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IR Receiver Modules for Remote Control Systems

94 8691
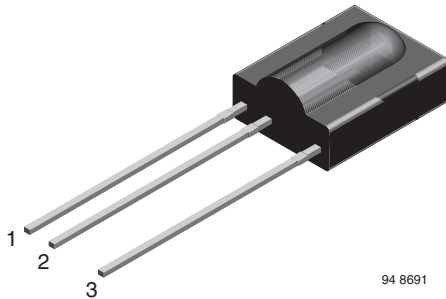
DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

MECHANICAL DATA

Pinning:

1 = GND, 2 = V_S, 3 = OUT

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

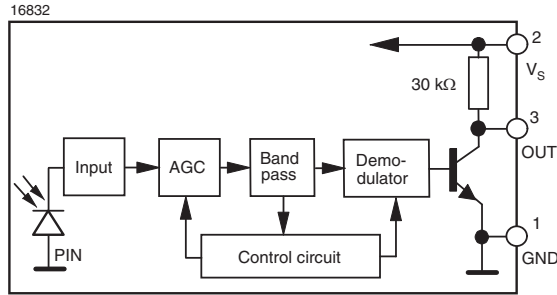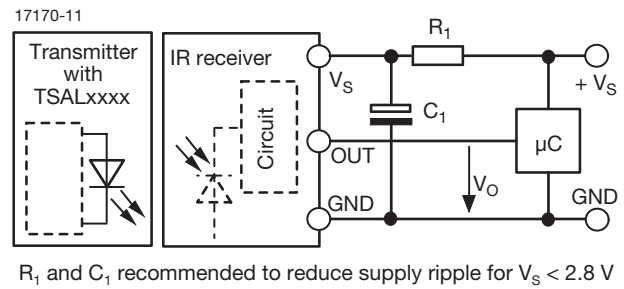HALOGEN
FREE

GREEN
(5-2008)

DESCRIPTION

The TSOP311.., TSOP313.., and TSOP315.. series are miniaturized receivers for infrared remote control systems. A PIN diode and a preamplifier are 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 TSOP313.. series devices are optimized to suppress almost all spurious pulses from energy saving lamps like CFLs. AGC3 may also suppress some data signals if continuously transmitted.

The TSOP311.. series are provided primarily for compatibility with old AGC1 designs. New designs should prefer the TSOP313.. series containing the newer AGC3. The TSOP315.. series contain a very robust AGC5. This series should only be used for critically noisy environments.

These components have not been qualified according to automotive specifications.

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] Mitsubishi [3] RECS-80 Code [4] r-map [5] XMP-1, XMP-2 [6] RCMM		

BLOCK DIAGRAM

16832

APPLICATION CIRCUIT

17170-11

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 (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	$t \leq 10$ 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 (pin 2)	$E_v = 0$, $V_S = 3.3$ 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	-	24	-	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	Pulse width tolerance: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see Fig. 1	$E_{e\ min.}$	-	0.12	0.25	mW/m²
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, 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)
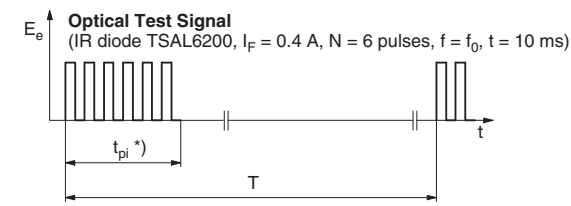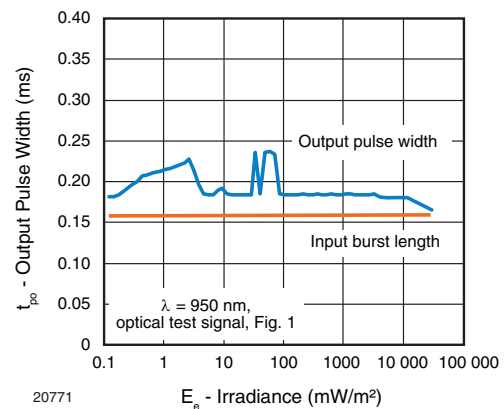

Fig. 1 - Output Active Low
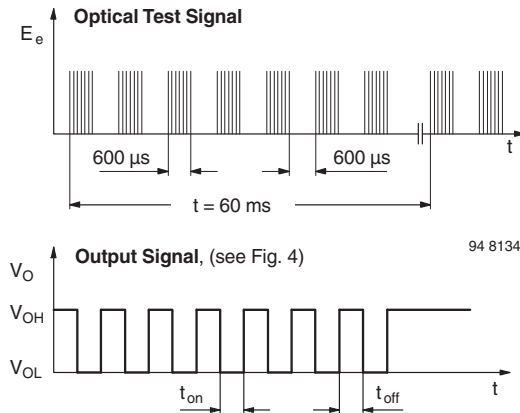

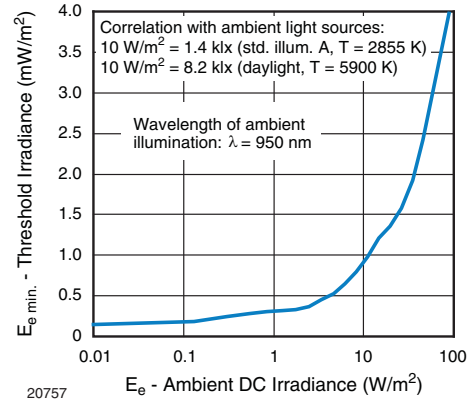Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

Optical Test Signal

Fig. 3 - Output Function

Fig. 4 - Output Pulse Diagram

Fig. 5 - Frequency Dependence of Responsivity

Fig. 6 - Sensitivity in Bright Ambient

Fig. 7 - Sensitivity vs. Supply Voltage Disturbances
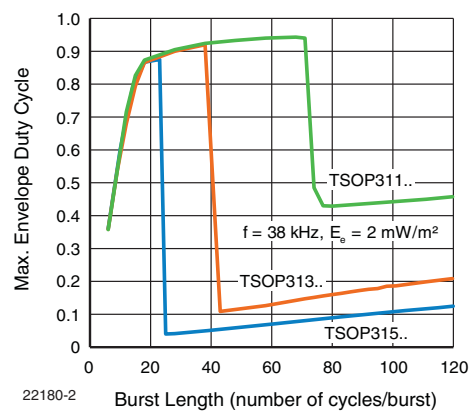

Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length
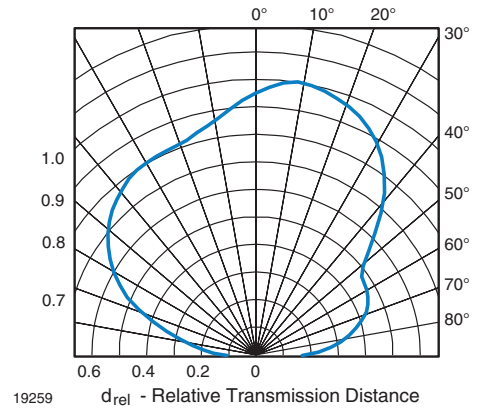
Fig. 9 - Sensitivity vs. Ambient Temperature
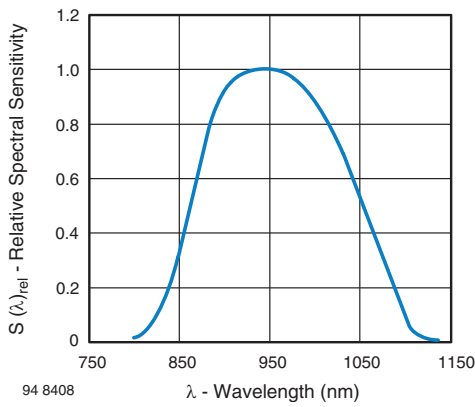

Fig. 12 - Vertical Directivity

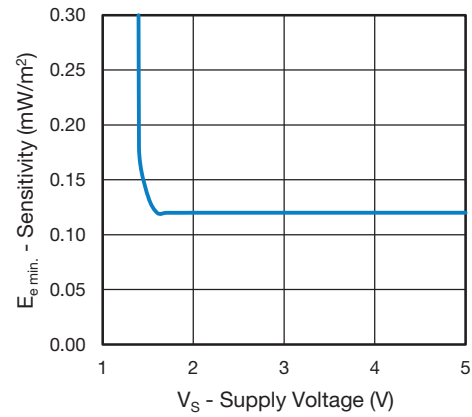Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

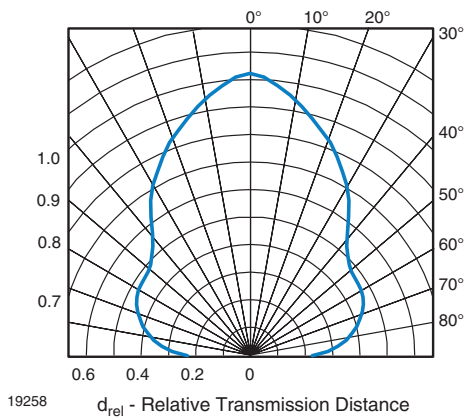Fig. 13 - Sensitivity vs. Supply Voltage

Fig. 11 - Horizontal Directivity

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
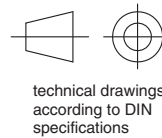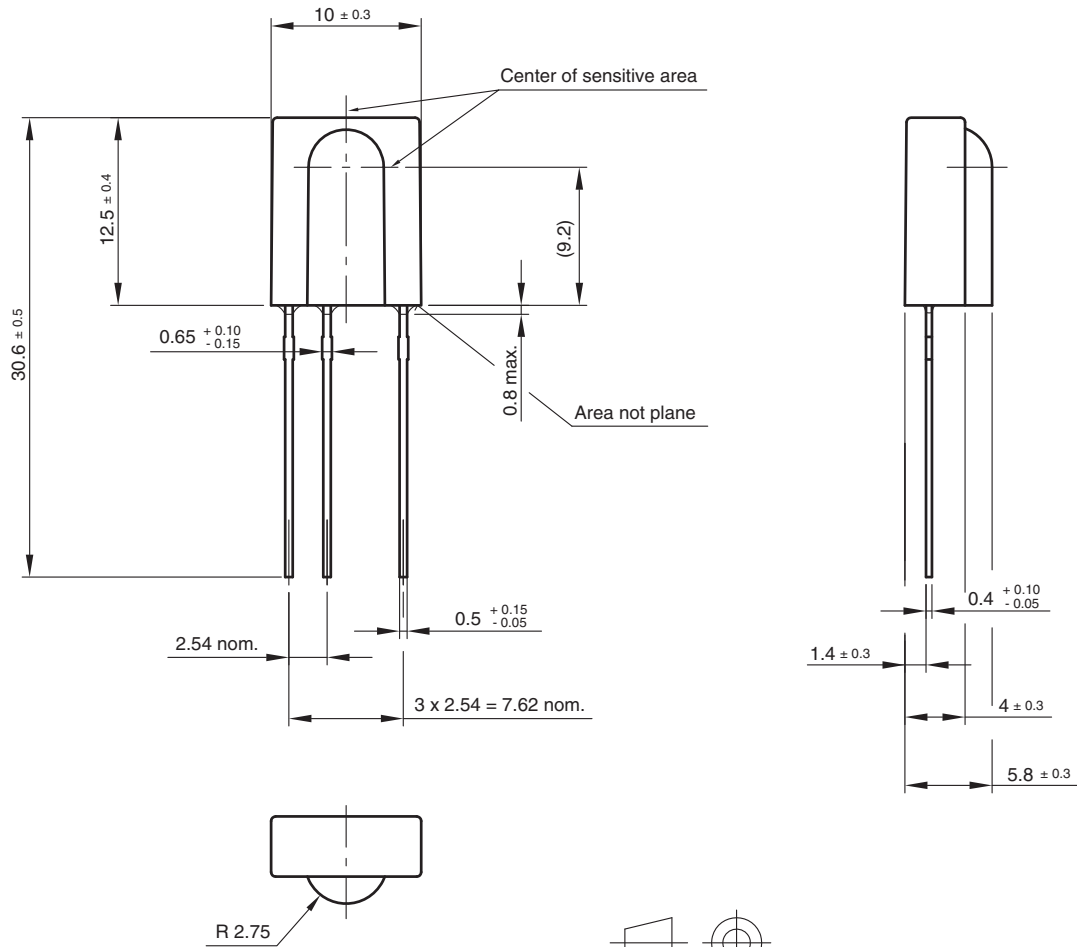
	TSOP311..	TSOP313..	TSOP315..
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length A gap time is required of	6 to 70 cycles ≥ 10 cycles	6 to 35 cycles ≥ 10 cycles	6 to 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 1.2 x burst length	35 cycles > 6 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000	2000
MCIR code	Yes	Preferred	Yes
RCMM code	Yes	Preferred	Yes
XMP-1, XMP-2 code	Yes	Preferred	Yes
Suppression of interference from fluorescent lamps	Mild disturbance patterns are suppressed (example: signal pattern of Fig. 14)	Complex disturbance patterns are suppressed (example: signal pattern of Fig. 15)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

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

PACKAGE DIMENSIONS in millimeters

10 ± 0.3

Center of sensitive area

12.5 ± 0.4

(9.2)

30.6 ± 0.5

0.65 $^{+0.10}_{-0.15}$

0.8 max.

Area not plane

0.5 $^{+0.15}_{-0.05}$

2.54 nom.

3 x 2.54 = 7.62 nom.

0.4 $^{+0.10}_{-0.05}$

1.4 ± 0.3

4 ± 0.3

5.8 ± 0.3

R 2.75

technical drawings
according to DIN
specifications

Drawing-No.: 6.550-5095.01-4

Issue: 20; 15.03.10

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