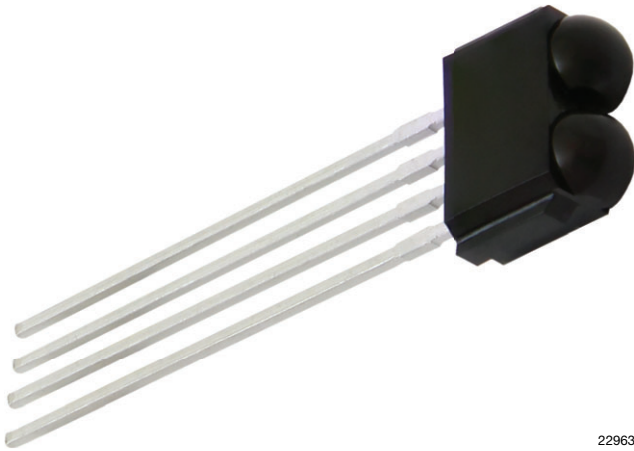




## IR Receiver Modules for Remote Control Systems



22963

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



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### LINKS TO ADDITIONAL RESOURCES



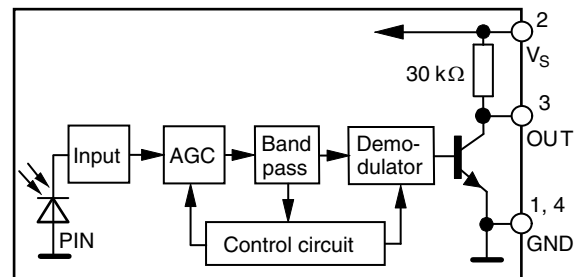
### APPLICATIONS

- Infrared remote control systems

### DESIGN SUPPORT TOOLS

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

### BLOCK DIAGRAM



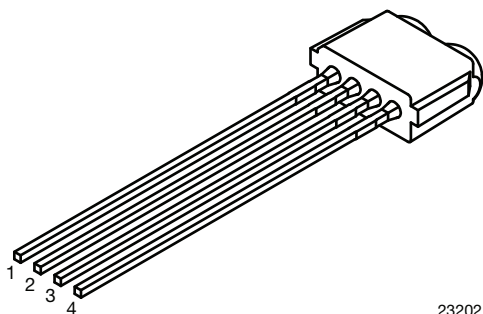
20445-1



**MECHANICAL DATA**

**Pinning:**

1, 4 = GND, 2 = V<sub>S</sub>, 3 = OUT

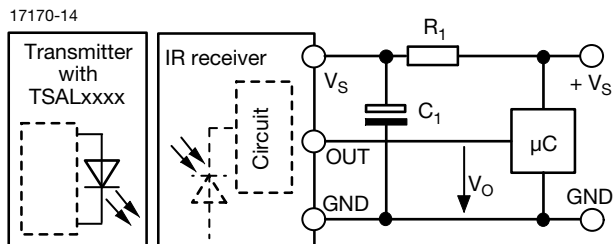


23202

**ORDERING CODE**

TSOP593.., TSOP595.. - 2400 pcs in 6 bags

**APPLICATION CIRCUIT**



R<sub>1</sub> and C<sub>1</sub> recommended in case there are strong ripple or spikes on the supply line.

PARTS TABLE			
<b>AGC</b>		<b>NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)</b>	<b>VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)</b>
<b>Carrier frequency</b>	30 kHz	TSOP59330	TSOP59530
	33 kHz	TSOP59333	TSOP59533
	36 kHz	TSOP59336 <sup>(1)(2)</sup>	TSOP59536
	38 kHz	TSOP59338 <sup>(2)(3)(4)</sup>	TSOP59538
	40 kHz	TSOP59340	TSOP59540
	56 kHz	TSOP59356 <sup>(5)</sup>	TSOP59556
<b>Package</b>	TVCast		
<b>Pinning</b>	1, 4 = GND, 2 = V <sub>S</sub> , 3 = OUT		
<b>Dimensions (mm)</b>	6.8 W x 2.6 H x 5.3 D		
<b>Mounting</b>	Leaded		
<b>Application</b>	Remote control		
<b>Best choice for</b>	<sup>(1)</sup> MCIR <sup>(2)</sup> RCMM <sup>(3)</sup> RECS-80 code <sup>(4)</sup> XMP <sup>(5)</sup> r-map		
<b>Special options</b>	<ul style="list-style-type: none"> <li>Narrow optical filter: <a href="http://www.vishay.com/doc?81590">www.vishay.com/doc?81590</a></li> <li>Wide optical filter: <a href="http://www.vishay.com/doc?82726">www.vishay.com/doc?82726</a></li> </ul>		

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>	5	mA
Output voltage		V <sub>O</sub>	-0.3 to 5.5	V
Voltage at output to supply		V <sub>S</sub> - 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>sd</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>	0.25	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>	2.0	-	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	-	21	-	m
Output voltage low	I <sub>OSSL</sub> = 0.5 mA, E <sub>e</sub> = 0.7 mW/m <sup>2</sup> , test signal see Fig. 1	V <sub>OSSL</sub>	-	-	100	mV
Minimum irradiance	Test signal: RC-5	E <sub>e min.</sub>	-	0.15	0.3	mW/m <sup>2</sup>
	Test signal: XMP code	E <sub>e min.</sub>	-	0.23	0.4	mW/m <sup>2</sup>
Maximum irradiance	t <sub>pi</sub> - 3/f <sub>0</sub> < t <sub>po</sub> < t <sub>pi</sub> + 3.5/f <sub>0</sub> , test signal see Fig. 1	E <sub>e max.</sub>	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)

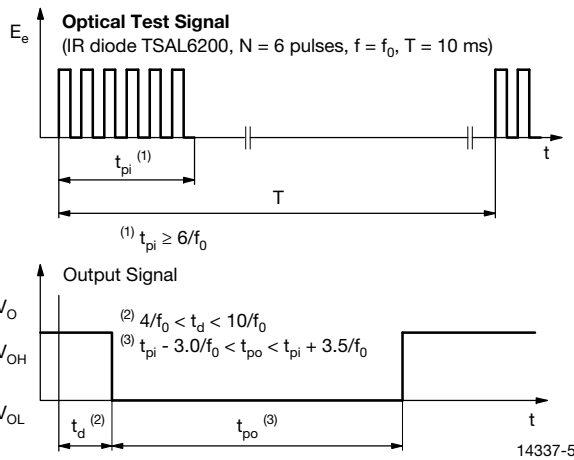


Fig. 1 - Output Active Low

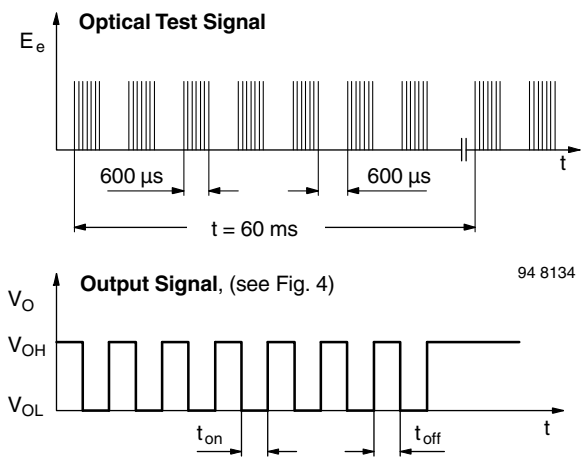


Fig. 3 - Output Function

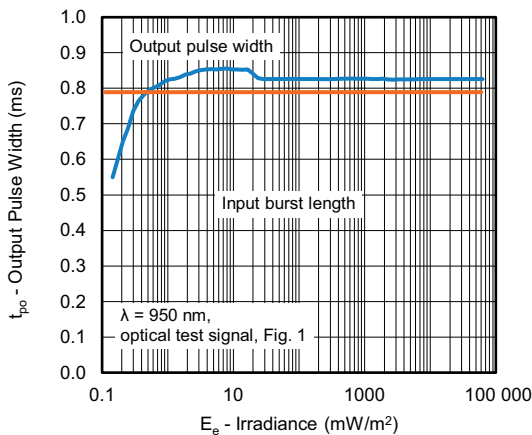


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

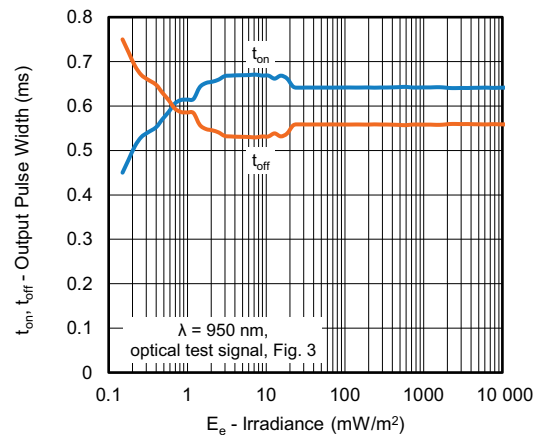


Fig. 4 - Output Pulse Diagram

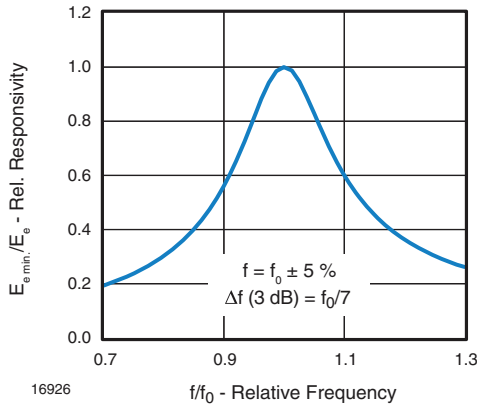


Fig. 5 - Frequency Dependence of Responsivity

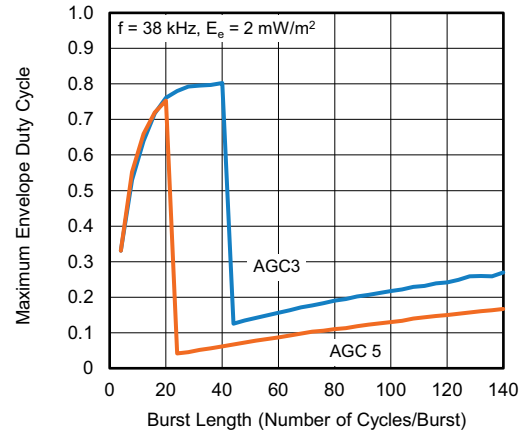


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

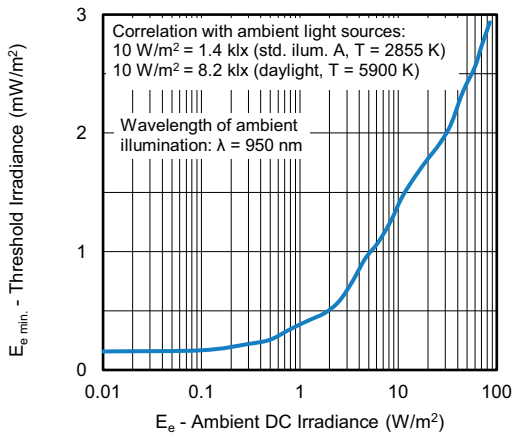


Fig. 6 - Sensitivity in Bright Ambient

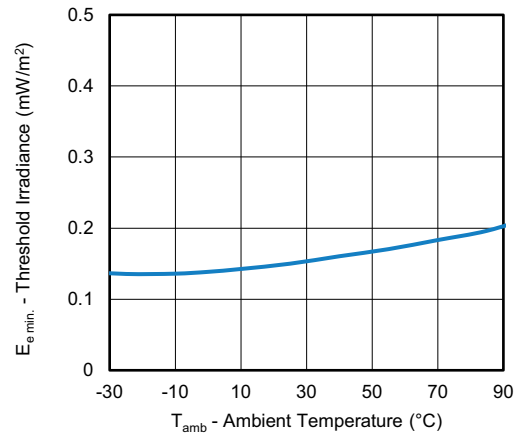


Fig. 9 - Sensitivity vs. Ambient Temperature

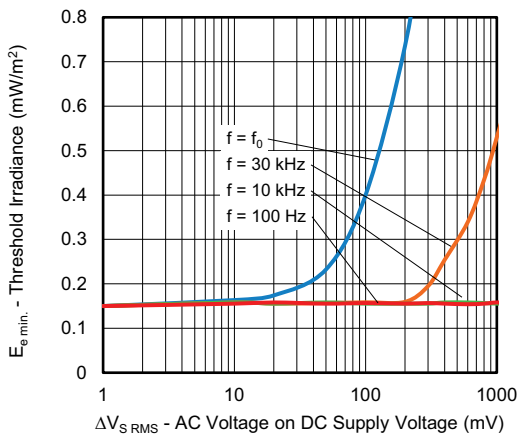


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

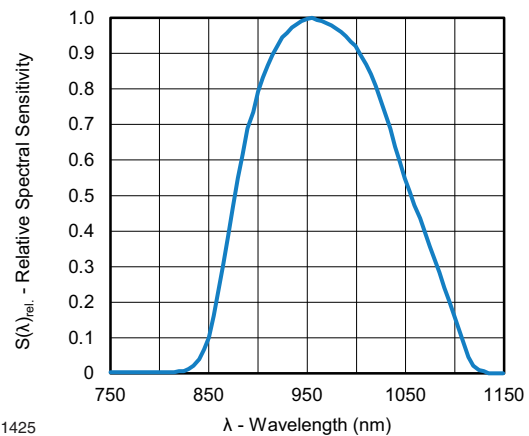


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

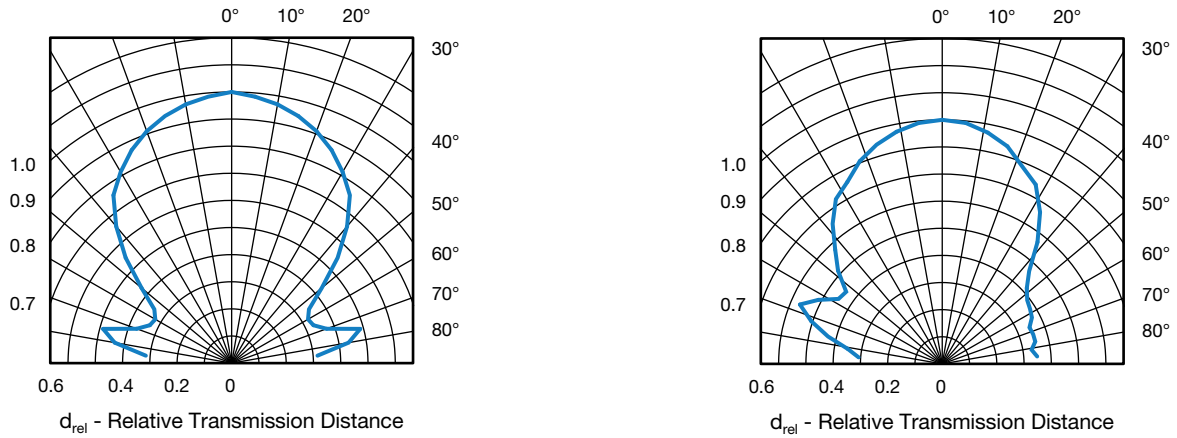


Fig. 11 - Horizontal and Vertical Directivity

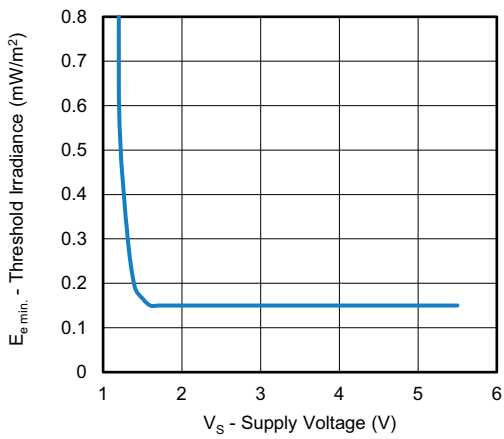


Fig. 12 - Sensitivity vs. Supply Voltage



**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 pattern from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14)

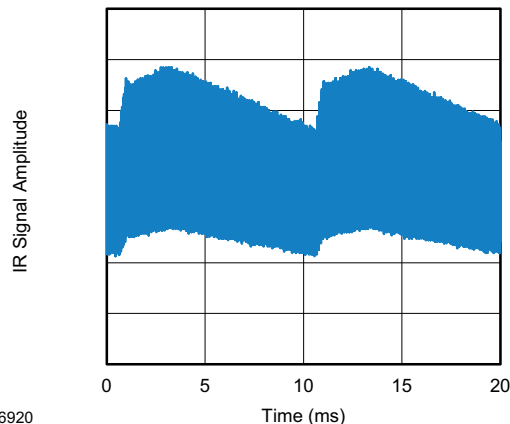


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

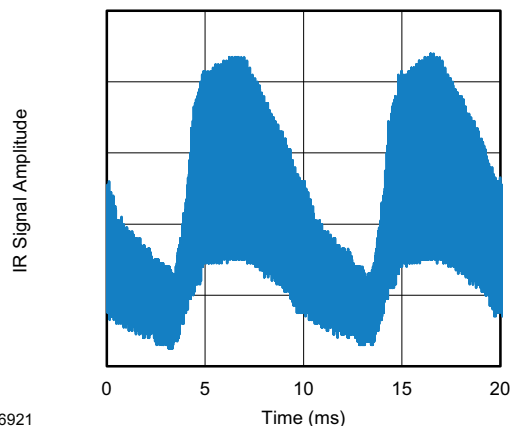


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

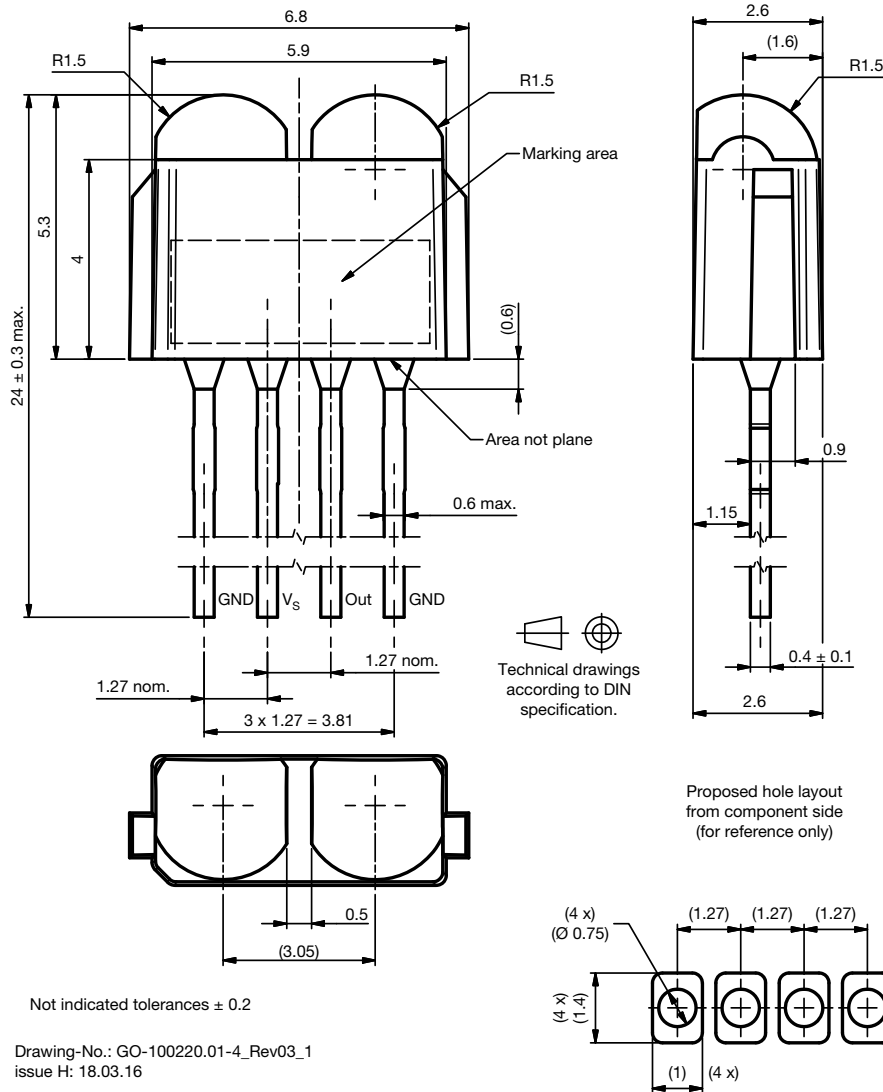
	TSOP593..	TSOP595..
Minimum burst length	6 cycles/burst	6 cycles/burst
After each burst of length a minimum gap time is required of	6 to 40 cycles ≥ 7 cycles	6 to 20 cycles ≥ 7 cycles
For bursts greater than a minimum gap time in the data stream is needed of	40 cycles > 6 x burst length	20 cycles > 10 x burst length
Maximum number of continuous short bursts/second	2500	2500
RCMM code	Preferred	Yes
XMP code	Preferred	Yes
r-map code	Preferred	Yes
RECS-80 code	Preferred	Yes
Suppression of interference from fluorescent lamps	Mild and complex disturbance patterns are suppressed (example: signal patterns of Fig. 13 and Fig. 14)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

**Note**

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



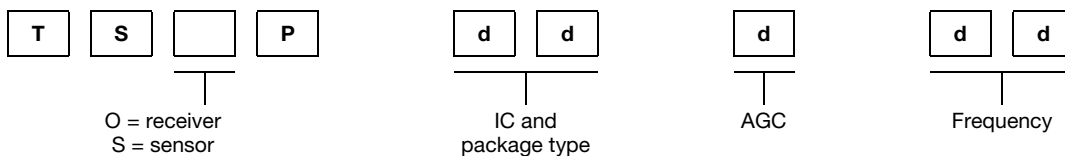
**PACKAGE DIMENSIONS** in millimeters



**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**



**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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