www.vishay.com

IR Receiver Modules for Remote Control Systems
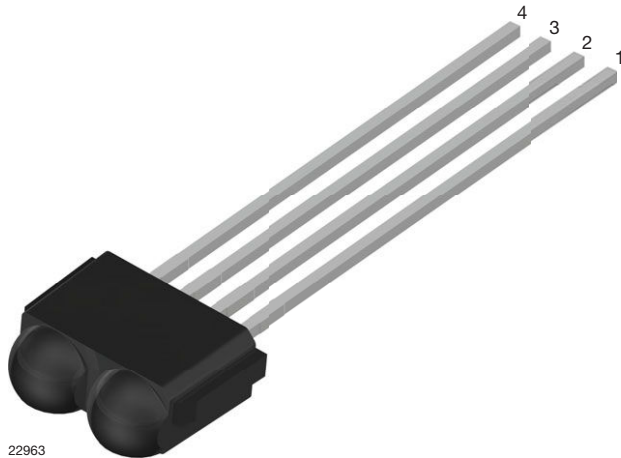
22963

DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

MECHANICAL DATA

Pinning:

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

FEATURES

- Improved immunity against HF and RF noise
- 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
- Two lenses for high sensitivity
- Insensitive to supply voltage ripple and noise
- Ultra small top-view PCB footprint
- 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 TSOP59... series are miniaturized receiver modules for infrared remote control systems. Two PIN diodes and a preamplifier are assembled on a leadframe, the epoxy package contains an IR filter. The demodulated output signal can be directly connected to digital circuitry for decoding.

The TSOP593.. series devices are optimized to suppress almost all spurious pulses from Wi-Fi and energy saving lamps (CFLs). They may also suppress some data signals if continuously transmitted.

The TSOP595.. series contains a very robust AGC5. This series should only be used for critically noisy environments. Please check compatibility with your codes.

These components have not been qualified according to automotive specifications.

PARTS TABLE

AGC		NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)	VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)
Carrier frequency	30 kHz	TSOP59330	TSOP59530
	33 kHz	TSOP59333	TSOP59533
	36 kHz	TSOP59336 [1]	TSOP59536
	38 kHz	TSOP59338 [2][3][4][5]	TSOP59538
	40 kHz	TSOP59340	TSOP59540
	56 kHz	TSOP59356	TSOP59556
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] Mitsubishi [3] RECS-80 Code [4] r-map [5] XMP-1	

BLOCK DIAGRAM

APPLICATION CIRCUIT

R_1 and C_1 recommended to reduce supply ripple for $V_S < 2.8$ V
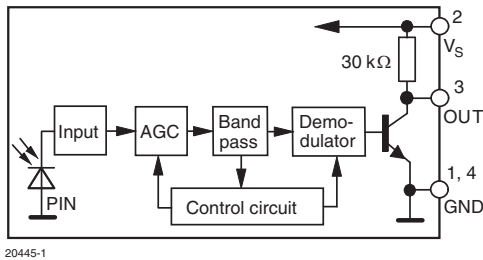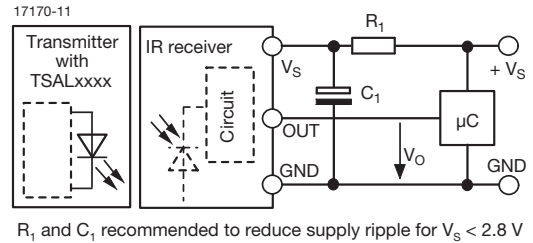
ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		V_S	-0.3 to +6	V
Supply current		I_S	5	mA
Output voltage		V_O	-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		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)

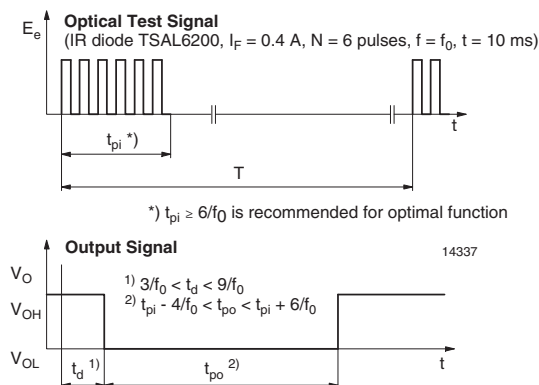| PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	$E_v = 0$, $V_S = 5$ V	I_{SD}	0.55	0.7	0.9	mA
	$E_v = 40$ klx, sunlight	I_{SH}	-	0.8	-	mA
Supply voltage		V_S	2.5	-	5.5	V
Transmission distance	$E_v = 0$, test signal see Fig. 1, IR diode TSAL6200, $I_F = 50$ mA	d	-	18	-	m
Output voltage low	$I_{OSL} = 0.5$ 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	$E_{e\ min.}$	-	0.2	0.4	mW/m²
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see Fig. 1	$E_{e\ max.}$	50	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	deg

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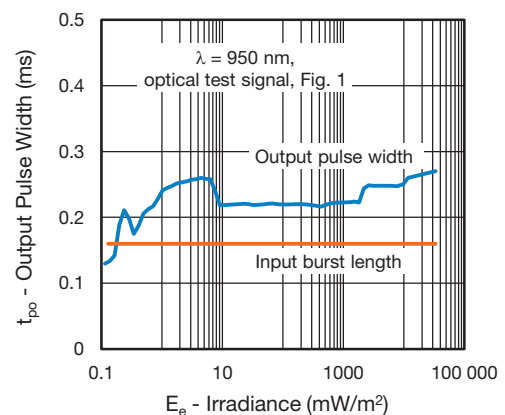

Fig. 1 - Output Active Low

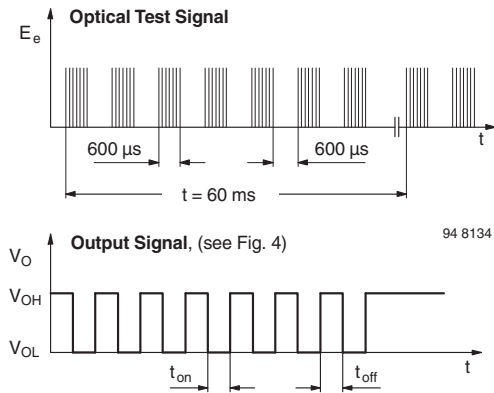Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

Optical Test Signal
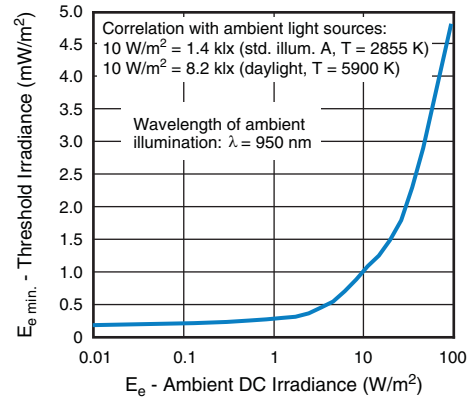
E_e

600 µs   600 µs

t = 60 ms

94 8134

Output Signal, (see Fig. 4)

V_O

V_{OH}

V_{OL}

t_{on} t_{off} t

Fig. 3 - Output Function

Correlation with ambient light sources:
10 W/m² = 1.4 klx (std. illum. A, T = 2855 K)
10 W/m² = 8.2 klx (daylight, T = 5900 K)

Wavelength of ambient
illumination: λ = 950 nm

$E_{e\,min.}$ - Threshold Irradiance (mW/m²)

E_e - Ambient DC Irradiance (W/m²)

Fig. 6 - Sensitivity in Bright Ambient

t_{on}, t_{off} - Output Pulse Width (ms)

t_{on}

t_{off}

λ = 950 nm,
optical test signal, Fig. 3

E_e - Irradiance (mW/m²)
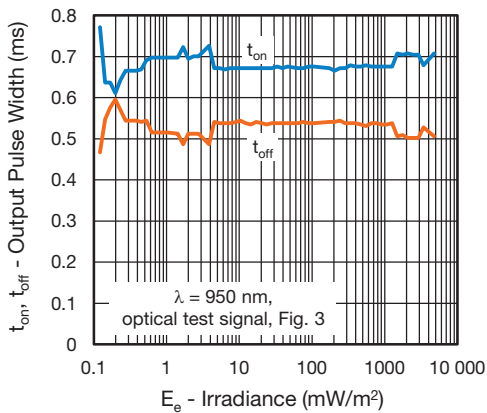
Fig. 4 - Output Pulse Diagram

$E_{e\,min.}$ - Threshold Irradiance (mW/m²)

f = f_0

f = 30 kHz

f = 20 kHz

f = 10 kHz

f = 100 Hz

$\Delta V_{S_{RMS}}$ - AC Voltage on DC Supply Voltage (mV)
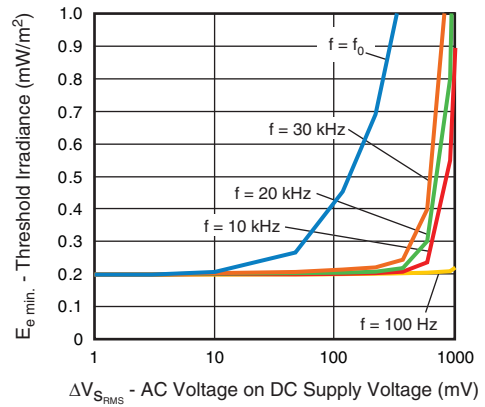
Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

$E_{e\,min.}/E_e$ - Rel. Responsivity

f = f_0 ± 5 %
Δf (3 dB) = f_0/7

16926

f/f_0 - Relative Frequency
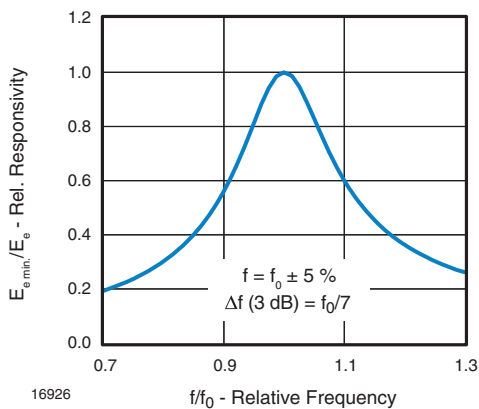
Fig. 5 - Frequency Dependence of Responsivity

Maximum Envelope Duty Cycle

TSOP593..

TSOP595..

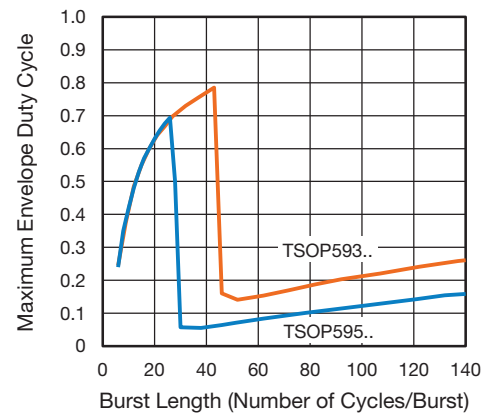Burst Length (Number of Cycles/Burst)

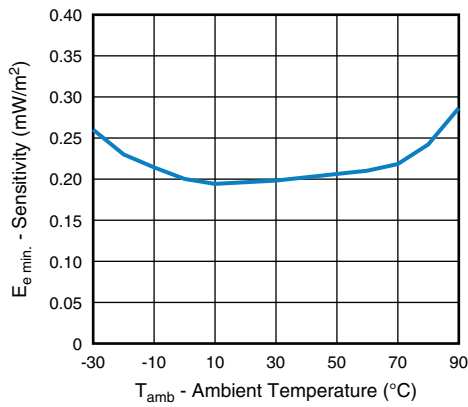Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

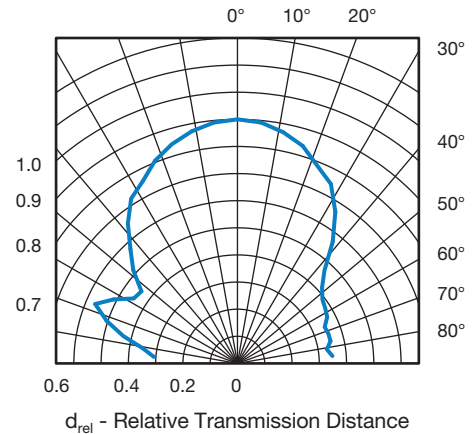Fig. 9 - Sensitivity vs. Ambient Temperature
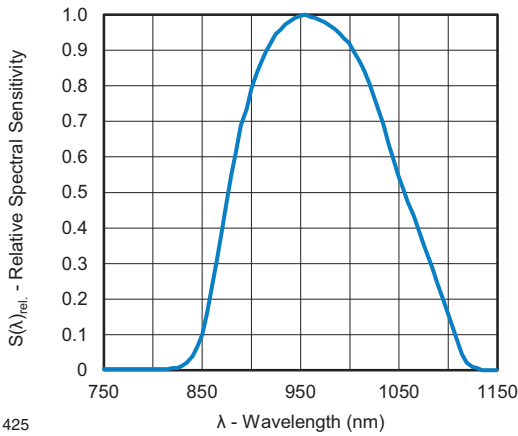

Fig. 12 - Vertical Directivity

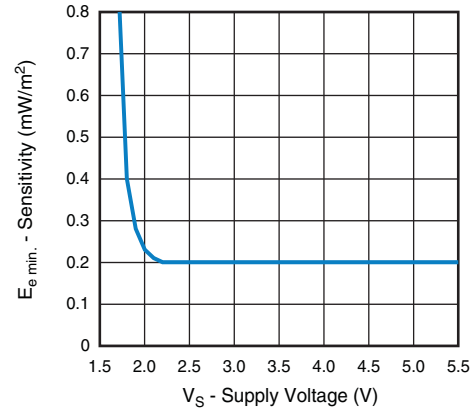Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

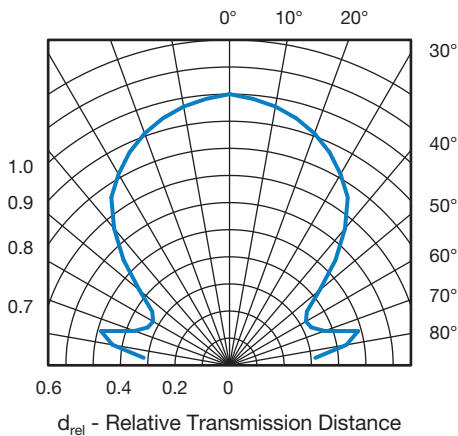Fig. 13 - Sensitivity vs. Supply Voltage

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 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
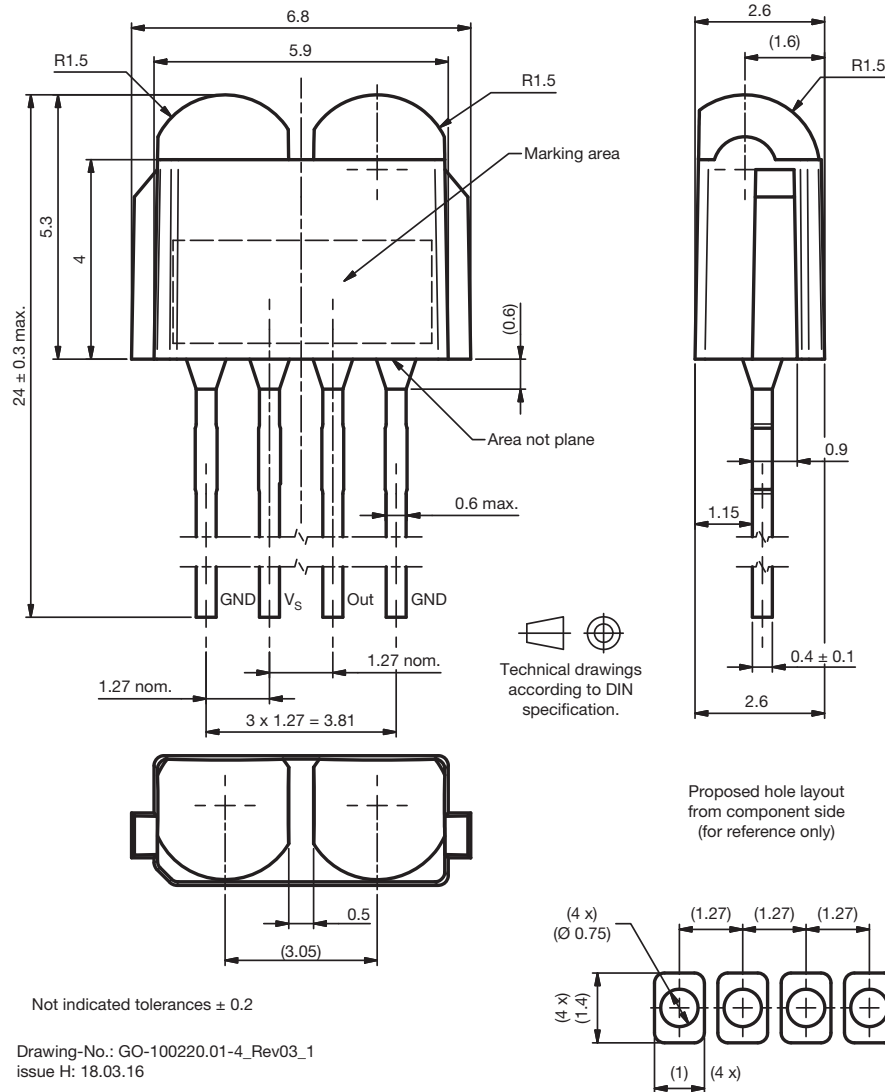With High Modulation

	TSOP593..	TSOP595..
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 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	35 cycles > 6 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000
MCIR code	Preferred	Yes
XMP-1, XMP-2 code	Preferred	Yes
Suppression of interference from fluorescent lamps	Mild and complex disturbance patterns are suppressed (example: signal patterns of Fig. 14 and Fig. 15)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

Note

• For data formats with long bursts please see the datasheet for TSOP592.., TSOP594..

PACKAGE DIMENSIONS in millimeters

6.8
5.9
R1.5
R1.5
Marking area
5.3
4
(0.6)
24 ± 0.3 max.
Area not plane
0.6 max.
GND Vs Out GND
1.27 nom.
1.27 nom.
3 x 1.27 = 3.81

2.6
(1.6)
R1.5
0.9
1.15
0.4 ± 0.1
2.6

Technical drawings according to DIN specification.

0.5
(3.05)

Not indicated tolerances ± 0.2

Drawing-No.: GO-100220.01-4_Rev03_1
issue H: 18.03.16

Proposed hole layout from component side (for reference only)

(4 x)
(Ø 0.75)
(1.27) (1.27) (1.27)
(4 x)
(1.4)
(1) (4 x)

BULK PACKAGING

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 ± 0.3 %.

ORDERING INFORMATION

T S ___ P   d d   d   d d

O = receiver
S = sensor

IC and package type

AGC

Frequency
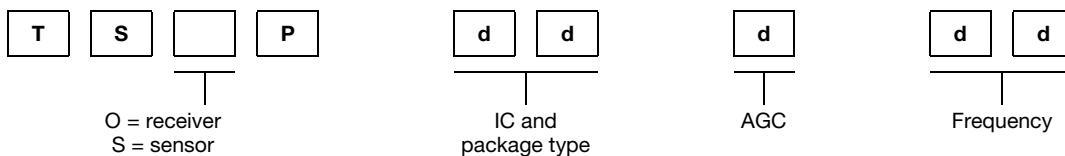
Note
- d = "digit", please consult the list of available devices create a valid part number

Example: TSOP59338

PACKAGING QUANTITY

- 400 pieces per bag (each bag is individually boxed)

- 6 bags per carton

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