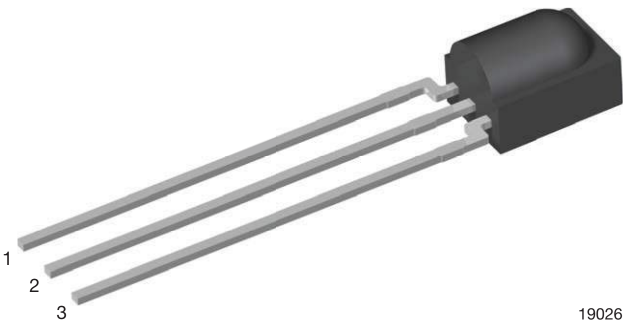
IR Receiver Modules for Remote Control Systems



LINKS TO ADDITIONAL RESOURCES

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

DESCRIPTION

The TSOP18... 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 robustness against spurious pulses originating from Wi-Fi signals has been enhanced.

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 TSOP181.., TSOP183.., and TSOP185.. series devices are designed to receive short burst codes (6 or more carrier cycles per burst). The third digit designates the AGC level (AGC1, AGC3, or AGC5) 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. AGC1 provides basic noise suppression, AGC3 provides enhanced noise suppression and AGC5 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.

FEATURES

- Improved dark sensitivity
- Improved immunity against optical noise
- Improved immunity against Wi-Fi noise
- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 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)

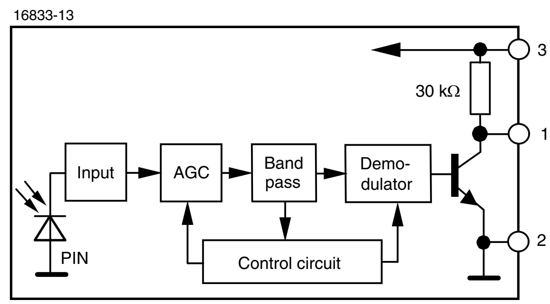
MECHANICAL DATA

1 = OUT, 2 = GND, 3 = V_S

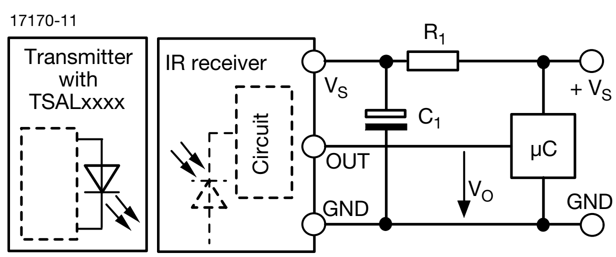
ORDERING CODE

TSOP18... - 1500 pieces in bags

BLOCK DIAGRAM



APPLICATION CIRCUIT



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

PARTS TABLE				
AGC		**BASIC NOISE SUPPRESSION (AGC1)**	**ENHANCED NOISE SUPPRESSION (AGC3)**	**MAXIMIZED NOISE SUPPRESSION (AGC5)**
Carrier frequency	30 kHz	TSOP18130	TSOP18330	TSOP18530
	33 kHz	TSOP18133	TSOP18333	TSOP18533
	36 kHz	TSOP18136	TSOP18336 (1)	TSOP18536
	38 kHz	TSOP18138	TSOP18338 (2)(4)	TSOP18538
	40 kHz	TSOP18140	TSOP18340	TSOP18540
	56 kHz	TSOP18156	TSOP18356 (3)	TSOP18556
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) RCMM (2) RECS-80 Code (3) r-map (4) XMP-1, XMP-2		

Note

- 30 kHz and 33 kHz only available on written request

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}	0.55	0.7	0.9	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.8	-	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	-	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	Pulse width tolerance: $t_{pi} - 3.0/f_0 < t_{po} < t_{pi} + 3.5/f_0$, test signal see Fig. 1	$E_{e\ min.}$	-	0.12	0.25	mW/m^2
Maximum irradiance	$t_{pi} - 3.0/f_0 < t_{po} < t_{pi} + 3.5/f_0$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m^2
Maximum long burst irradiance (AGC3, AGC5)	$t_{pi} - 3.0/f_0 < t_{po} < t_{pi} + 3.5/f_0$, test signal see Fig. 1, dark ambient, burst length > 30 cycles	$E_{e\ max.}$	0.5	-	-	W/m^2
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	°

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

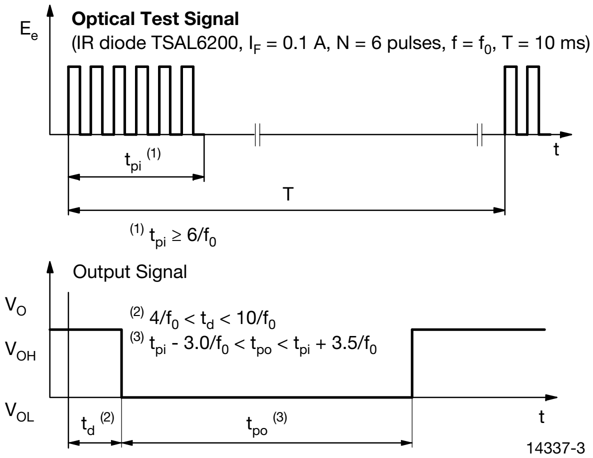


Fig. 1 - Output Delay and Pulse-Width

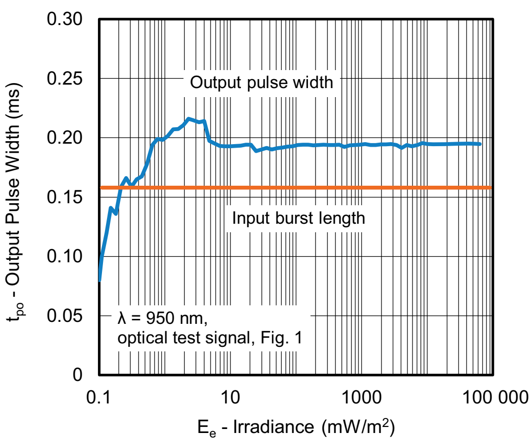


Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient

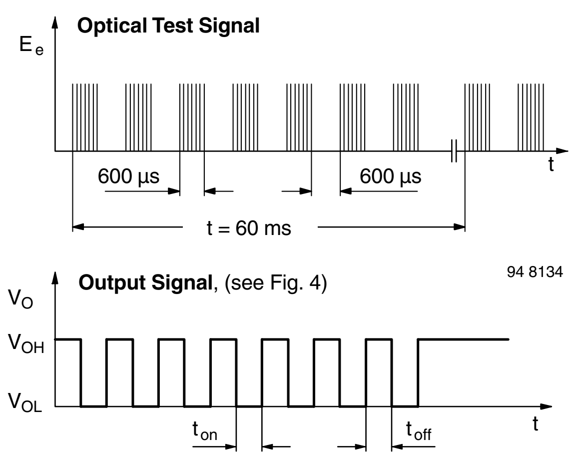


Fig. 3 - Test Signal

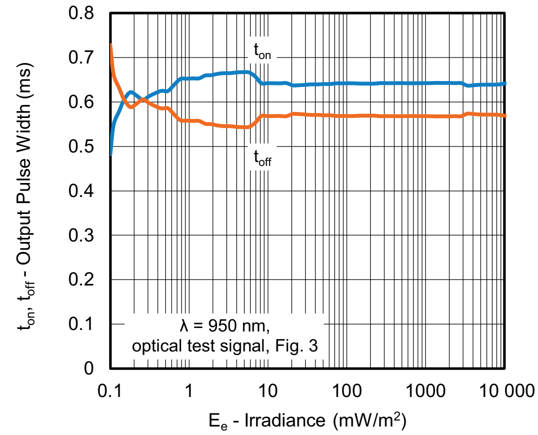


Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

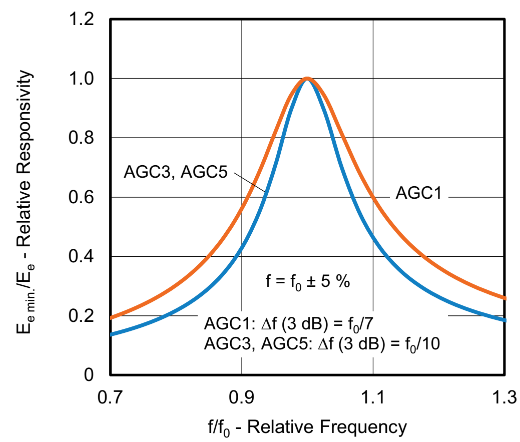


Fig. 5 - Frequency Dependence of Responsivity

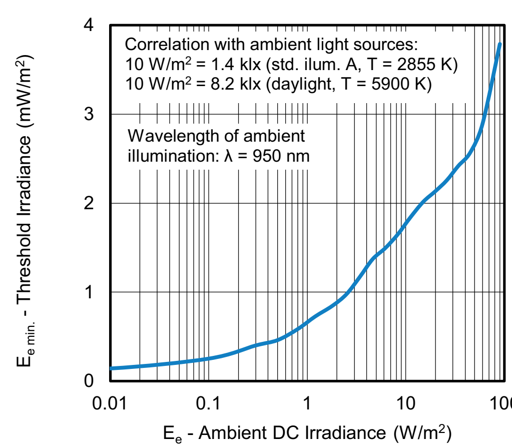


Fig. 6 - Sensitivity in Bright Ambient

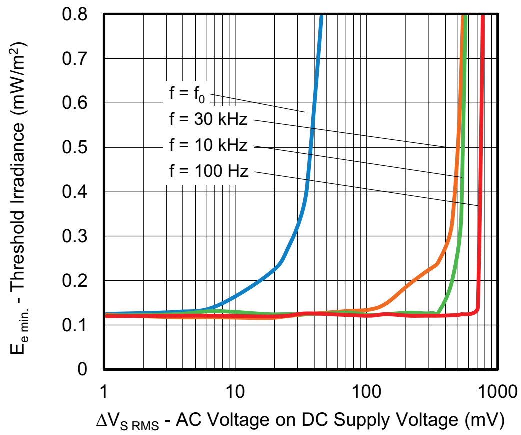


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

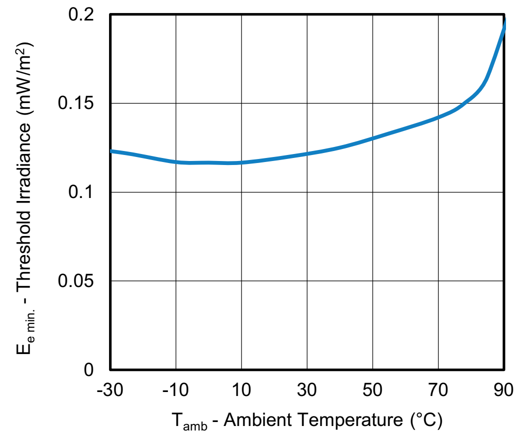


Fig. 9 - Sensitivity vs. Ambient Temperature

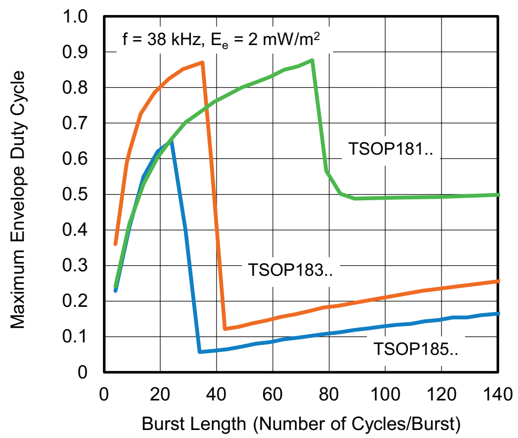


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

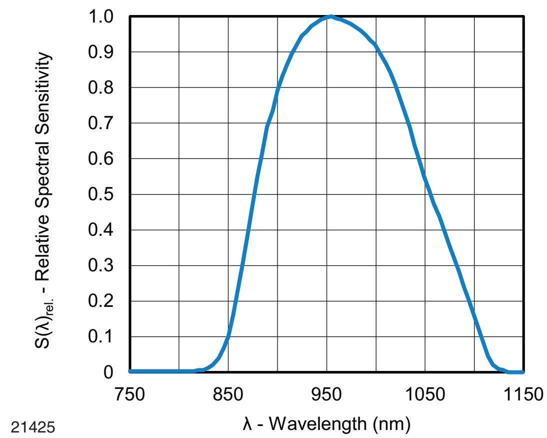


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

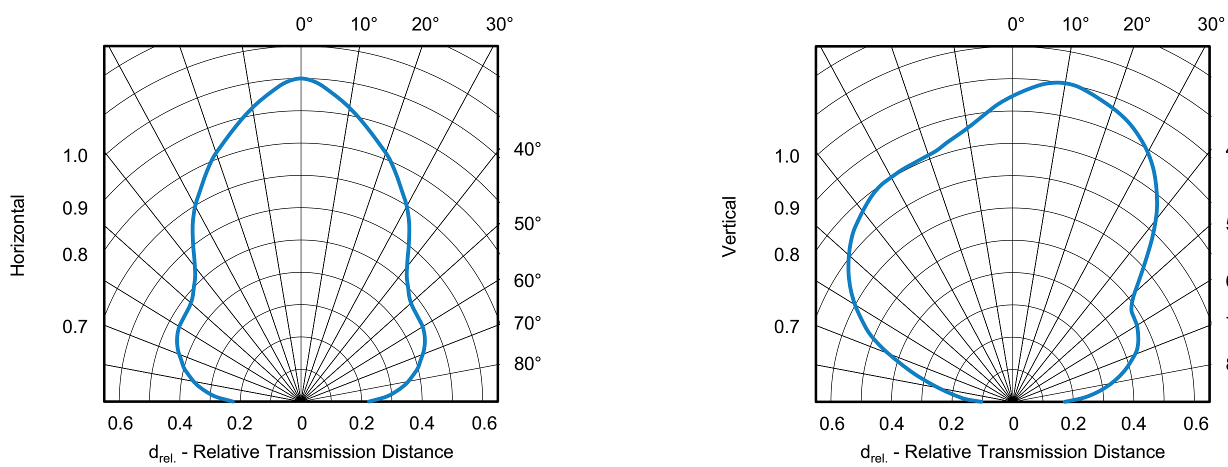


Fig. 11 - Horizontal and Vertical Directivity

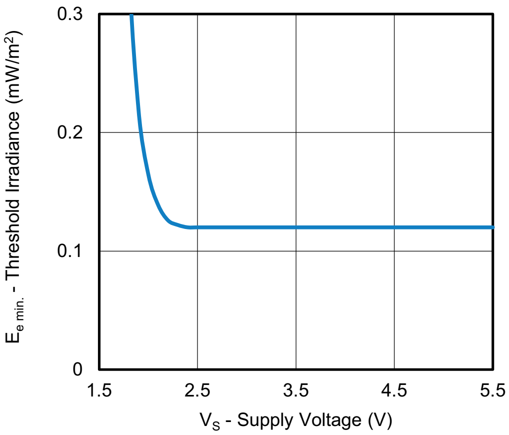


Fig. 12 - Sensitivity vs. Supply Voltage

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)
- 2.4 GHz and 5 GHz Wi-Fi

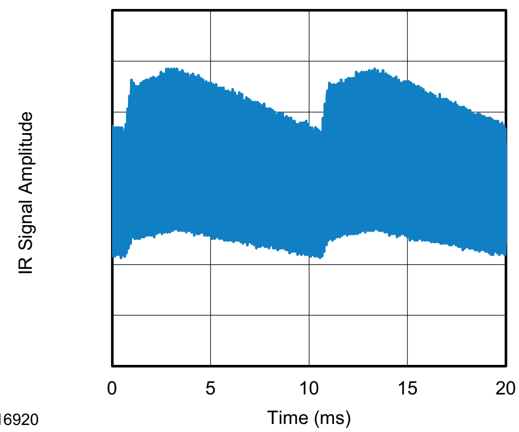


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

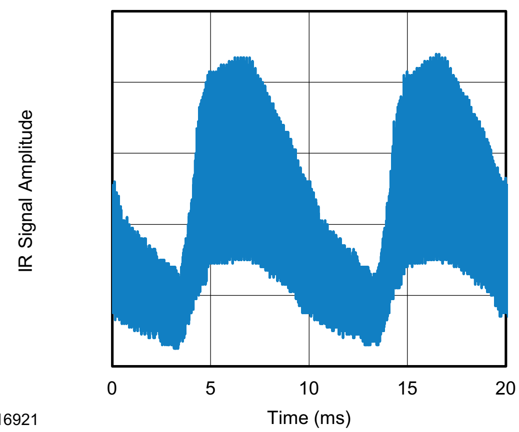


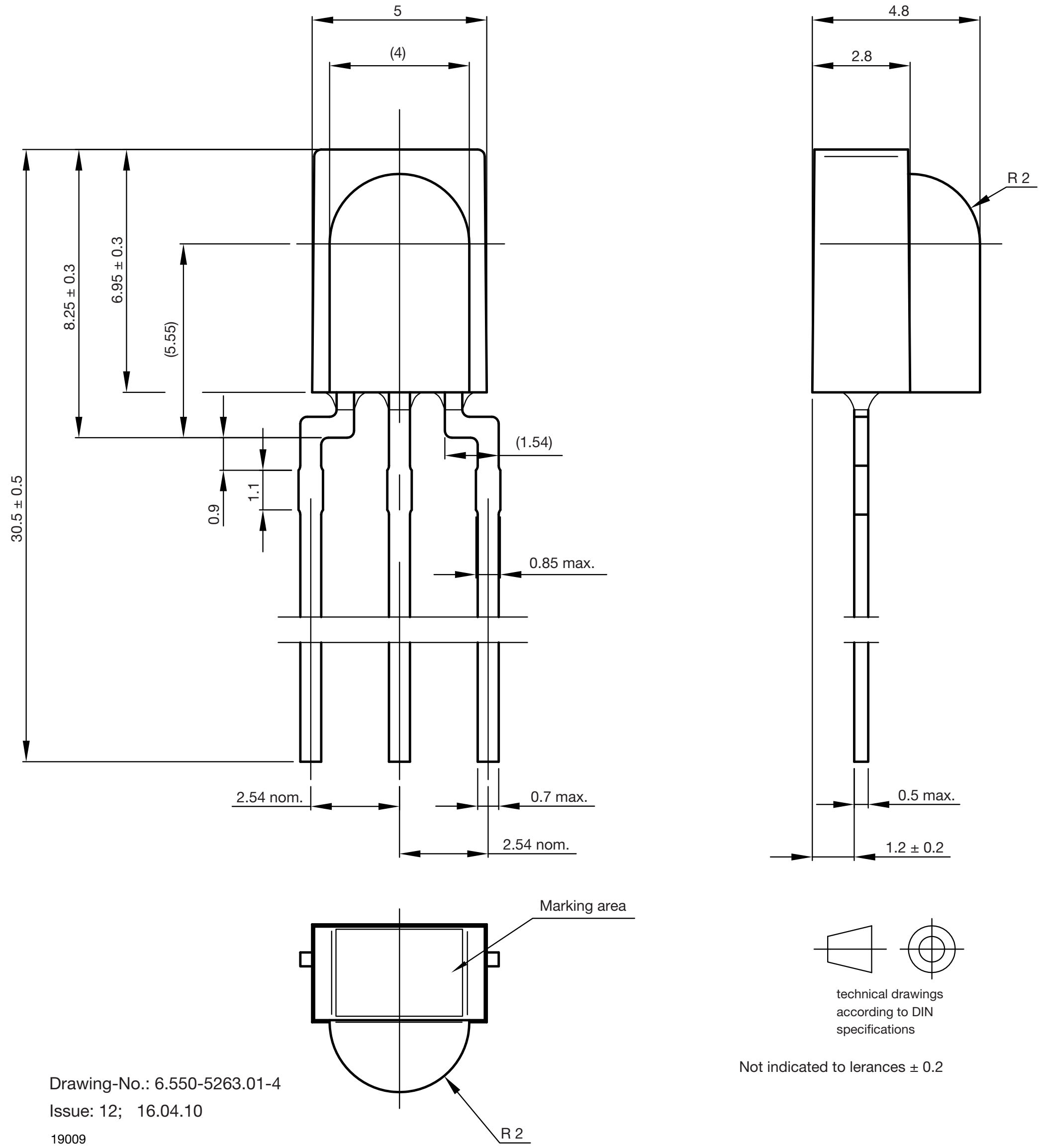
Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

	TSOP181..	TSOP183..	TSOP185..
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 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 1 x burst length	35 cycles > 6 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	1800	2800	1800
RCMM code	Yes	Preferred	Yes
XMP-1 code	Yes	Preferred	Yes
r-map code	Yes	Preferred	Yes
Suppression of interference from fluorescent lamps	Fig. 13	Fig. 13 and Fig. 14	Fig. 13 and Fig. 14

Note

- For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP182.., TSOP184.., TSOP186..

PACKAGE DIMENSIONS in millimeters



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