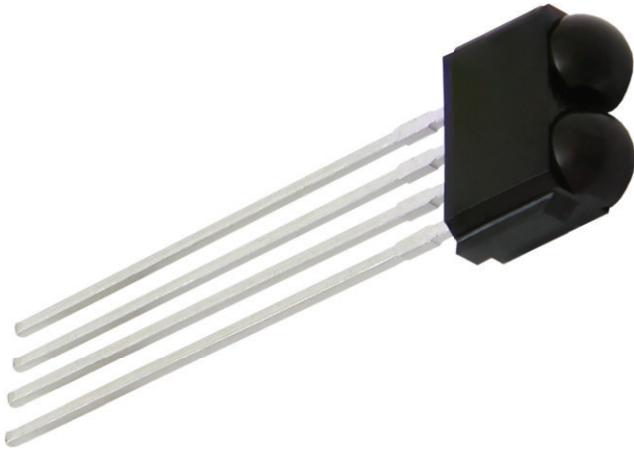




IR Receiver Modules for Remote Control Systems



DESCRIPTION

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

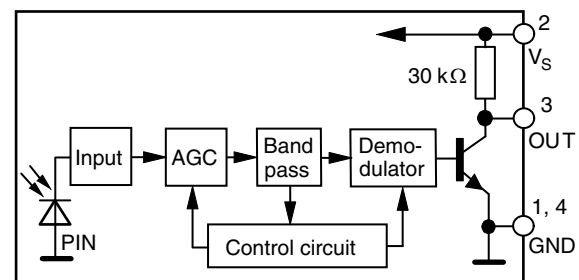


Packages

DESIGN SUPPORT TOOLS

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

BLOCK DIAGRAM



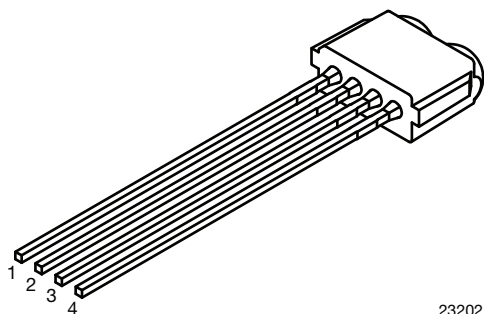
20445-1



MECHANICAL DATA

Pinning:

1, 4 = GND, 2 = V_S , 3 = OUT



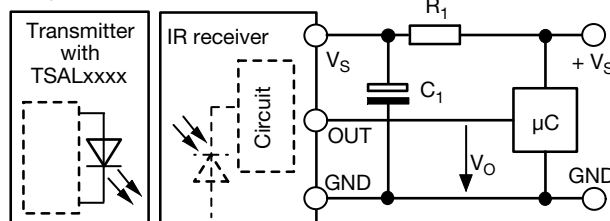
23202

ORDERING CODE

TSOP.9.... - 2400 pieces in 6 bags

APPLICATION CIRCUIT

17170-14



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

PARTS TABLE

AGC		NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)	VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)
Carrier frequency	30 kHz	TSOP39330	TSOP39530
	33 kHz	TSOP39333	TSOP39533
	36 kHz	TSOP39336 ⁽¹⁾⁽²⁾	TSOP39536
	38 kHz	TSOP39338 ⁽³⁾⁽⁴⁾⁽⁵⁾	TSOP39538
	40 kHz	TSOP39340	TSOP39540
	56 kHz	TSOP39356	TSOP39556
Package		TVCast	
Pinning		1, 4 = GND, 2 = V_S , 3 = OUT	
Dimensions (mm)		6.8 W x 2.6 H x 5.3 D	
Mounting		Leaded	
Application		Remote control	
Best choice for		⁽¹⁾ MCIR ⁽²⁾ RCMM ⁽³⁾ RECS-80 Code ⁽⁴⁾ r-map ⁽⁵⁾ XMP	

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	$t \leq 10$ 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage		V_S	2.0	-	5.5	V
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
Transmission distance	$E_v = 0$, test signal see Fig. 1, IR diode TSAL6200, $I_F = 50\text{ mA}$	d	-	26	-	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	$E_{e\text{ min.}}$	-	0.1	0.2	mW/m^2
	Test signal: XMP code	$E_{e\text{ min.}}$	-	0.12	0.25	mW/m^2
Maximum irradiance	$t_{pi} - 3/f_0 < t_{po} < t_{pi} + 3.5/f_0$, 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

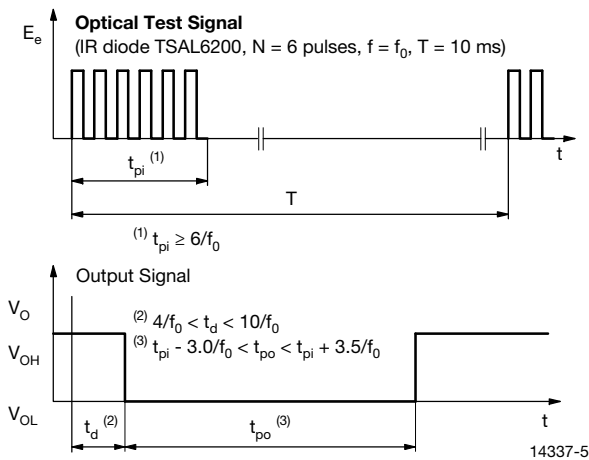


Fig. 1 - Output Active Low

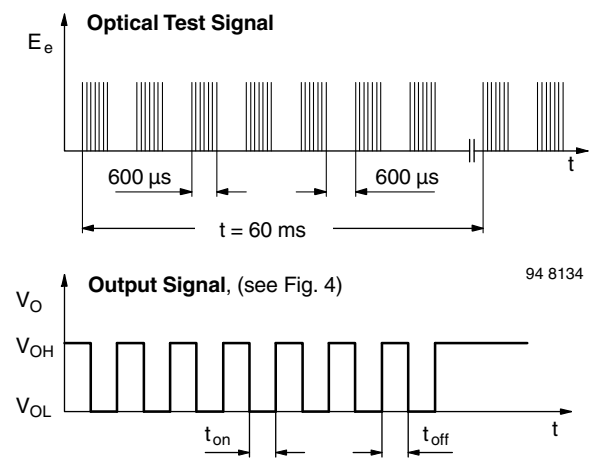


Fig. 3 - Output Function

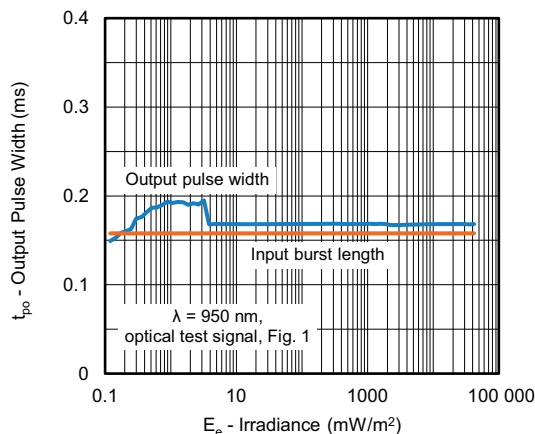


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

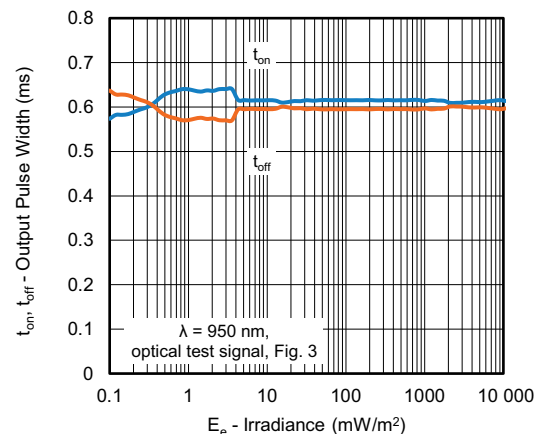


Fig. 4 - Output Pulse Diagram

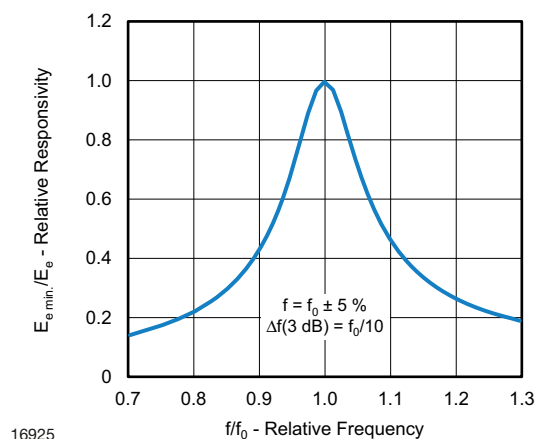


Fig. 5 - Frequency Dependence of Responsivity

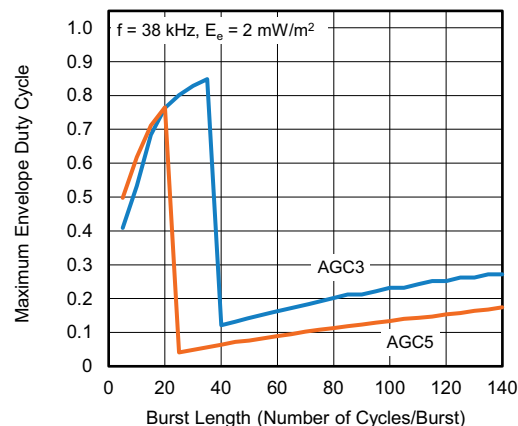


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

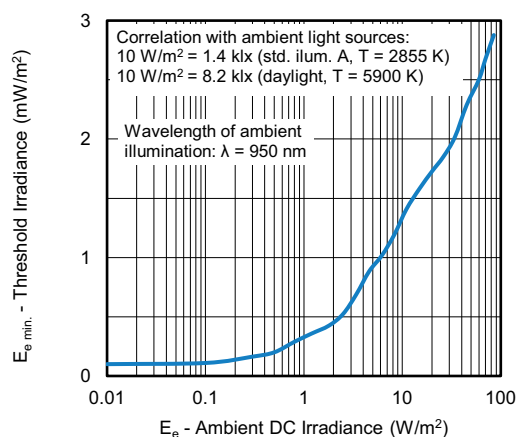


Fig. 6 - Sensitivity in Bright Ambient

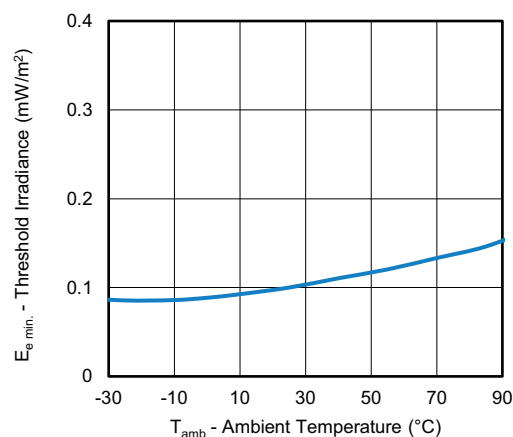


Fig. 9 - Sensitivity vs. Ambient Temperature

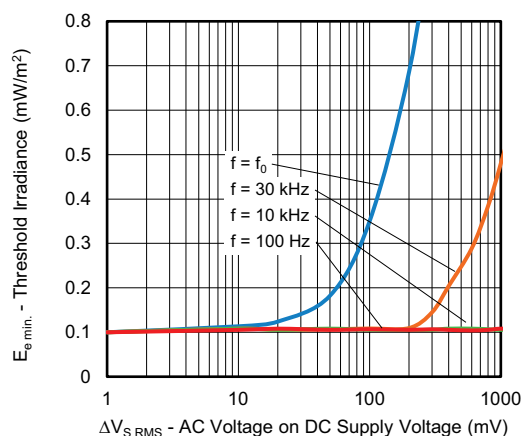


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

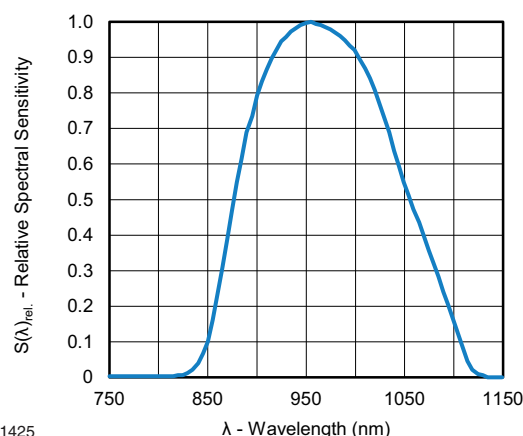
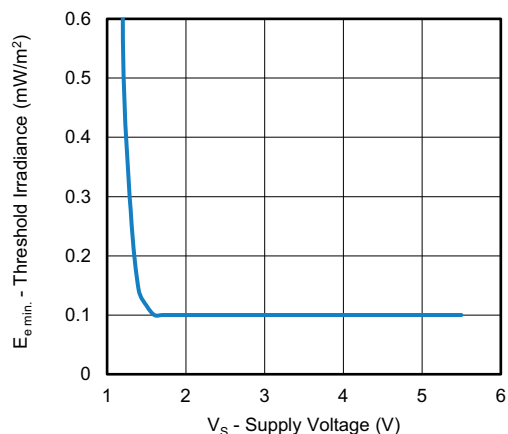
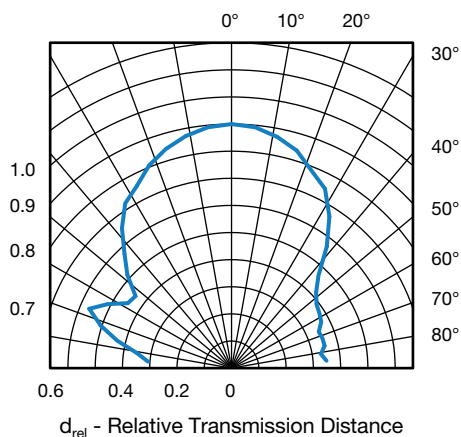
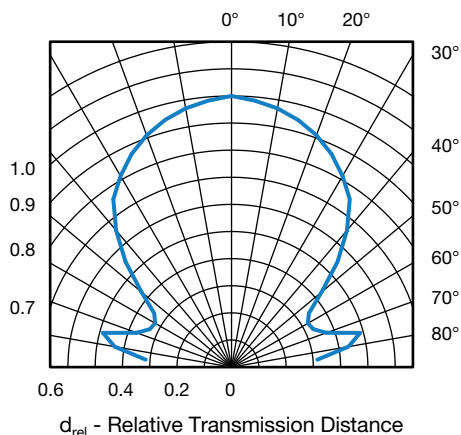


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength



**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 pattern 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

	TSOP393..	TSOP395..
Minimum burst length	6 cycles/burst	6 cycles/burst
After each burst of length a minimum gap time is required of	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	35 cycles > 9 x burst length	20 cycles > 25 x burst length
Maximum number of continuous short bursts/second	2000	2000
MCIR code	Preferred	No
XMP code	Preferred	Yes
RCMM code	Preferred	Yes
RECS-80 code	Preferred	Yes
r-map code	Preferred	Yes
Suppression of interference from fluorescent lamps	Fig. 14 and Fig. 15	Fig. 14 and Fig. 15

Note

- For data formats with long bursts please see the datasheet for TSOP392.., TSOP394..

[illegible]

Standard shipping for TVCast 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 $\pm 0.3\%$.

Figure 1 illustrates a feature vector structure. It consists of four main components: a box labeled 'T', a box labeled 'S', a box labeled 'P', and three pairs of boxes labeled 'd'. Below the 'S' box, there is a vertical line with a horizontal bar at the bottom, labeled 'O = receiver' and 'S = sensor'. Below the first pair of 'd' boxes, there is a vertical line with a horizontal bar at the bottom, labeled 'IC and package type'. Below the second pair of 'd' boxes, there is a vertical line with a horizontal bar at the bottom, labeled 'AGC'. Below the third pair of 'd' boxes, there is a vertical line with a horizontal bar at the bottom, labeled 'Frequency'.

- d = “digit”, please consult the list of available series on the previous page to create a valid part number.

Example: TSOP39338

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



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