



## IR Receiver Modules for Remote Control Systems



### 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](http://www.vishay.com/doc?99912)



### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

These products 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 TSOP383.. 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 TSOP381.. series are provided primarily for compatibility with old AGC1 designs. New designs should prefer the TSOP383.. series containing the newer AGC3. The TSOP385.. 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.

### MECHANICAL DATA

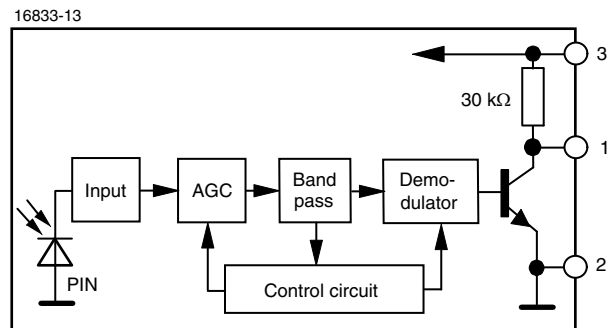
Pinning for TSOP381.., TSOP383.., TSOP385..:

1 = OUT, 2 = GND, 3 = V<sub>S</sub>

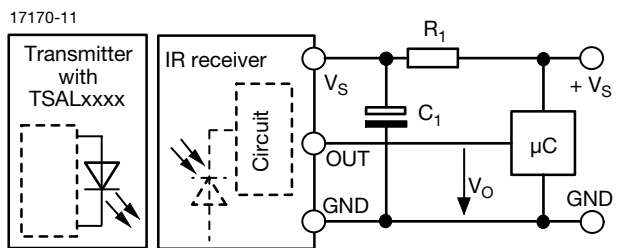
### ORDERING CODE

TSOP38... - 1500 pieces in bags

### BLOCK DIAGRAM



### APPLICATION CIRCUIT



R<sub>1</sub> and C<sub>1</sub> recommended to reduce supply ripple for V<sub>S</sub> < 2.8 V



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	TSOP38130	TSOP38330	TSOP38530
	33 kHz	TSOP38133	TSOP38333	TSOP38533
	36 kHz	TSOP38136	TSOP38336 (1)(6)	TSOP38536
	38 kHz	TSOP38138	TSOP38338 (2)(3)(4)(5)	TSOP38538
	40 kHz	TSOP38140	TSOP38340	TSOP38540
	56 kHz	TSOP38156	TSOP38356	TSOP38556
Package	Minicast			
Pinning	1 = OUT, 2 = GND, 3 = V <sub>S</sub>			
Dimensions (mm)	5.0 W x 6.95 H x 4.8 D			
Mounting	Leaded			
Application	Remote control			
Best choice for	(1) MCIR (2) Mitsubishi (3) RECS-80 Code (4) r-map (5) XMP-1, XMP-2 (6) RCMM			
Special options	• Low voltage option: <a href="http://www.vishay.com/doc?82382">www.vishay.com/doc?82382</a>			

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		V <sub>S</sub>	-0.3 to +6	V
Supply current		I <sub>S</sub>	3	mA
Output voltage		V <sub>O</sub>	-0.3 to (V <sub>S</sub> + 0.3)	V
Output current		I <sub>O</sub>	5	mA
Junction temperature		T <sub>j</sub>	100	°C
Storage temperature range		T <sub>stg</sub>	-25 to +85	°C
Operating temperature range		T <sub>amb</sub>	-25 to +85	°C
Power consumption	T <sub>amb</sub> ≤ 85 °C	P <sub>tot</sub>	10	mW
Soldering temperature	t ≤ 10 s, 1 mm from case	T <sub>sdl</sub>	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 <sub>amb</sub> = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	E <sub>v</sub> = 0, V <sub>S</sub> = 3.3 V	I <sub>SD</sub>	0.27	0.35	0.45	mA
	E <sub>v</sub> = 40 klx, sunlight	I <sub>SH</sub>	-	0.45	-	mA
Supply voltage		V <sub>S</sub>	2.5	-	5.5	V
Transmission distance	E <sub>v</sub> = 0, test signal see Fig. 1, IR diode TSAL6200, I <sub>F</sub> = 50 mA	d	-	24	-	m
Output voltage low	I <sub>OSL</sub> = 0.5 mA, E <sub>e</sub> = 0.7 mW/m <sup>2</sup> , test signal see Fig. 1	V <sub>OSL</sub>	-	-	100	mV
Minimum irradiance	Pulse width tolerance: t <sub>pi</sub> - 5/f <sub>o</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>o</sub> , test signal see Fig. 1	E <sub>e</sub> min.	-	0.12	0.25	mW/m <sup>2</sup>
Maximum irradiance	t <sub>pi</sub> - 5/f <sub>o</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>o</sub> , test signal see Fig. 1	E <sub>e</sub> max.	30	-	-	W/m <sup>2</sup>
Directivity	Angle of half transmission distance	φ <sub>1/2</sub>	-	± 45	-	°

## TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

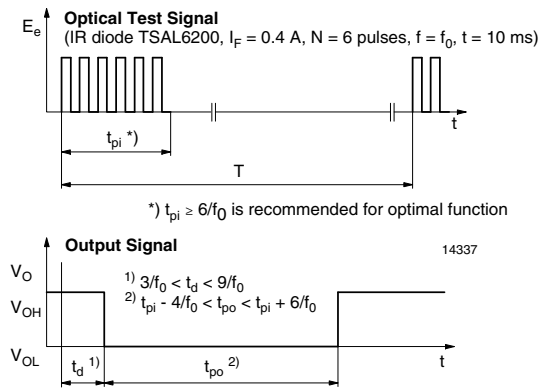


Fig. 1 - Output Active Low

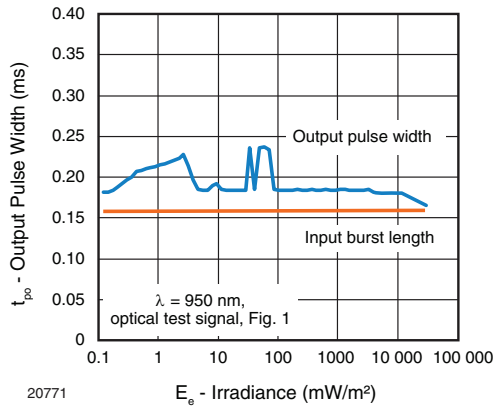


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

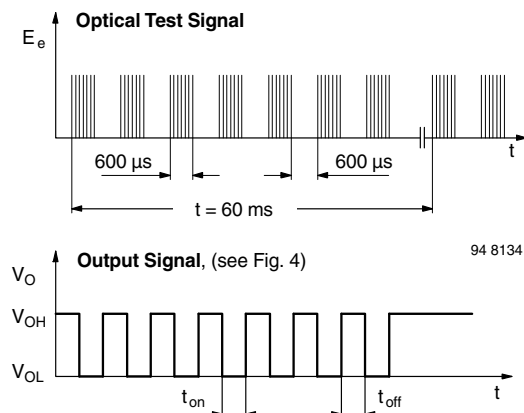


Fig. 3 - Output Function

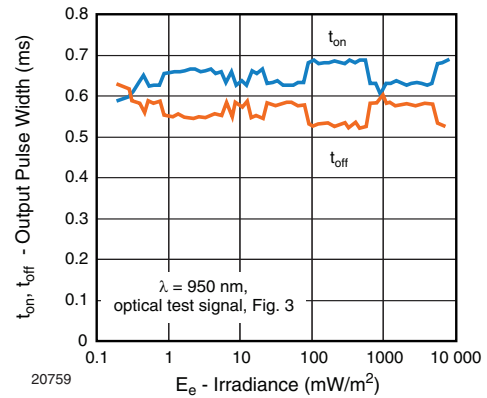


Fig. 4 - Output Pulse Diagram

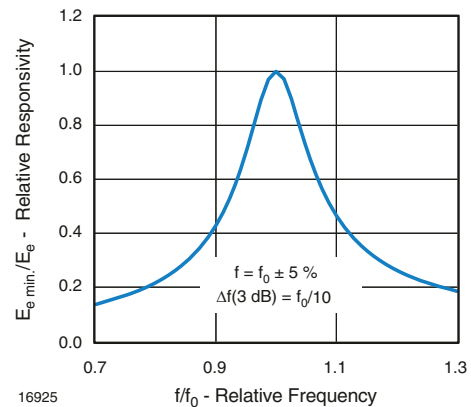


Fig. 5 - Frequency Dependence of Responsivity

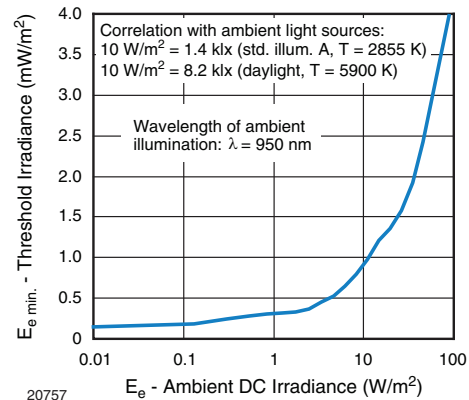


Fig. 6 - Sensitivity in Bright Ambient

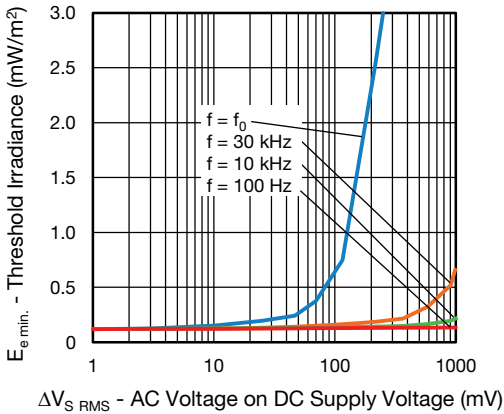


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

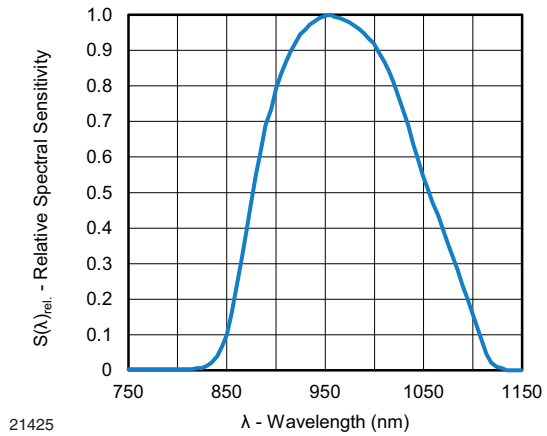


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

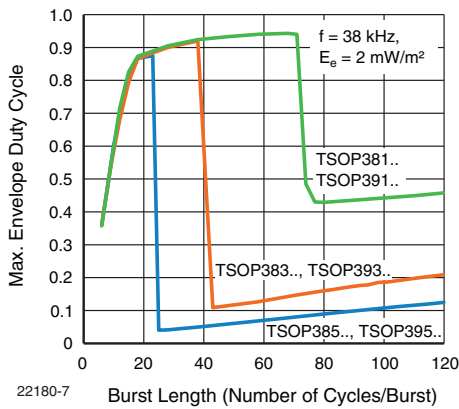


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

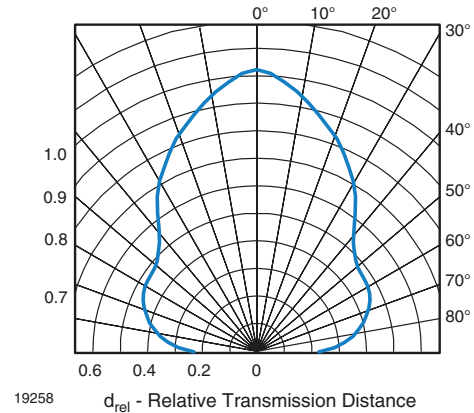


Fig. 11 - Horizontal Directivity

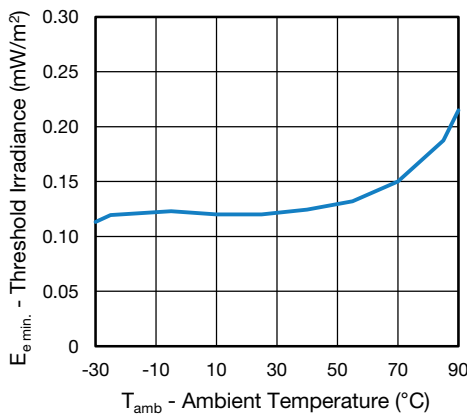


Fig. 9 - Sensitivity vs. Ambient Temperature

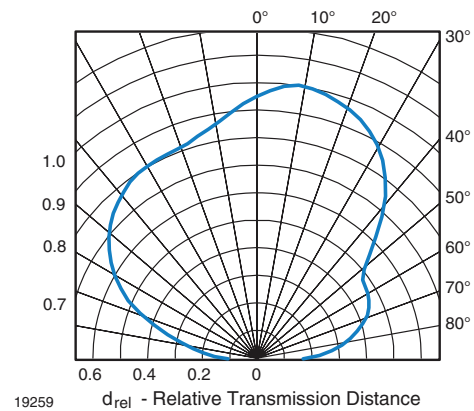


Fig. 12 - Vertical Directivity

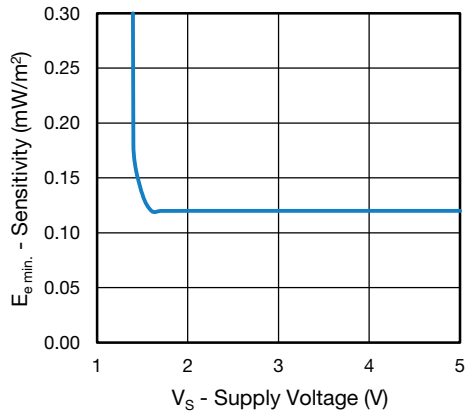


Fig. 13 - Sensitivity vs. Supply Voltage

**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. 14 or Fig. 15)



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



Fig. 15 - IR Disturbance from Fluorescent Lamp With High Modulation

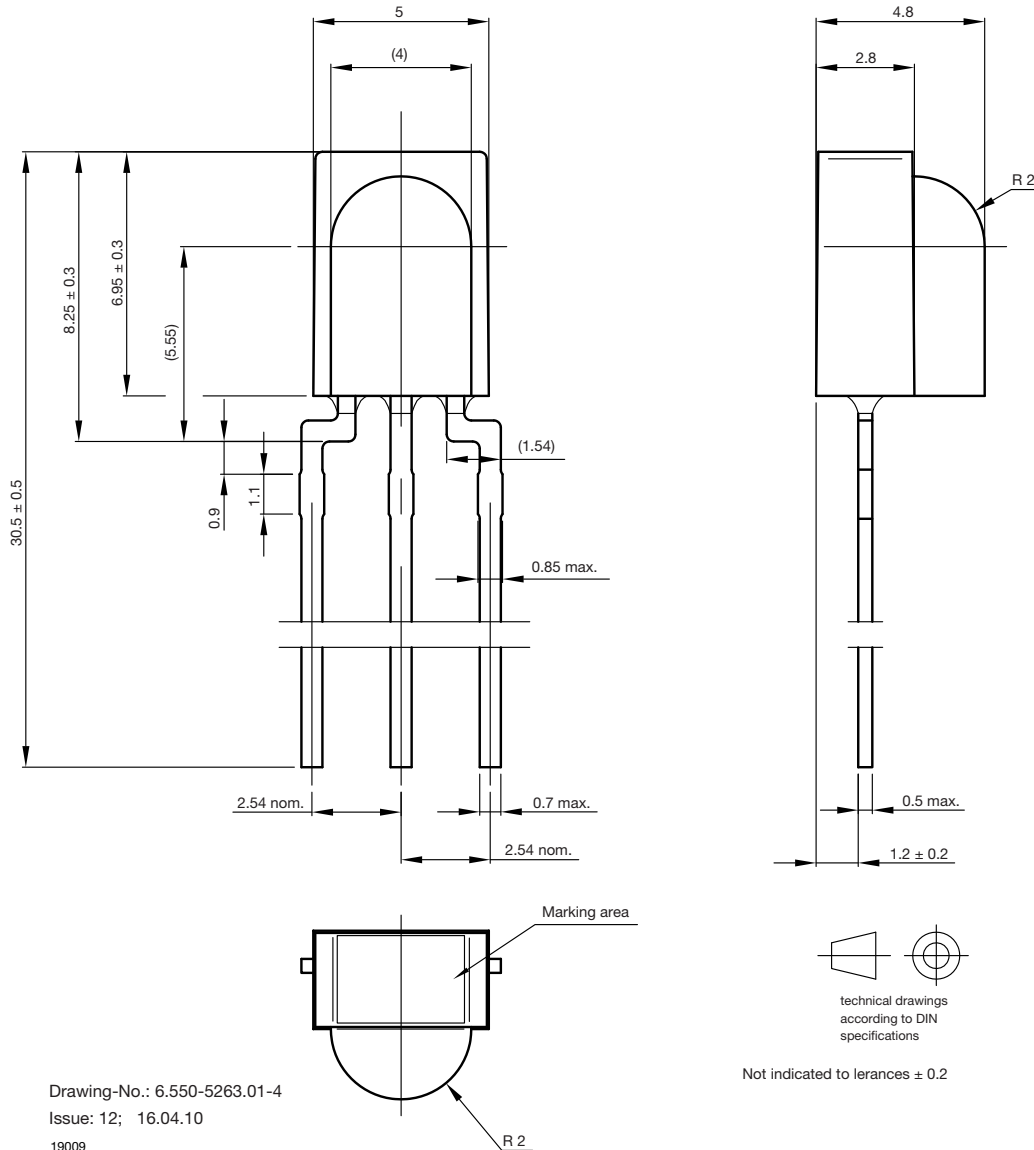
	<b>TSOP381..</b>	<b>TSOP383..</b>	<b>TSOP385..</b>
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length A gap time is required of	6 to 70 cycles ≥ 10 cycles	6 to 35 cycles ≥ 10 cycles	6 to 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the 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 TSOP382.., TSOP384..



## PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5263.01-4  
Issue: 12; 16.04.10  
19009



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