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IR Receiver Modules for Remote Control Systems



LINKS TO ADDITIONAL RESOURCES











DESCRIPTION

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



COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

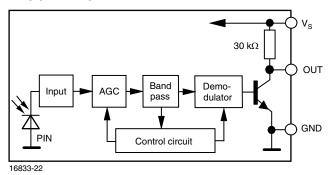
DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

APPLICATIONS

• Infrared remote control systems

BLOCK DIAGRAM





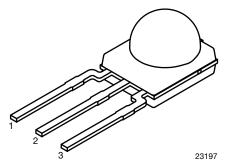
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MECHANICAL DATA

Pinning for TSOP53...:

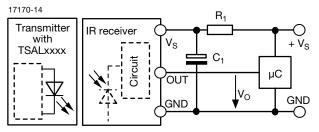
 $1 = OUT, 2 = GND, 3 = V_S$



ORDERING CODE

TSOP53... - 1800 pieces in bags

APPLICATION CIRCUIT



 \mathbf{R}_1 and \mathbf{C}_1 recommended in case there are strong ripple or spikes on the supply line.

PARTS TABLE					
AGC		LEGACY, FOR SHORT BURSTS (AGC1)	FOR SHORT BURSTS, NOISY ENVIRONMENTS (AGC3)	FOR SHORT BURSTS, VERY NOISY ENVIRONMENTS (AGC5)	
	30 kHz	TSOP53130	TSOP53330	TSOP53530	
	33 kHz	TSOP53133	TSOP53333	TSOP53533	
Carrier	36 kHz	TSOP53136	TSOP53336 (1)(2)	TSOP53536	
frequency	38 kHz	TSOP53138	TSOP53338 (3)(5)	TSOP53538	
	40 kHz	TSOP53140	TSOP53340	TSOP53540	
	56 kHz	TSOP53156	TSOP53356 (4)	TSOP53556	
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) MCIR (2) RCMM (3) RECS-80 Code (4) r-map (5) XMP			
Special options	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		IS	5	mA
Output voltage		Vo	-0.3 to 5.5	V
Voltage at output to supply		V _S - V _O	-0.3 to (V _S + 0.3)	V
Output current		I _O	5	mA
Junction temperature		Tj	100	°C
Storage temperature range		T _{stg}	-25 to +85	°C
Operating temperature range		T _{amb}	-25 to +85	°C
Power consumption	T _{amb} ≤ 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

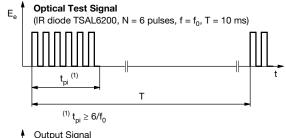


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ELECTRICAL AND OPTICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Committee and	$E_{v} = 0, V_{S} = 3.3 \text{ V}$	I _{SD}	0.25	0.35	0.45	mA
Supply current	$E_v = 40 \text{ klx, sunlight}$ I_{SH} -	-	0.45	-	mA	
Supply voltage		Vs	2.0	-	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	$I_{OSL} = 0.5 \text{ mA}, E_e = 0.7 \text{ mW/m}^2,$ test signal see Fig. 1	V _{OSL}	-	-	100	mV
Minimum invadions	Test signal: RC5 code	E _{e min.}	=	0.12	0.25	mW/m ²
Minimum irradiance	Test signal: XMP code	E _{e min.}	-	0.2	0.4	mW/m ²
Maximum irradiance	t_{pi} - $3/f_o$ < t_{po} < t_{pi} + $3.5/f_o$, test signal see Fig. 1	E _{e max.}	50	-	-	W/m ²
Directivity	Angle of half transmission distance	Ψ1/2	=	± 45	-	deg

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



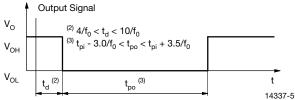
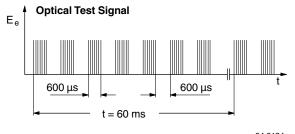
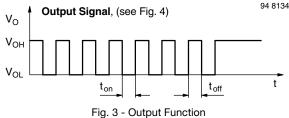


Fig. 1 - Output Active Low





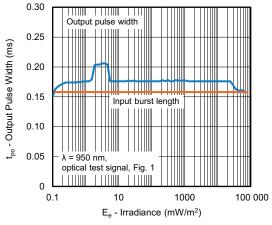


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

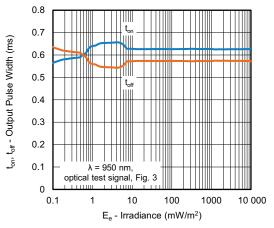


Fig. 4 - Output Pulse Diagram



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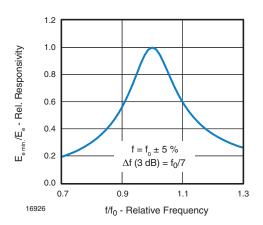


Fig. 5 - Frequency Dependence of Responsivity

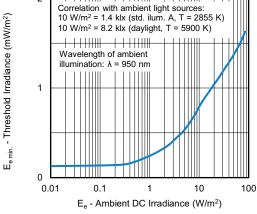


Fig. 6 - Sensitivity in Bright Ambient

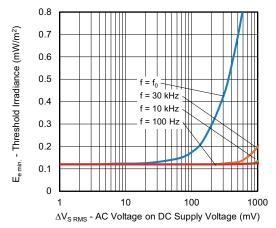


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

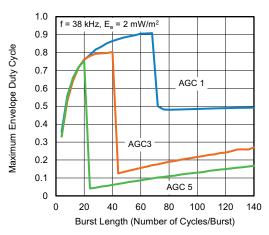


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

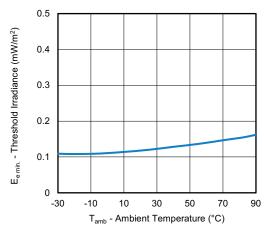


Fig. 9 - Sensitivity vs. Ambient Temperature

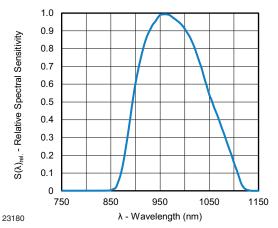


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength



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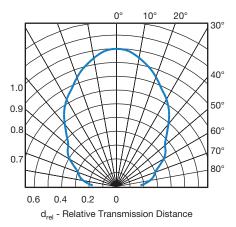


Fig. 11 - Horizontal Directivity

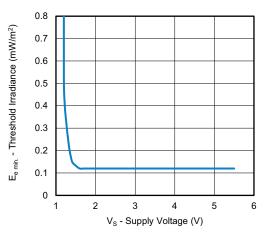


Fig. 12 - Sensitivity vs. Supply Voltage



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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

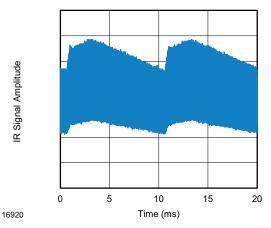


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

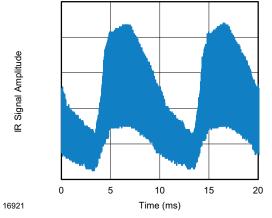


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

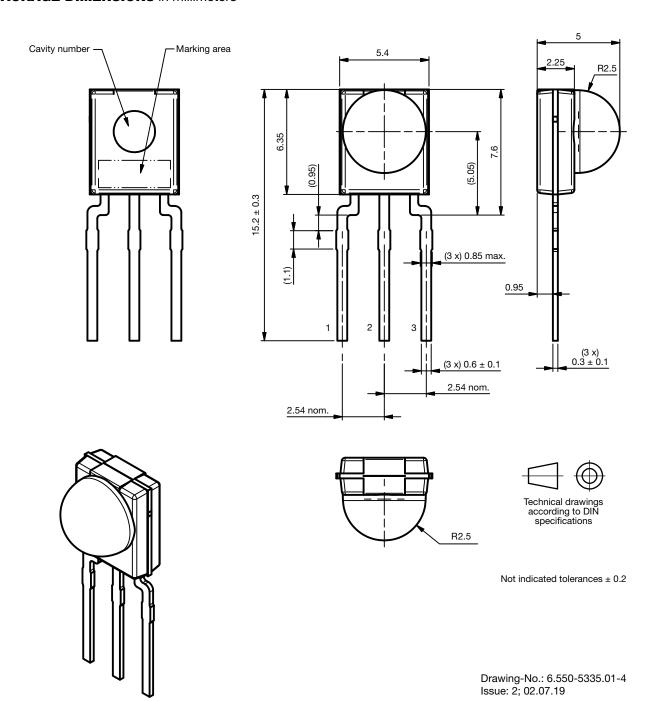
	TSOP531	TSOP533	TSOP535
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length A gap time is required of	6 to 68 cycles ≥ 6 cycles	6 to 40 cycles ≥ 7 cycles	6 to 20 cycles ≥ 7 cycles
For bursts greater than a minimum gap time in the data stream is needed of	68 cycles > 1 x burst length	40 cycles > 6 x burst length	20 cycles > 10 x burst length
Maximum number of continuous short bursts/second	2500	2500	2500
RCMM code	Yes	Preferred	Yes
XMP code	Yes	Preferred	Yes
r-map code	Yes	Preferred	Yes
RECS-80 code	Yes	Preferred	Yes
Suppression of interference from fluorescent lamps	Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13)	Complex disturbance patterns are suppressed (example: signal pattern of Fig. 14)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP532..,TSOP534..,



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PACKAGE DIMENSIONS in millimeters



Datasheet Values Refer to PCN-OPT-1225-2022-REV-0



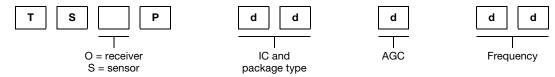
TSOP531.., TSOP533.., TSOP535..

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BULK PACKAGING

Standard shipping for minimold is in conductive plastic bags. The packing quantity is determined by weight and a maximum of 0.3 % of the components per carton may be missing.

ORDERING INFORMATION



Note

• d = "digit", please consult the list of available series on the previous page to create a valid part number

Examples: TSOP53338

TSOP53356VI1 TSOP53338SS1F

PACKAGING QUANTITY

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



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