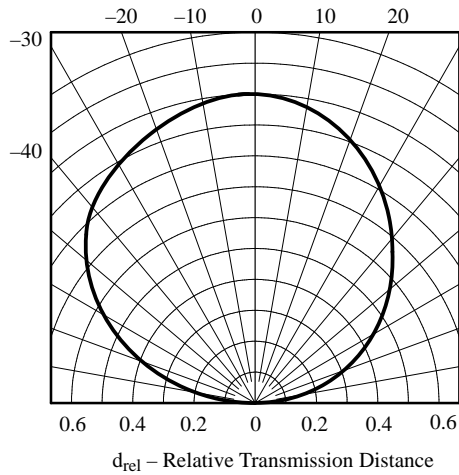
Figure 12. Vertical Directivity φ_y
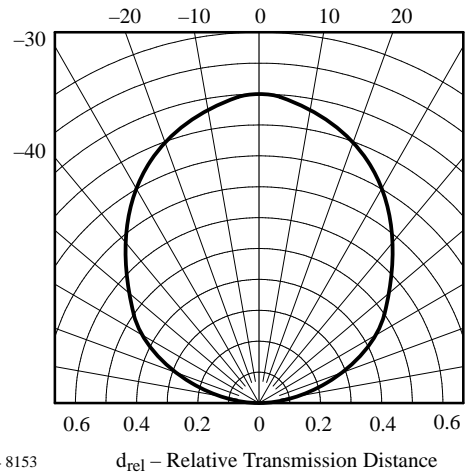
94 8152

94 8153

Figure 13. Horizontal Directivity φ_x

d_rel – Relative Transmission Distance

Dimensions in mm

96 12116

technical drawings
according to DIN
specifications
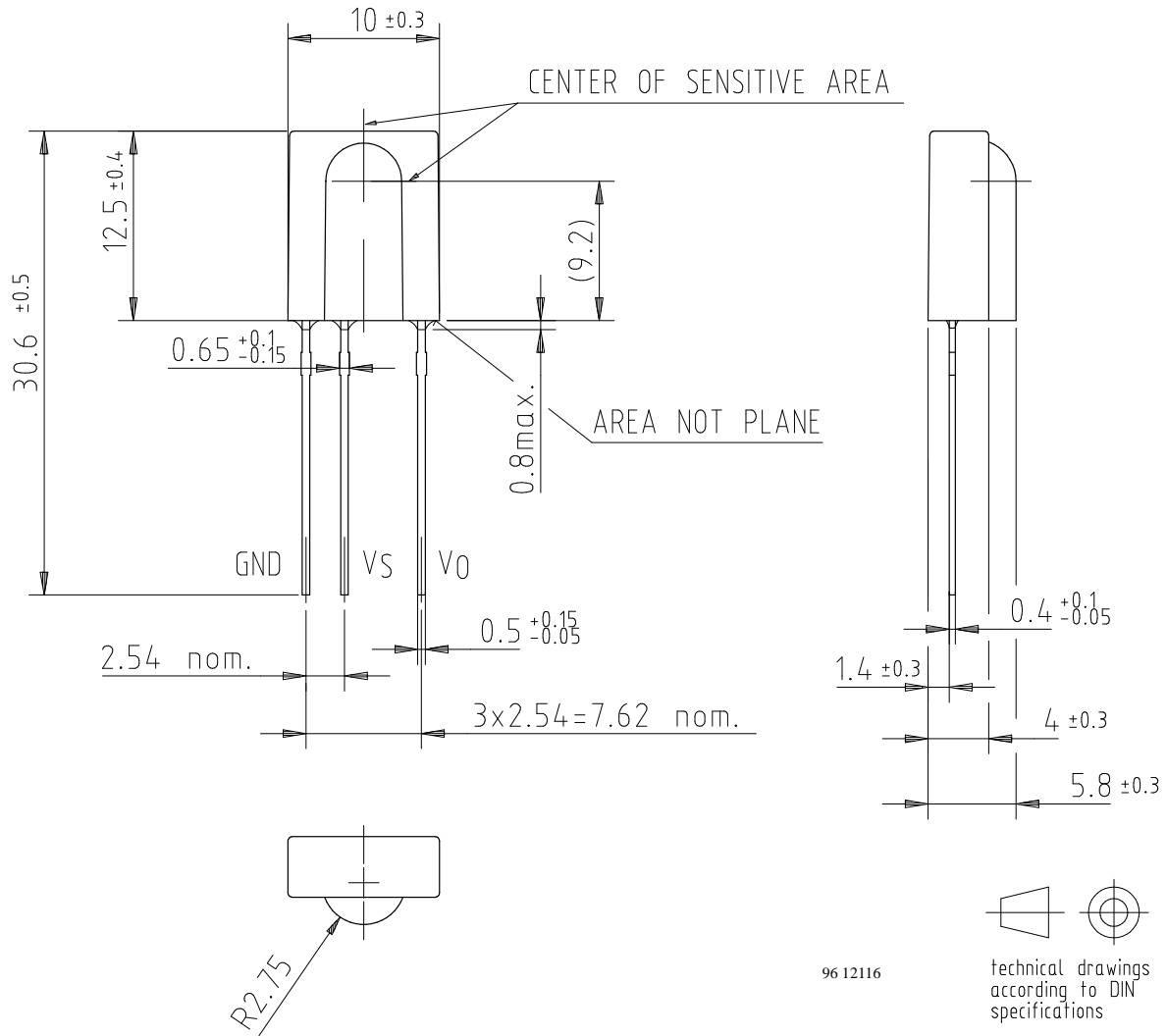
Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.