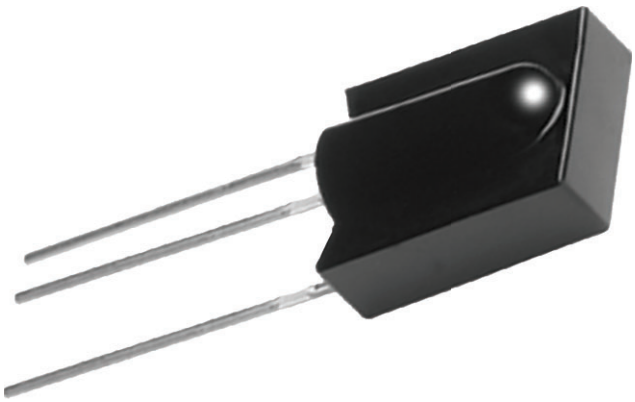
THE DATASHEET OF

TSOP31130

IR Receiver Modules for Remote Control Systems



DESCRIPTION

This IR receiver series is optimized for short burst remote control systems in different environments. The customer can chose between different IC settings (AGC variants), to find the optimum solution for his application. The higher the AGC, the better noise is suppressed, but the lower the code compatibility.

The devices contain a PIN diode and a preamplifier assembled on a lead frame. The epoxy package contains an IR filter. The demodulated output signal can be directly connected to a microprocessor for decoding. These components have not been qualified to automotive specifications.

FEATURES

- Individual IC settings to reach maximum performance
- Immunity against noise (lamps, LCD TV, Wi-Fi)
- Low supply current
- Photo detector and preamplifier in one package
- Supply voltage: 2.0 V to 5.5 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

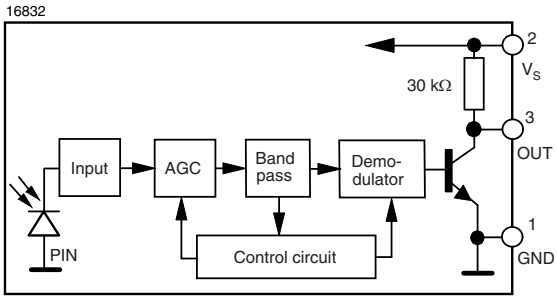
LINKS TO ADDITIONAL RESOURCES

Product Page | Marking | Packages | Holders | Bends and Cuts

DESIGN SUPPORT TOOLS

- 3D models

BLOCK DIAGRAM



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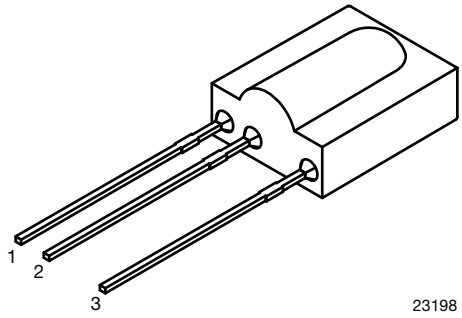
MECHANICAL DATA

Pinning:

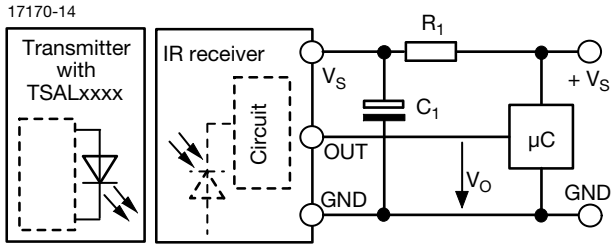
1 = GND, 2 = V_S, 3 = OUT



ORDERING CODE

TSO.1. - 1000 pieces in tubes

APPLICATION CIRCUIT



R_1 and C_1 recommended in case there are strong ripple or spikes on the supply line.

PARTS TABLE				
AGC		**LEGACY, FOR SHORT BURST REMOTE CONTROLS (AGC1)**	**NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)**	**VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)**
Carrier frequency	30 kHz	TSOP31130	TSOP31330	TSOP31530
	33 kHz	TSOP31133	TSOP31333	TSOP31533
	36 kHz	TSOP31136	TSOP31336 (1)(6)	TSOP31536
	38 kHz	TSOP31138	TSOP31338 (2)(3)(4)(5)	TSOP31538
	40 kHz	TSOP31140	TSOP31340	TSOP31540
	56 kHz	TSOP31156	TSOP31356	TSOP31556
Package		Cast		
Pinning		1 = GND, 2 = V_S, 3 = OUT	1 = GND, 2 = V_S, 3 = OUT	1 = GND, 2 = V_S, 3 = OUT
Dimensions (mm)		10.0 W x 12.5 H x 5.8 D		
Mounting		Leaded		
Application		Remote control		
Best remote control code		(1) MCIR (2) r-step (3) RECS-80 Code (4) r-map (5) XMP (6) RCMM		

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Supply voltage (pin 2)		V_S	-0.3 to +6	V
Supply current (pin 2)		I_S	3	mA
Output voltage (pin 3)		V_O	-0.3 to (V_S + 0.3)	V
Output current (pin 3)		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.

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ELECTRICAL AND OPTICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Supply current (pin 2)	E_v = 0, V_S = 3.3 V	I_{SD}	0.25	0.35	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.45	-	mA
Supply voltage		V_S	2.0	-	5.5	V
Transmission distance	E_v = 0, test signal see Fig. 1, IR diode TSAL6200, I_F = 50 mA	d	-	26	-	m
Output voltage low (pin 3)	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m², test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Test signal: RC5 code	$E_{e\,min.}$	-	0.1	0.2	mW/m²
	Test signal: XMP code	$E_{e\,min.}$	-	0.15	0.3	mW/m²
Maximum irradiance	t_{pi} - 3/f_0 < t_{po} < t_{pi} + 3.5/f_0, test signal see Fig. 1	$E_{e\,max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	°

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

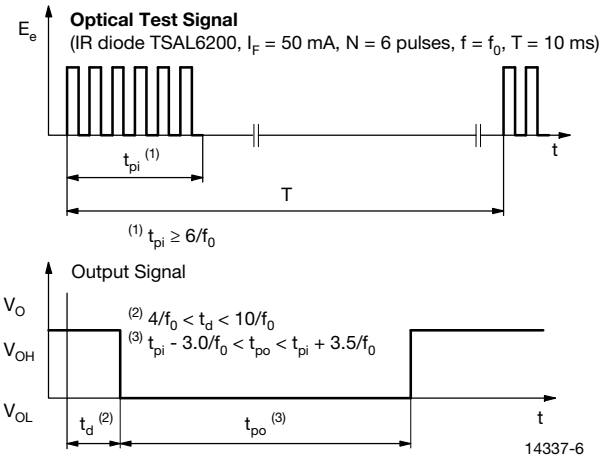

Fig. 1 - Output Active Low

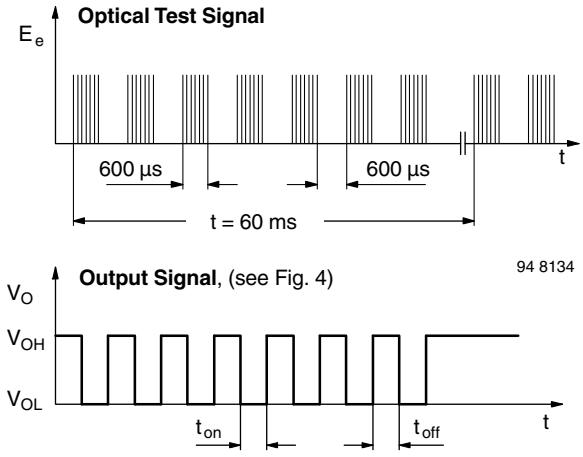

Fig. 3 - Output Function

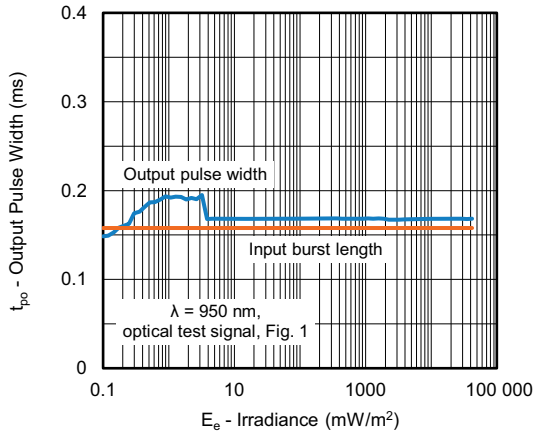

Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

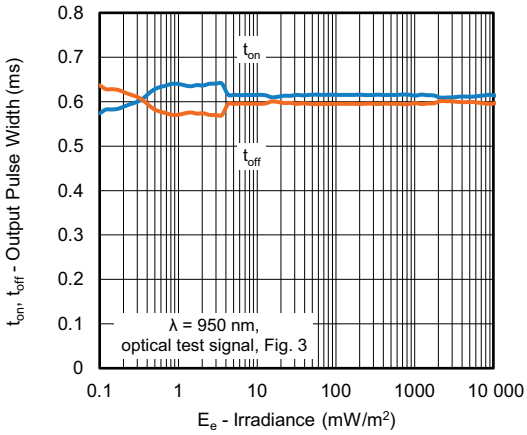

Fig. 4 - Output Pulse Diagram

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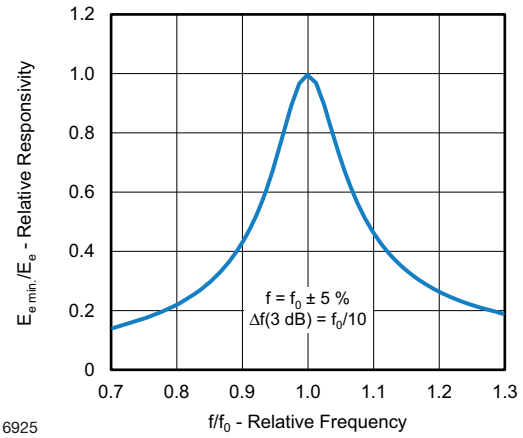

Fig. 5 - Frequency Dependence of Responsivity

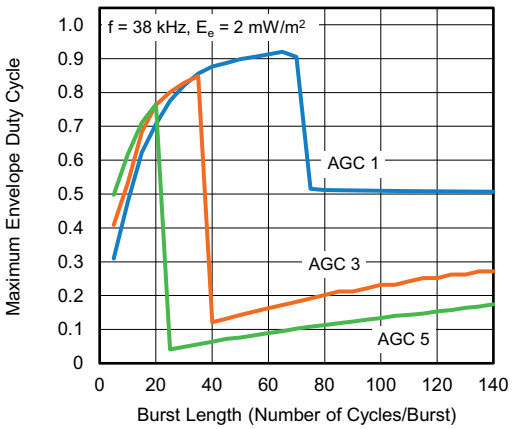

Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

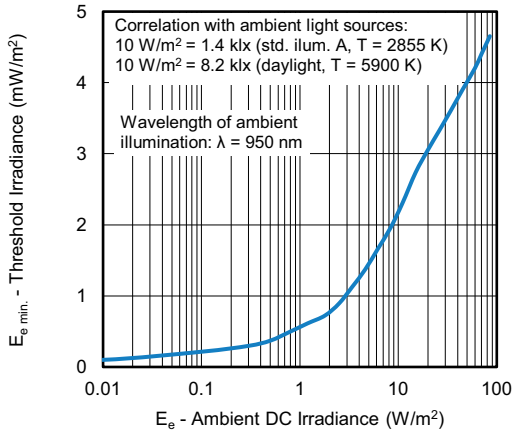

Fig. 6 - Sensitivity in Bright Ambient

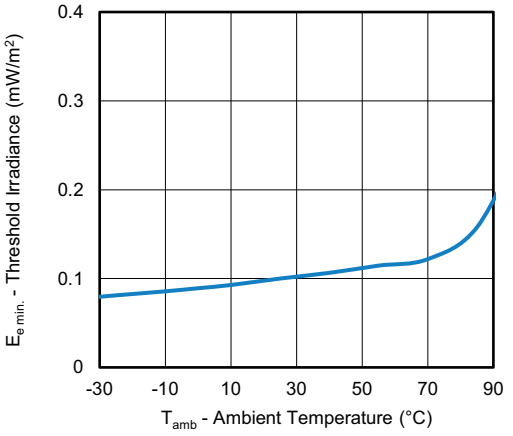

Fig. 9 - Sensitivity vs. Ambient Temperature

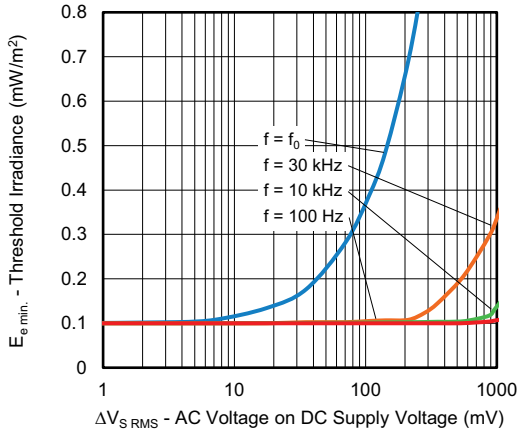

Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

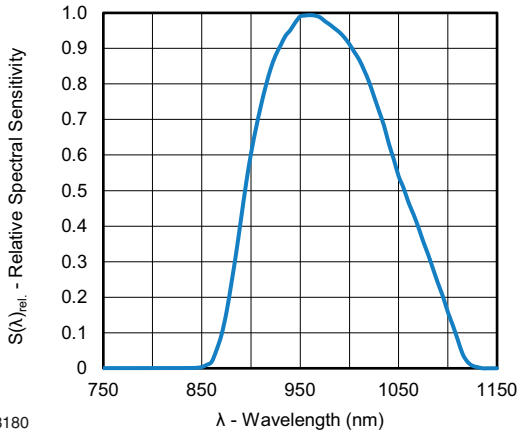

Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

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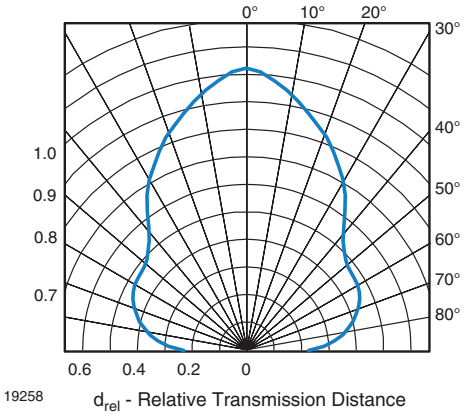

Fig. 11 - Horizontal Directivity

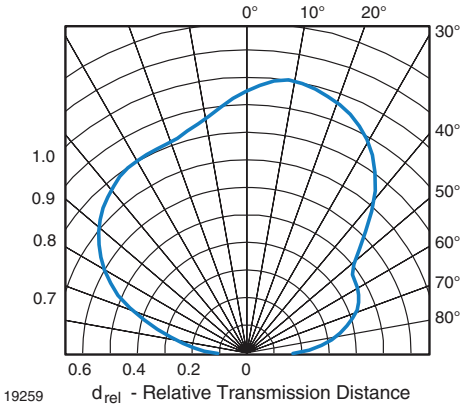

Fig. 12 - Vertical Directivity

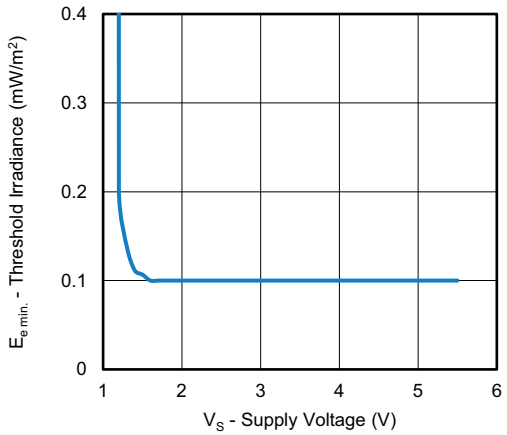

Fig. 13 - Sensitivity vs. Supply Voltage

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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. 14 or Fig. 15).

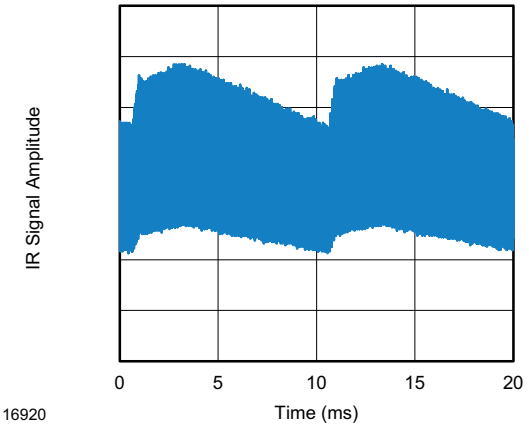

Fig. 14 - IR Disturbance from Fluorescent Lamp with Low Modulation

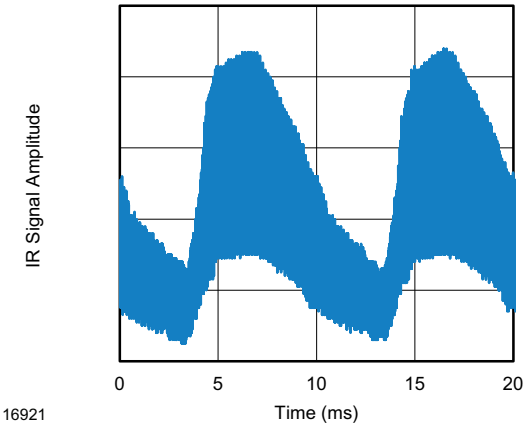

Fig. 15 - IR Disturbance from Fluorescent Lamp with High Modulation

	TSOP311..	TSOP313..	TSOP315..
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length A gap time is required of	6 to 70 cycles ≥ 10 cycles	6 to 35 cycles ≥ 10 cycles	6 to 20 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 2 x burst length	35 cycles > 9 x burst length	20 cycles > 25 x burst length
Maximum number of continuous short bursts/second	2000	2000	2000
MCIR code	Yes	Preferred	No
RCMM code	Yes	Preferred	Yes
XMP code	Yes	Preferred	Yes
RECS-80 code	Yes	Preferred	Yes
r-map code	Yes	Preferred	Yes
Suppression of interference from fluorescent lamps	Fig. 14	Fig. 14 and Fig. 15	Fig. 14 and Fig. 15

Note

- For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP312.., TSOP314..

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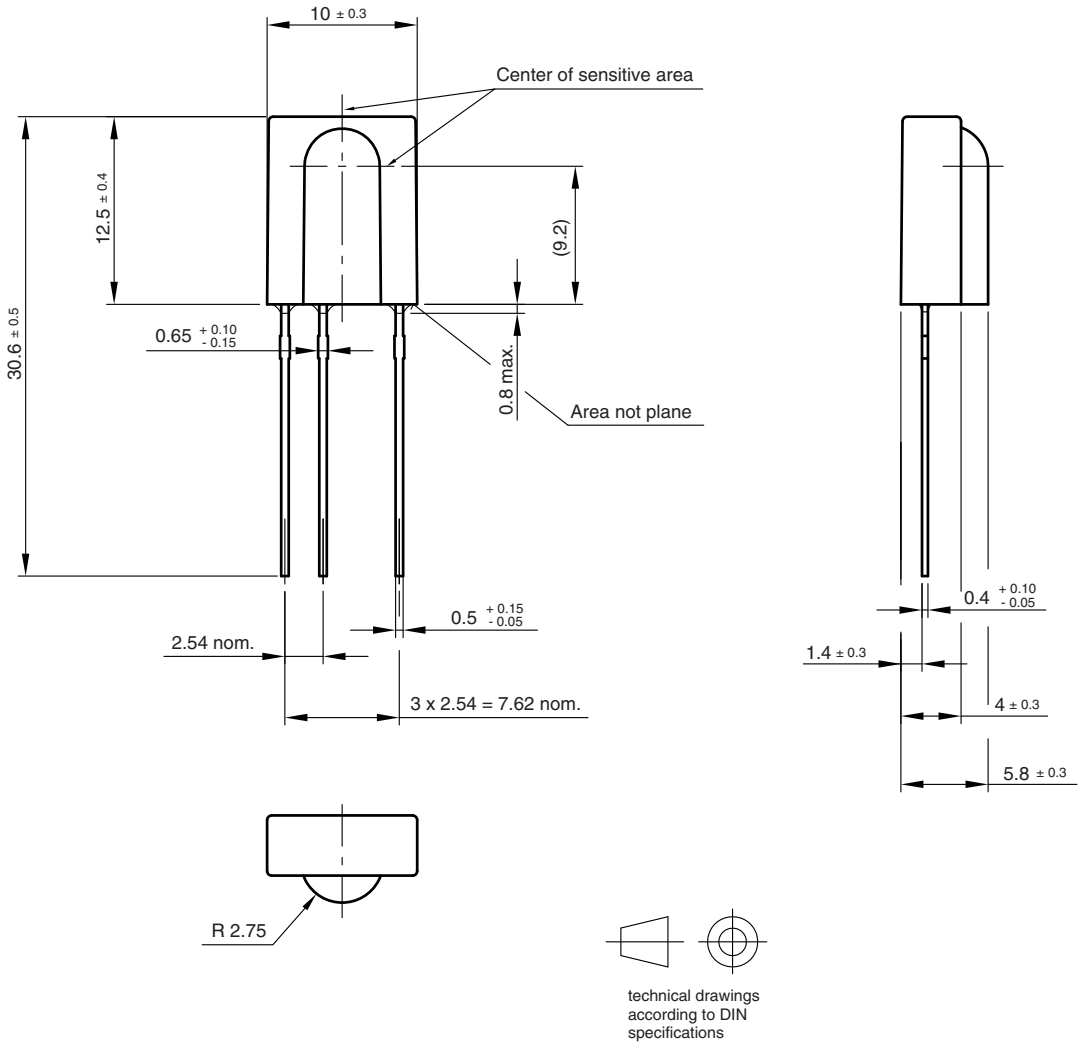
PACKAGE DIMENSIONS in millimeters



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