



IR Receiver Modules for Remote Control Systems



23051

DESCRIPTION

This IR receiver series is optimized for short burst remote control systems in different environments. The customer can choose 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



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

LINKS TO ADDITIONAL RESOURCES



Product Page



Marking



Packages



Holders



Bends and Cuts

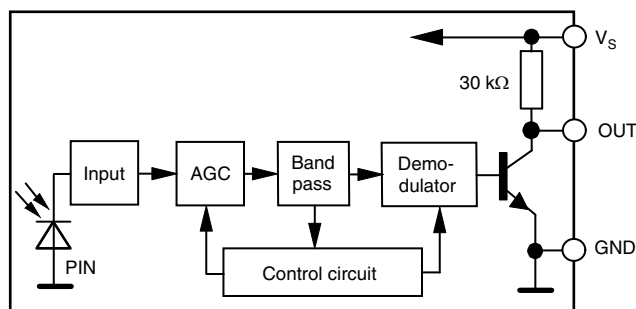
DESIGN SUPPORT TOOLS

- [3D models](#)
- [Window size calculator](#)

APPLICATIONS

- Infrared remote control systems

BLOCK DIAGRAM



16833-22



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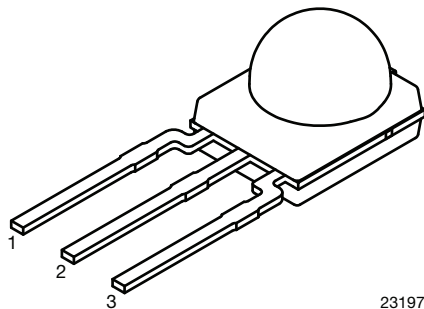
TSOP131.., TSOP133.., TSOP135..

Vishay Semiconductors

MECHANICAL DATA

Pinning for TSOP13...:

1 = OUT, 2 = GND, 3 = V_S

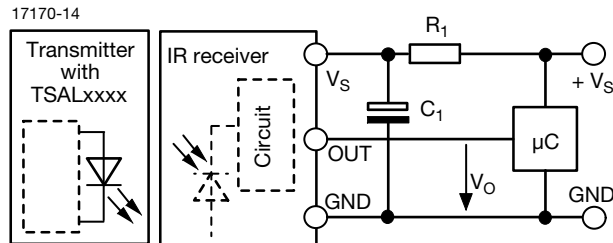


23197

ORDERING CODE

TSOP13... - 1800 pieces in bags

APPLICATION CIRCUIT



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

PARTS TABLE

AGC		BASIC NOISE SUPPRESSION (AGC1)	ENHANCED NOISE SUPPRESSION (AGC3)	MAXIMIZED NOISE SUPPRESSION (AGC5)
Carrier frequency	30 kHz	TSOP13130	TSOP13330	TSOP13530
	33 kHz	TSOP13133	TSOP13333	TSOP13533
	36 kHz	TSOP13136	TSOP13336 ⁽¹⁾⁽⁵⁾	TSOP13536
	38 kHz	TSOP13138	TSOP13338 ⁽²⁾⁽⁴⁾	TSOP13538
	40 kHz	TSOP13140	TSOP13340	TSOP13540
	56 kHz	TSOP13156	TSOP13356 ⁽³⁾	TSOP13556
Package		Minimold		
Pinning		1 = OUT, 2 = GND, 3 = V_S		
Dimensions (mm)		5.4 W x 6.35 H x 4.9 D		
Mounting		Leaded		
Application		Remote control		
Best choice for		⁽¹⁾ RCMM ⁽²⁾ RECS-80 Code ⁽³⁾ r-map ⁽⁴⁾ XMP ⁽⁵⁾ MCIR		
Special options		<ul style="list-style-type: none"> Narrow optical filter: www.vishay.com/doc?81590 Wide optical filter: www.vishay.com/doc?82726 		

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	$T_{amb} \leq 85^\circ\text{C}$	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 ($T_{amb} = 25^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	$E_v = 0$, $V_S = 3.3\text{ V}$	I_{SD}	0.25	0.35	0.45	mA
	$E_v = 40\text{ klx}$, 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, $I_F = 50\text{ mA}$	d	-	39	-	m
Output voltage low	$I_{OSL} = 0.5\text{ mA}$, $E_e = 0.7\text{ mW/m}^2$, test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Test signal: RC5 code	$E_e\text{ min.}$	-	0.05	0.1	mW/m^2
	Test signal: XMP code	$E_e\text{ min.}$	-	0.1	0.2	mW/m^2
Maximum irradiance	$t_{pi} - 3.0/f_0 < t_{po} < t_{pi} + 3.5/f_0$, test signal see Fig. 1	$E_e\text{ max.}$	30	-	-	W/m^2
Directivity	Angle of half transmission distance	$\Phi_{1/2}$	-	± 45	-	$^{\circ}$

TYPICAL CHARACTERISTICS ($T_{amb} = 25^{\circ}\text{C}$, unless otherwise specified)

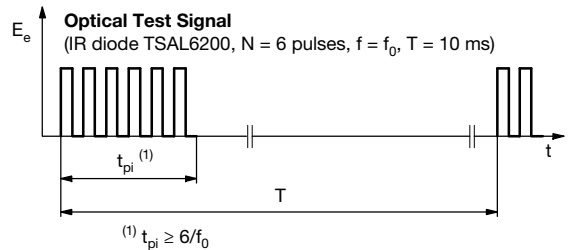


Fig. 1 - Output Delay and Pulse-Width

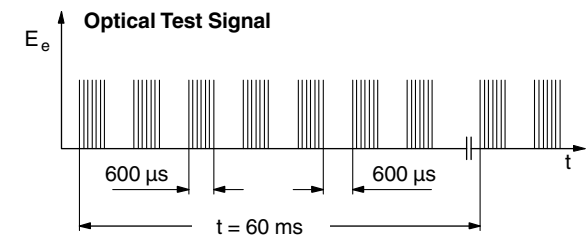


Fig. 3 - Test Signal

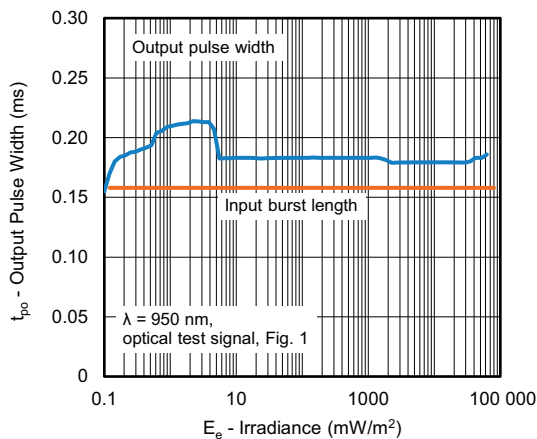


Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient

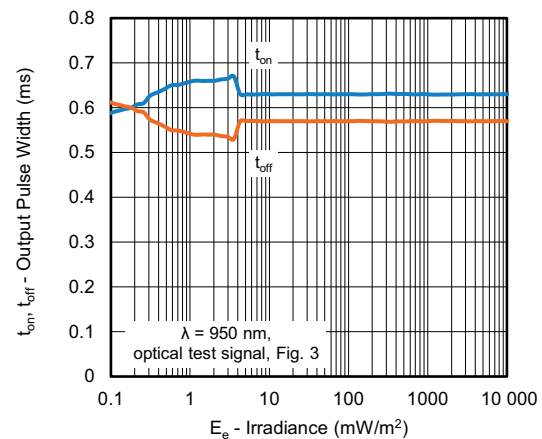


Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

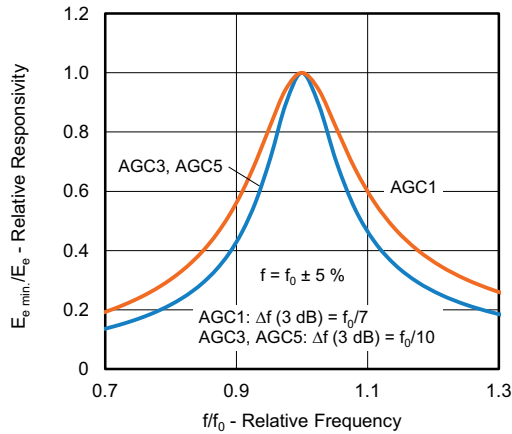


Fig. 5 - Frequency Dependence of Responsivity

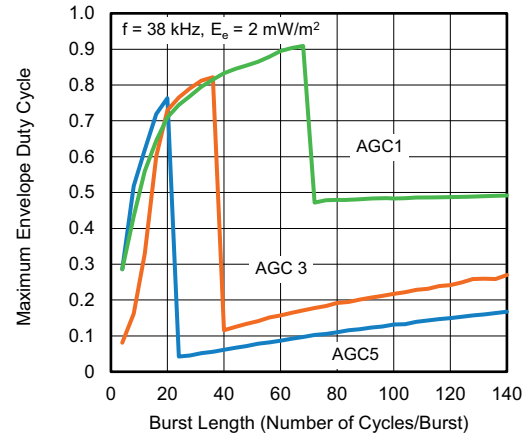


Fig. 8 - Maximum Envelope Duty Cycle vs. Burst Length

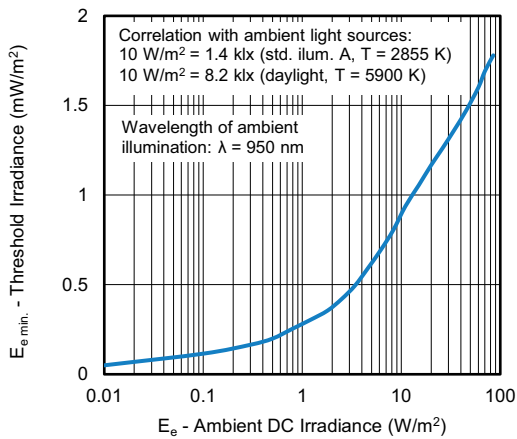


Fig. 6 - Sensitivity in Bright Ambient

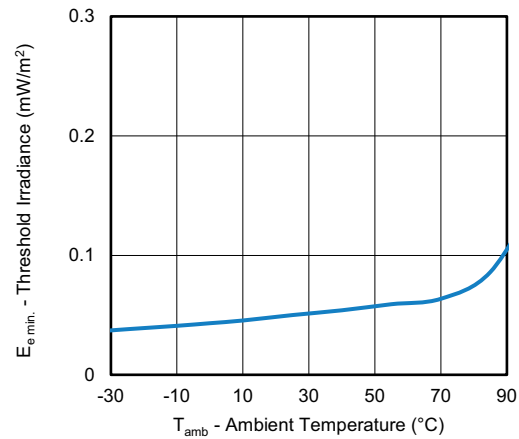


Fig. 9 - Sensitivity vs. Ambient Temperature

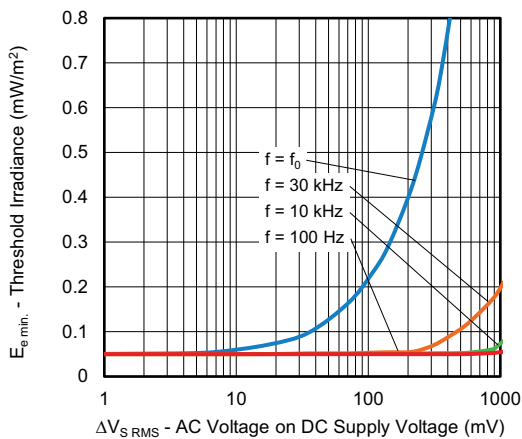


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

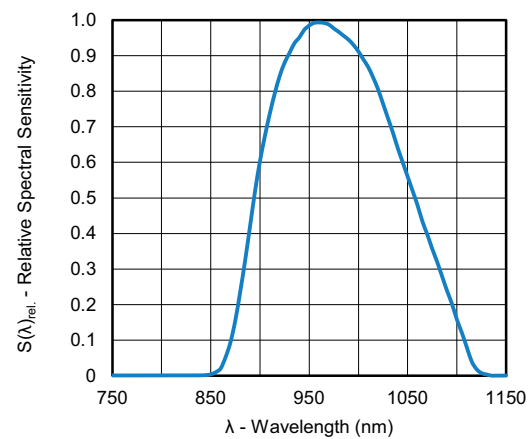
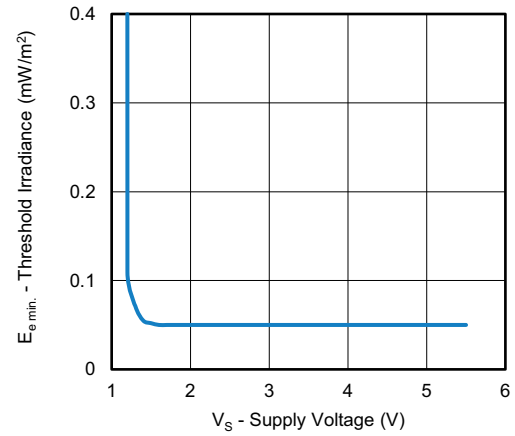
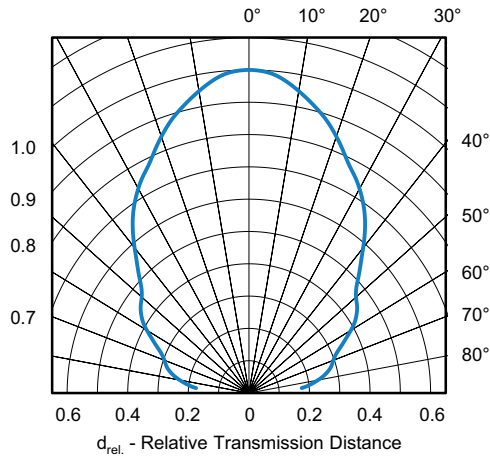


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength





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 Emission from Fluorescent Lamp With Low Modulation

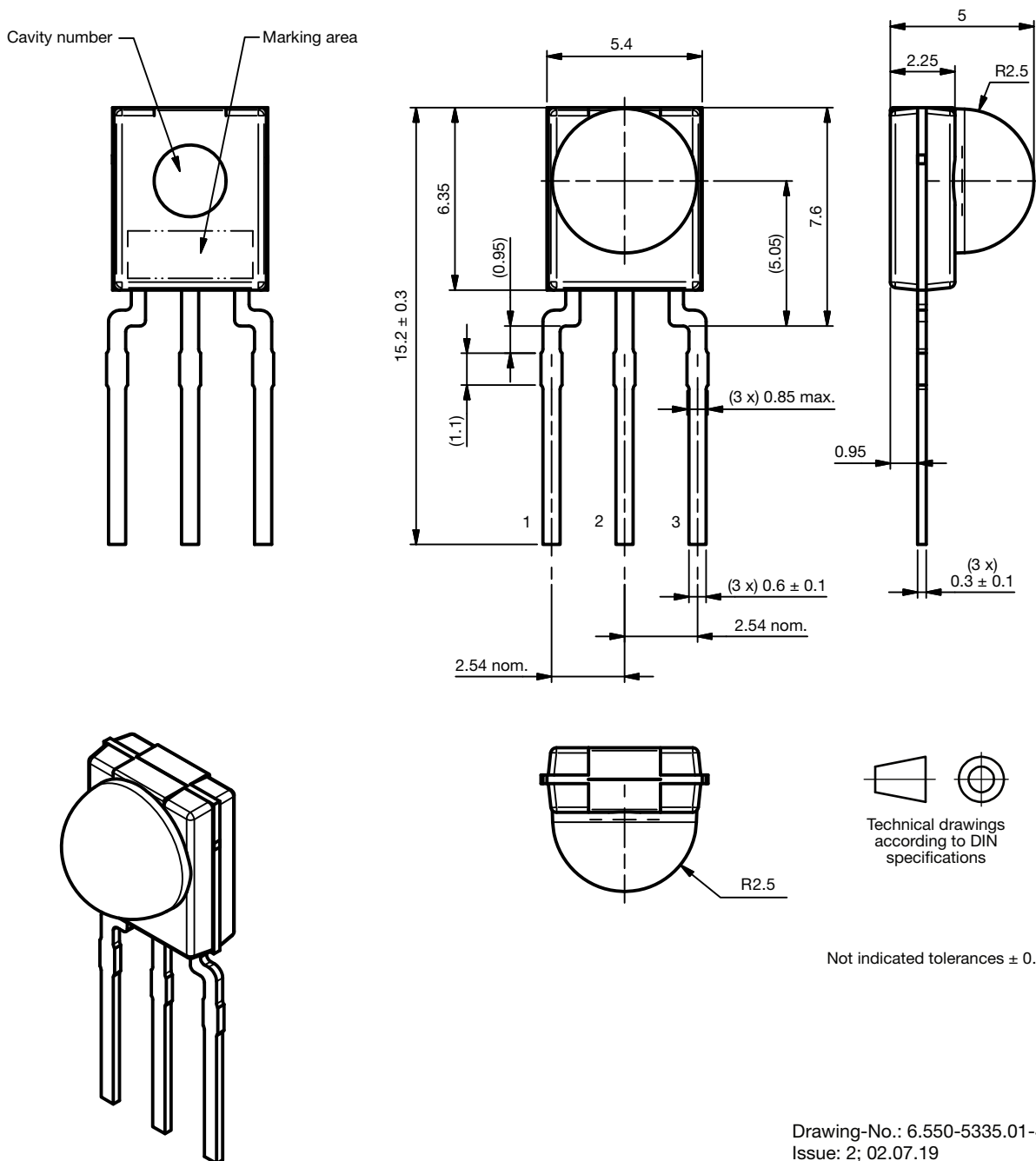


Fig. 14 - IR Emission from Fluorescent Lamp With High Modulation

	TSOP131..	TSOP133..	TSOP135..
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 68 cycles ≥ 7 cycles	6 to 36 cycles ≥ 8 cycles	6 to 19 cycles ≥ 8 cycles
For bursts greater than a minimum gap time in the data stream is needed of	68 cycles > 1 x burst length	36 cycles > 10 x burst length	19 cycles > 10 x burst length
Maximum number of continuous short bursts/second	2100	2100	2100
RCMM code	Yes	Preferred	Yes
XMP 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 TSOP132.., TSOP134.., TSOP136..



Technical drawings
according to DIN
specifications

Not indicated tolerances ± 0.2

Drawing-No.: 6.550-5335.01-4
Issue: 2; 02.07.19



BULK PACKAGING

Standard shipping for minimold is in conductive plastic bags. The packing quantity is determined by weight and the number of components per carton may vary by a maximum of $\pm 0.3\%$.

ORDERING INFORMATION

Examples: TSOP13338

TSOP13356VI1

TSOP13338SS1F

For more information, see: www.vishay.com/doc?80076

PACKAGING QUANTITY

- 300 pieces per bag (each bag is individually boxed)
- 6 bags per carton



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