IR Receiver Modules for Remote Control Systems

19026
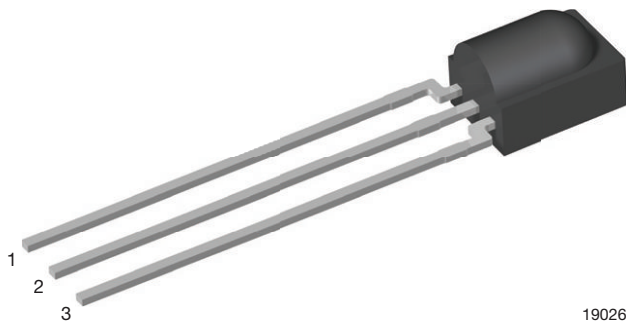
LINKS TO ADDITIONAL RESOURCES

Product Page	3D Models	Calculators	Marking	Packages
Holders	Bends and Cuts			

FEATURES

- Improved dark sensitivity
- Improved immunity against optical noise
- Very low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Low supply voltage: 2.0 V to 3.6 V
- Insensitive to supply voltage ripple and noise
- Material categorization:
  for definitions of compliance please see
  www.vishay.com/doc?99912

Pb-free
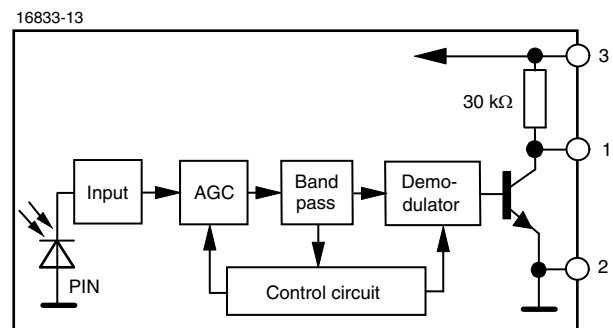
e3

RoHS
COMPLIANT

HALOGEN
FREE

GREEN
(5-2008)

DESCRIPTION

The TSOP98... series devices are the latest generation miniaturized IR receiver modules for infrared remote control systems. This series provides improvements in sensitivity to remote control signals in dark ambient as well as in sensitivity in the presence of optical disturbances e.g. from CFLs.

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.

The TSOP986.. series devices are designed to receive long burst codes (10 or more carrier cycles per burst). The third digit designates the AGC level (AGC6) and the last two digits designate the band-pass frequency (see table below). The higher the AGC, the better noise is suppressed, but the lower the code compatibility. AGC6 provides maximized noise suppression. Generally, we advise to select the highest AGC that satisfactorily receives the desired remote code.

These components have not been qualified to automotive specifications.

MECHANICAL DATA
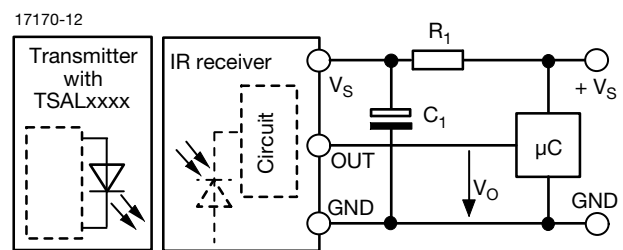
1 = OUT, 2 = GND, 3 = V_S

ORDERING CODE

TSOP986.. - 1500 pieces in bags

BLOCK DIAGRAM

APPLICATION CIRCUIT

R_1 and C_1 recommended to reduce supply ripple for V_S < 2.2 V

PARTS TABLE

AGC		MAXIMIZED NOISE SUPPRESSION (AGC6)
Carrier frequency	30 kHz	TSOP98630
	33 kHz	TSOP98633
	36 kHz	TSOP98636 [5][6]
	38 kHz	TSOP98638 [3][4][11]
	40 kHz	TSOP98640
	56 kHz	TSOP98656
Package		Minicast
Pinning		1 = OUT, 2 = GND, 3 = V_S
Dimensions (mm)		5.0 W x 6.95 H x 4.8 D
Mounting		Leaded
Application		Remote control
Best choice for		[1] Cisco [2] MCIR [3] Mitsubishi [4] NEC [5] Panasonic [6] RC-5 [7] RC-6 [8] RCA [9] r-step [10] Sejin 4PPM [11] Sharp [12] Sony

Notes
- 30 kHz and 33 kHz only available on written request
- See datasheet for TSOP982.., TSOP984.. for preferred devices for [1][2][7][8][9][10][12]

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		V_S	-0.3 to +3.6	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	$t \leq 10$ 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}	0.25	0.37	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.50	-	mA
Supply voltage		V_S	2.0	-	3.6	V
Transmission distance	E_v = 0, test signal see Fig. 1, IR diode TSAL6200, I_F = 50 mA	d	-	24	-	m
Output voltage low	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m^2, test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Test signal: NEC code	$E_{e\,min.}$	-	0.12	0.25	mW/m^2
Maximum irradiance	t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0, test signal see Fig. 1	$E_{e\,max.}$	30	-	-	W/m^2
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	°

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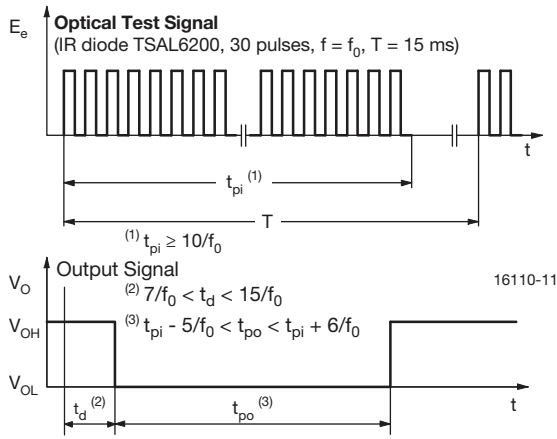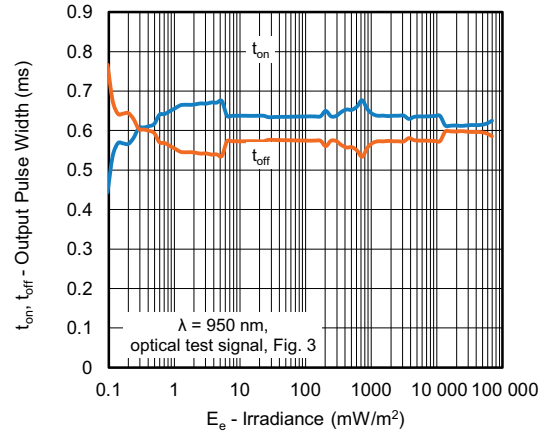

Fig. 1 - Output Delay and Pulse-Width

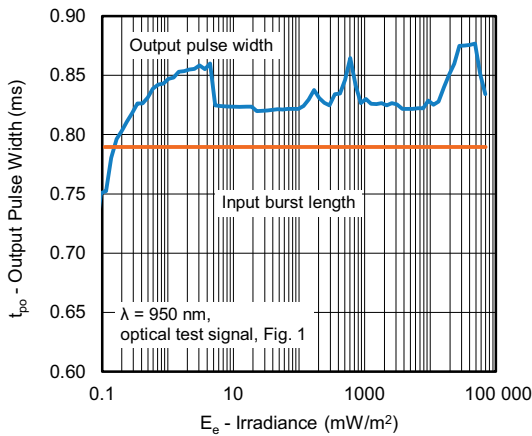Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient

Fig. 3 - Test Signal

Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

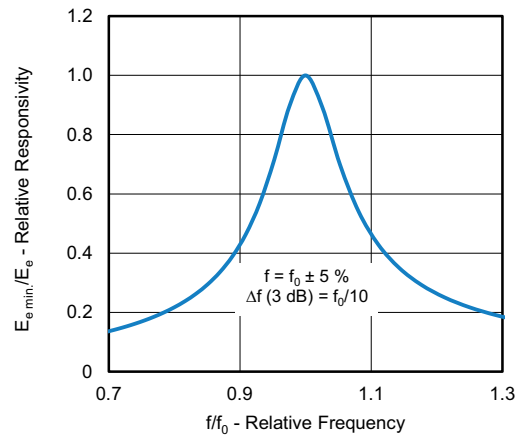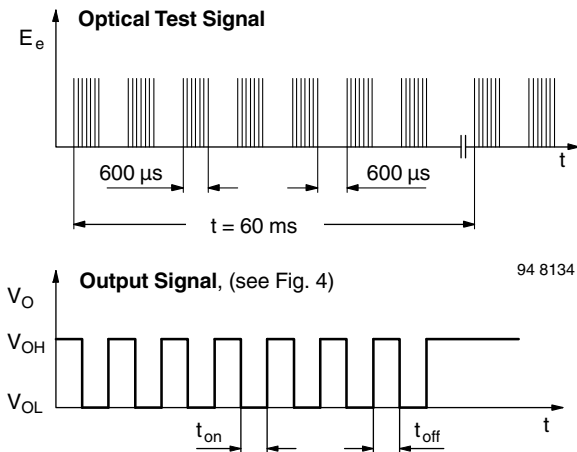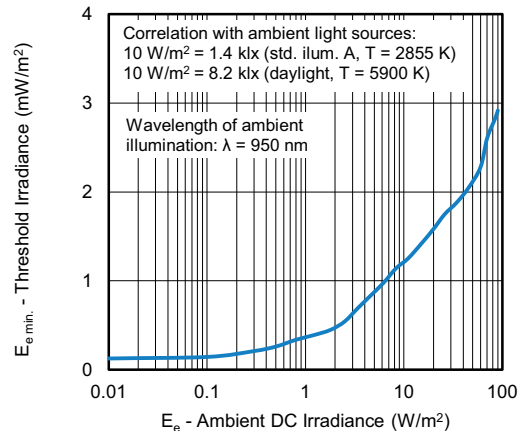Fig. 5 - Frequency Dependence of Responsivity
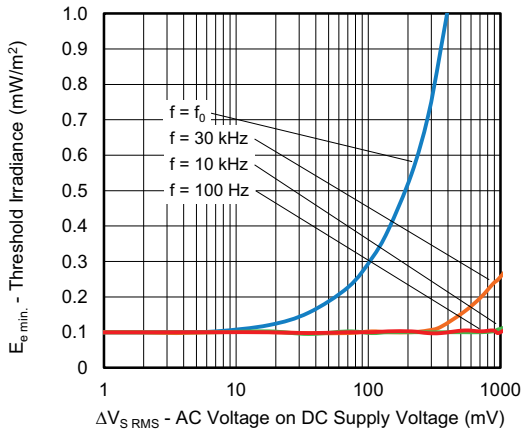

Fig. 6 - Sensitivity in Bright Ambient

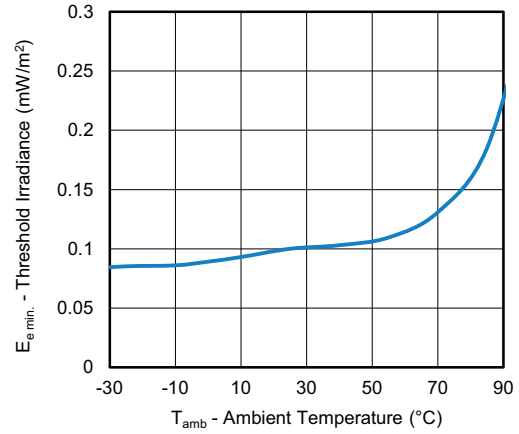Fig. 7 - Sensitivity vs. Supply Voltage Disturbances
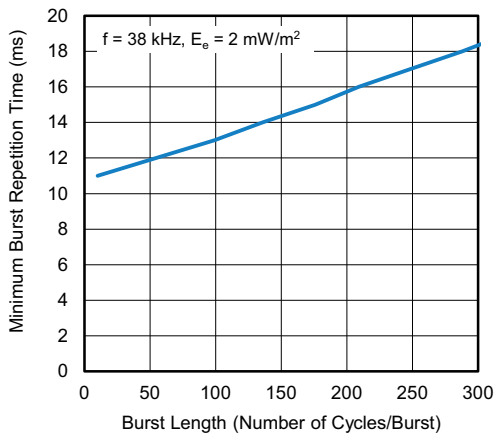

Fig. 9 - Sensitivity vs. Ambient Temperature

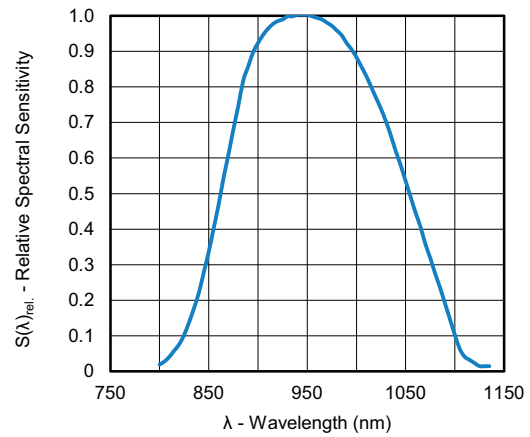Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

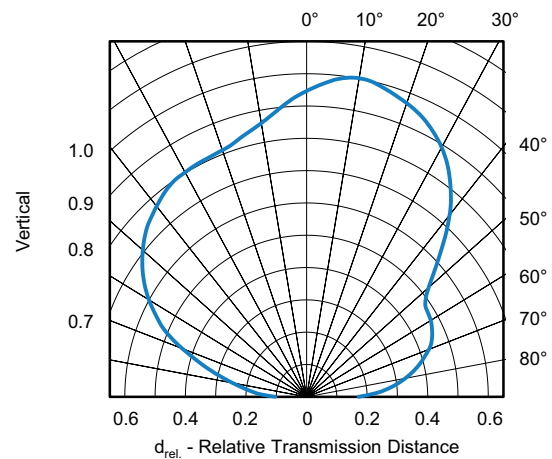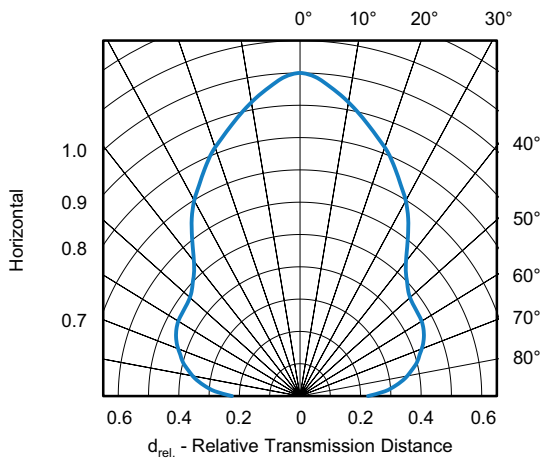Fig. 10 - Relative Spectral Sensitivity vs. Wavelength
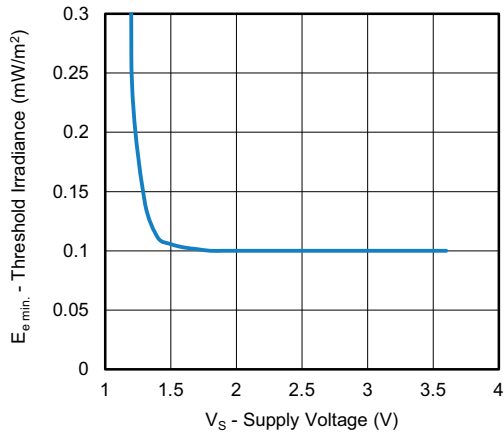

Fig. 11 - Horizontal and Vertical Directivity

Fig. 12 - Sensitivity vs. Supply Voltage

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)
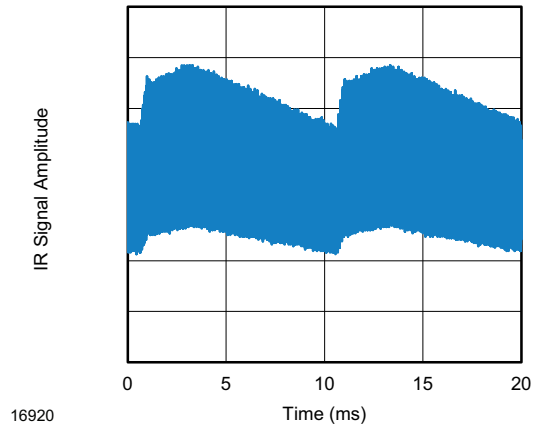
Fig. 13 - IR Disturbance from Fluorescent Lamp
With Low Modulation
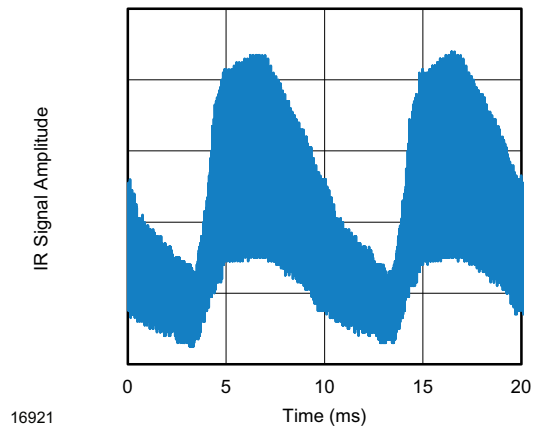
Fig. 14 - IR Disturbance from Fluorescent Lamp
With High Modulation

	TSOP986..
Minimum burst length	10 cycles/burst
Minimum gap time between bursts	$\geq$ 13 cycles
Minimum idle period between data frames	12 ms
RC-5 code	Preferred
RC-6 code	Yes
NEC code	Preferred
r-step code 56 kHz	Yes
Sony code	No
RCA 56 kHz code	Yes
Mitsubishi code 38 kHz	Preferred
Suppression of interference from fluorescent lamps	Fig. 13 and Fig. 14

Note

- For data formats with short bursts please see the datasheet for TSOP983.., TSOP985..

PACKAGE DIMENSIONS in millimeters

Drawing-No.: 6.550-5263.01-4
Issue: 12;   16.04.10
19009

Marking area

R 2

technical drawings
according to DIN
specifications

Not indicated to lerances ± 0.2
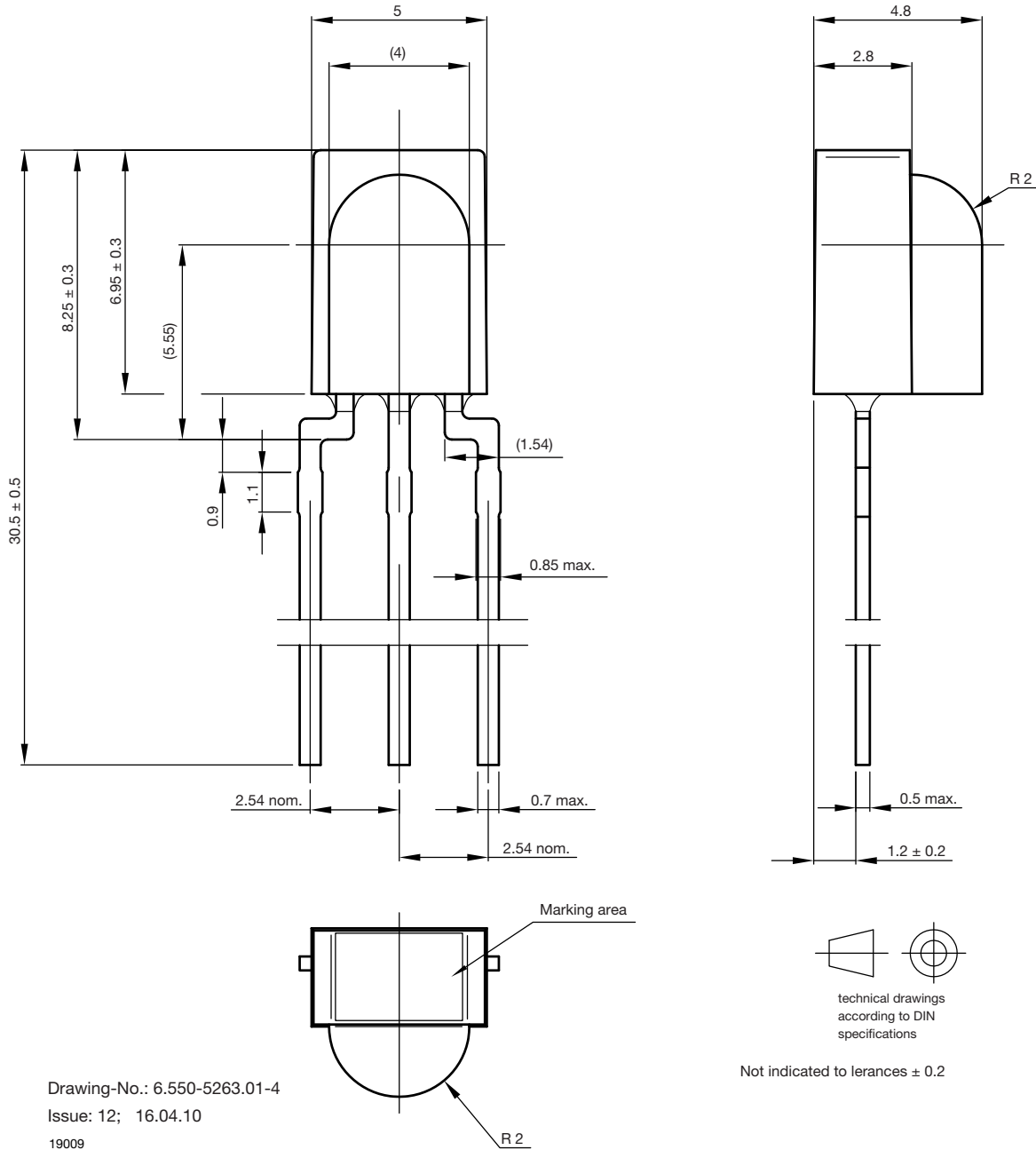
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