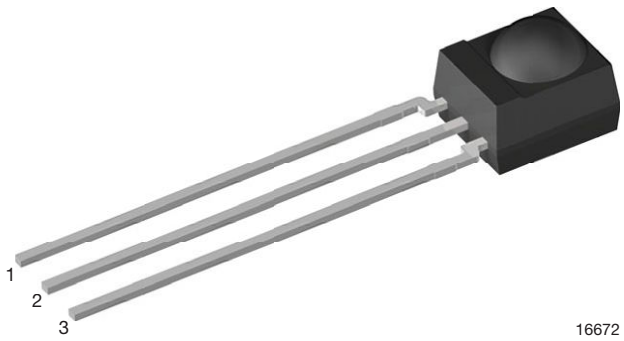
# THE DATASHEET OF

# TSOP34438

# IR Receiver Modules for Remote Control Systems




## FEATURES

- Very low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

## DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

## MECHANICAL DATA

**Pinning for TSOP348.., TSOP344..:**

1 = OUT, 2 = GND, 3 = $V_S$

**Pinning for TSOP322.., TSOP324..:**

1 = OUT, 2 = $V_S$, 3 = GND

## DESCRIPTION

The TSOP322.., TSOP348.., TSOP324.. and TSOP344.. series are miniaturized IR receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on lead frame, the epoxy package contains an IR filter.

The demodulated output signal can be directly connected to a microprocessor for decoding.

The TSOP324.., TSOP344.. series devices are optimized to suppress almost all spurious pulses from energy saving lamps like CFLs. The AGC4 used in the TSOP324.., TSOP344.. may suppress some data signals. The TSOP322.., TSOP348.. series are provided primarily for compatibility with old AGC2 designs. New designs should prefer the TSOP324.., TSOP344.. series containing the newer AGC4.

These components have not been qualified according to automotive specifications.

**PARTS TABLE**

| AGC | | LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2) | | RECOMMENDED FOR LONG BURST CODES (AGC4) | |
|---|---|---|---|---|---|
| Carrier frequency | 30 kHz | TSOP34830 | TSOP32230 | TSOP34430 | TSOP32430 |
| | 33 kHz | TSOP34833 | TSOP32233 | TSOP34433 | TSOP32433 |
| | 36 kHz | TSOP34836 | TSOP32236 | TSOP34436 (1)(2)(3) | TSOP32436 (1)(2)(3) |
| | 38 kHz | TSOP34838 | TSOP32238 | TSOP34438 (4)(5) | TSOP32438 (4)(5) |
| | 40 kHz | TSOP34840 | TSOP32240 | TSOP34440 | TSOP32440 |
| | 56 kHz | TSOP34856 | TSOP32256 | TSOP34456 (6)(7) | TSOP32456 (6)(7) |
| Package | | Mold | | | |
| Pinning | | 1 = OUT, 2 = GND, 3 = $V_S$ | 1 = OUT, 2 = $V_S$, 3 = GND | 1 = OUT, 2 = GND, 3 = $V_S$ | 1 = OUT, 2 = $V_S$, 3 = GND |
| Dimensions (mm) | | 6.0 W x 6.95 H x 5.6 D | | | |
| Mounting | | Leaded | | | |
| Application | | Remote control | | | |
| Best choice for | | (1) RC-5 (2) RC-6 (3) Panasonic (4) NEC (5) Sharp (6) r-step (7) Thomson RCA | | | |



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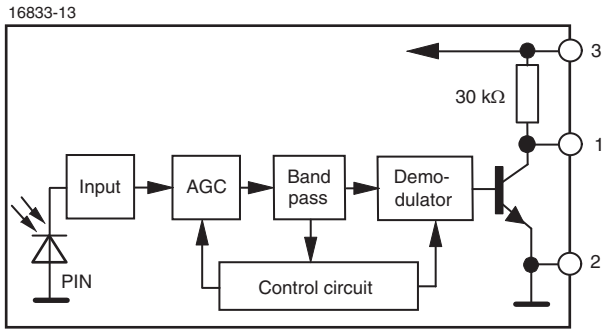
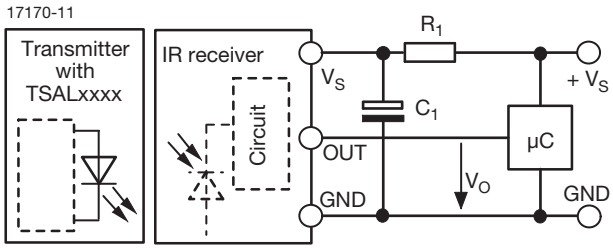
## BLOCK DIAGRAM




## APPLICATION CIRCUIT




$R_1$ and $C_1$ recommended to reduce supply ripple for $V_S < 2.8$ V

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| Supply voltage | | $V_S$ | -0.3 to +6 | V |
| Supply current | | $I_S$ | 3 | mA |
| Output voltage | | $V_O$ | -0.3 to ($V_S$ + 0.3) | V |
| Output current | | $I_O$ | 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**

- 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 conditions for extended periods may affect the device reliability

| ELECTRICAL AND OPTICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Supply current | $E_v$ = 0, $V_S$ = 3.3 V | $I_{SD}$ | 0.27 | 0.35 | 0.45 | mA |
| | $E_v$ = 40 klx, sunlight | $I_{SH}$ | - | 0.45 | - | mA |
| Supply voltage | | $V_S$ | 2.5 | - | 5.5 | V |
| Transmission distance | $E_v$ = 0, test signal see Fig. 1, IR diode TSAL6200, $I_F$ = 50 mA | d | - | 30 | - | m |
| Output voltage low | $I_{OSL}$ = 0.5 mA, $E_e$ = 0.7 mW/m², test signal see Fig. 1 | $V_{OSL}$ | - | - | 100 | mV |
| Minimum irradiance | Pulse width tolerance: $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$, test signal see Fig. 1 | $E_{e\ min.}$ | - | 0.08 | 0.15 | mW/m² |
| Maximum irradiance | $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$, test signal see Fig. 1 | $E_{e\ max.}$ | 30 | - | - | W/m² |
| Directivity | Angle of half transmission distance | $\varphi_{1/2}$ | - | ± 45 | - | ° |



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## TYPICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)

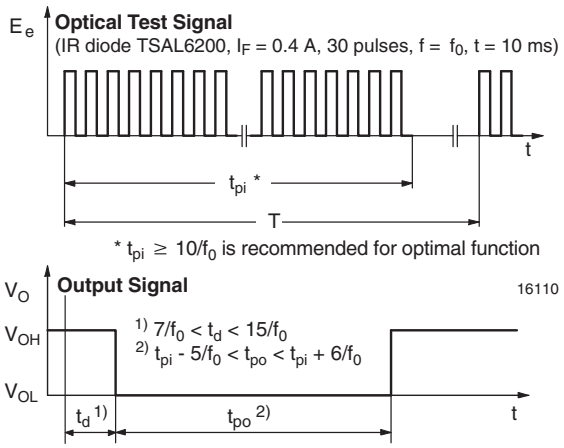


Fig. 1 - Output Active Low

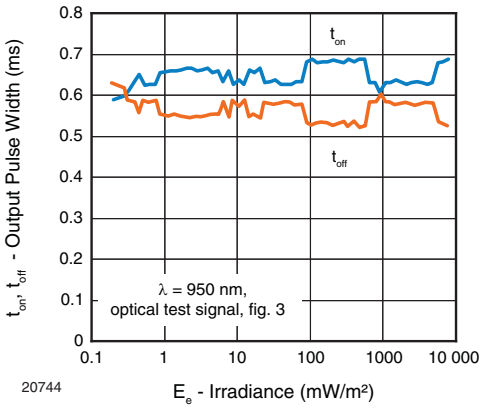


Fig. 4 - Output Pulse Diagram

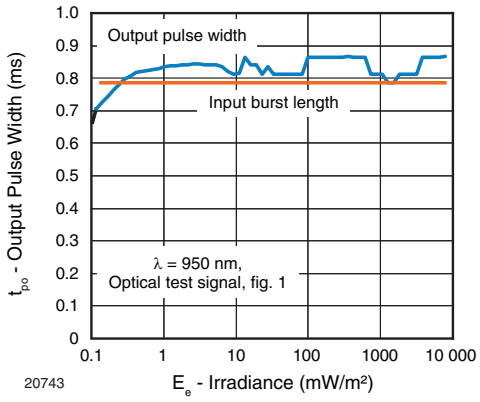


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

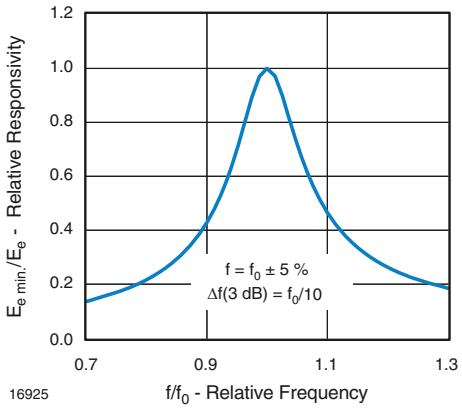


Fig. 5 - Frequency Dependence of Responsivity

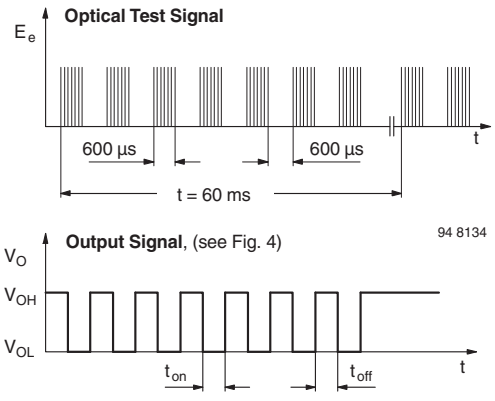


Fig. 3 - Output Function

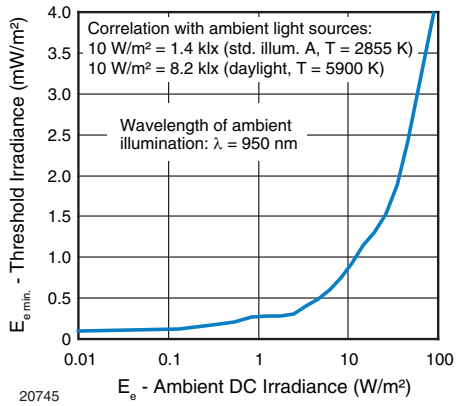


Fig. 6 - Sensitivity in Bright Ambient



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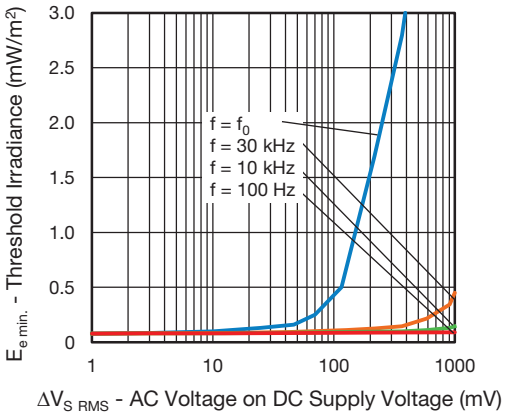


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

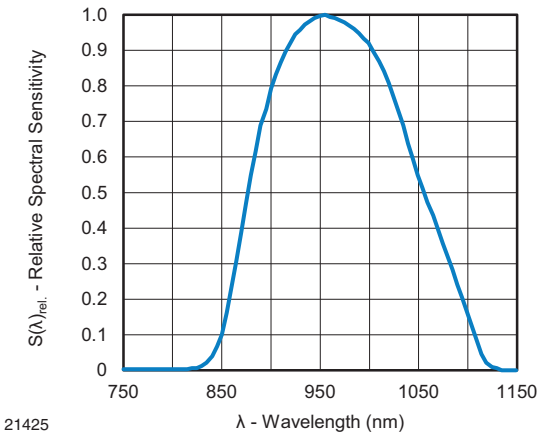


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

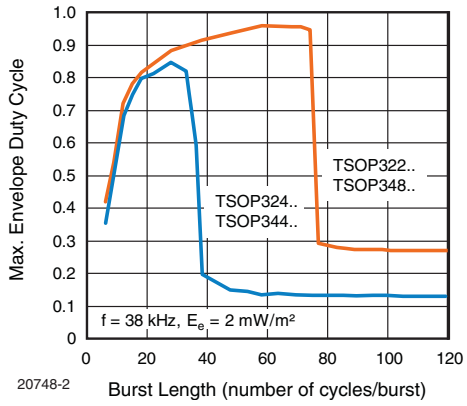


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

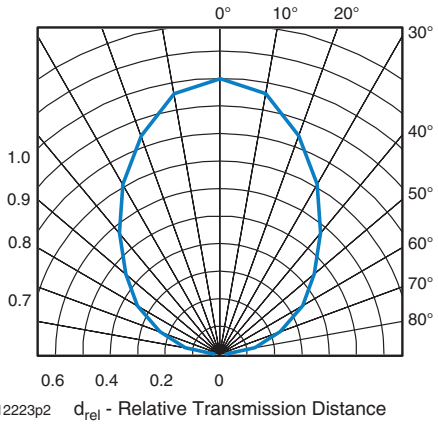


Fig. 11 - Horizontal Directivity

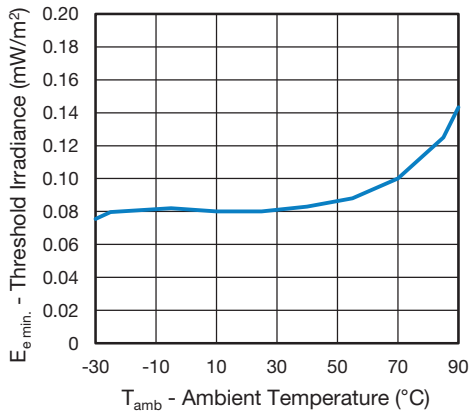


Fig. 9 - Sensitivity vs. Ambient Temperature

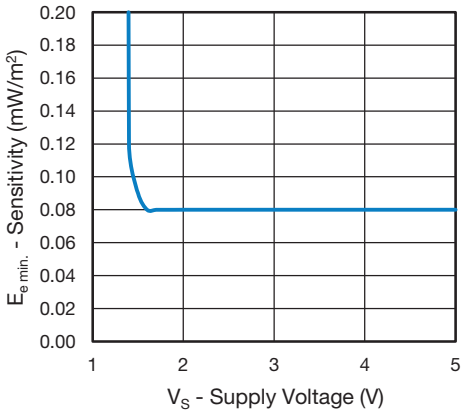


Fig. 12 - Sensitivity vs. Supply Voltage



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## SUITABLE DATA FORMAT

This series is designed to suppress spurious output pulses due to noise or disturbance signals. The devices can distinguish data signals from noise due to differences in frequency, burst length, and envelope duty cycle. The data signal should be close to the device's band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the product in the presence of a disturbance, the sensitivity of the receiver is automatically reduced by the AGC to insure that no spurious pulses are present at the receiver's output. Some examples which are suppressed are:

- DC light (e.g. from tungsten bulbs sunlight)
- Continuous signals at any frequency
- Strongly or weakly modulated patterns from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14).

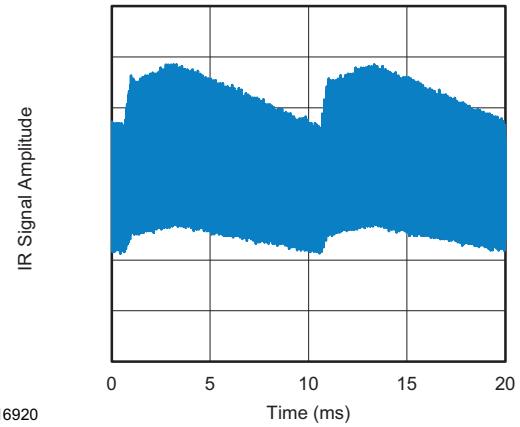


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

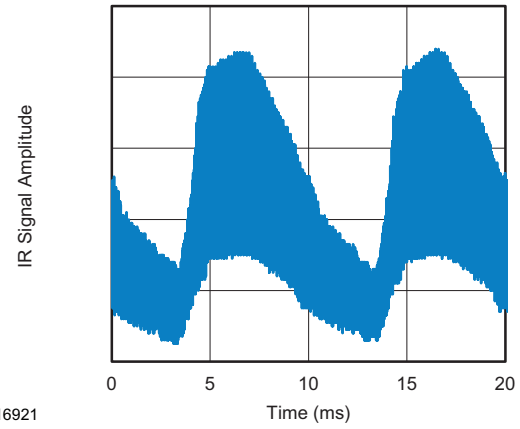


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

| | TSOP322.., TSOP348.. | TSOP324.., TSOP344.. |
|---|---|---|
| Minimum burst length | 10 cycles/burst | 10 cycles/burst |
| After each burst of length<br>a minimum gap time is required of | 10 to 70 cycles<br>≥ 10 cycles | 10 to 35 cycles<br>≥ 10 cycles |
| For bursts greater than<br>a minimum gap time in the data stream is needed of | 70 cycles<br>> 4 x burst length | 35 cycles<br>> 10 x burst length |
| Maximum number of continuous short bursts/second | 1800 | 1500 |
| NEC code | Yes | Preferred |
| RC5/RC6 code | Yes | Preferred |
| Thomson 56 kHz code | Yes | Preferred |
| Sharp code | Yes | Preferred |
| Suppression of interference from fluorescent lamps | Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13) | Complex and critical disturbance patterns are suppressed (example: signal pattern of Fig. 14 or highly dimmed LCDs) |

**Notes**

- For data formats with short bursts please see the datasheet for TSOP323.., TSOP325.., TSOP343.., TSOP345..
- For Sony 12, 15, and 20 bit IR codes please see the datasheet of TSOP34S40F, TSOP32S40F



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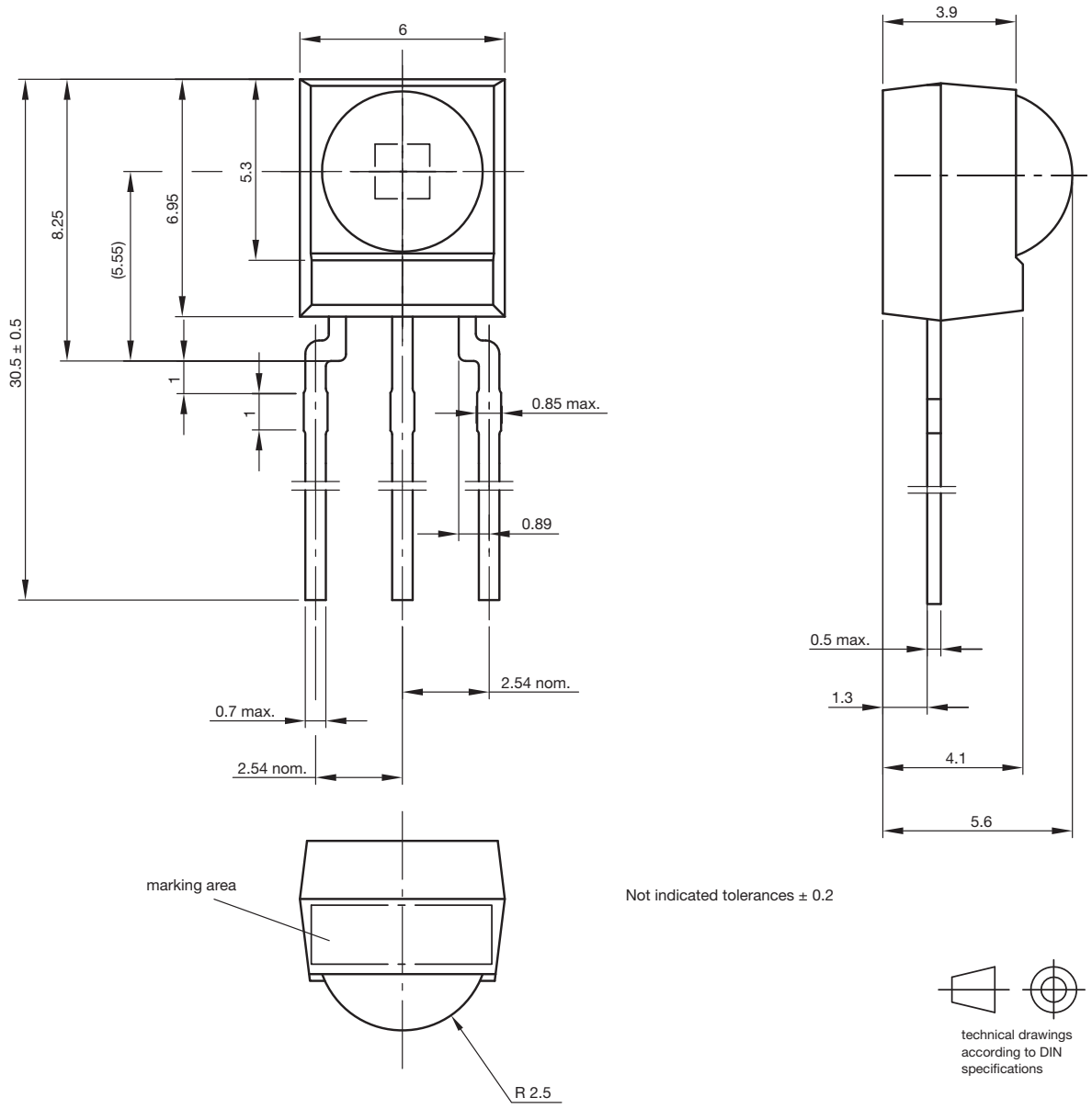
**PACKAGE DIMENSIONS** in millimeters

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