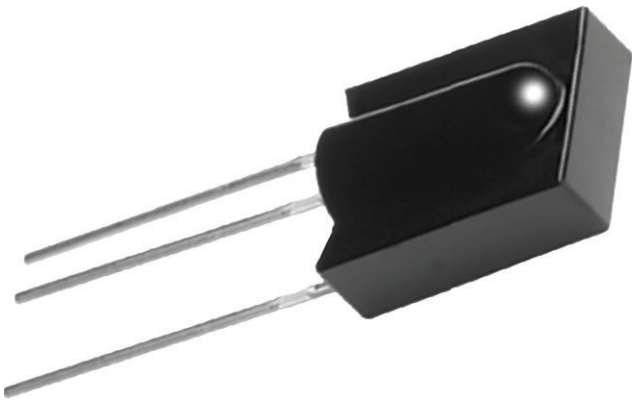
IR Receiver Modules for Remote Control Systems



LINKS TO ADDITIONAL RESOURCES

Product Page | Marking | Packages | Holders | Bends and Cuts

DESCRIPTION

This IR receiver series is optimized for long 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

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

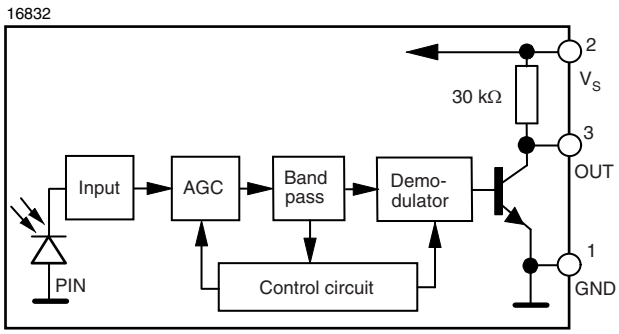
APPLICATIONS

- Infrared remote control systems

DESIGN SUPPORT TOOLS

- 3D models

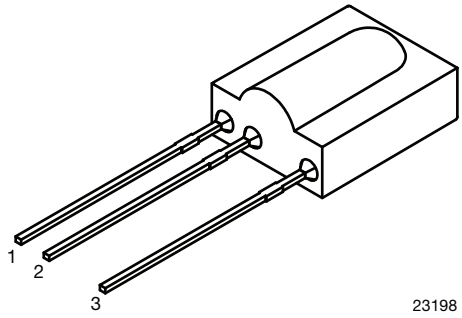
BLOCK DIAGRAM



MECHANICAL DATA

Pinning:

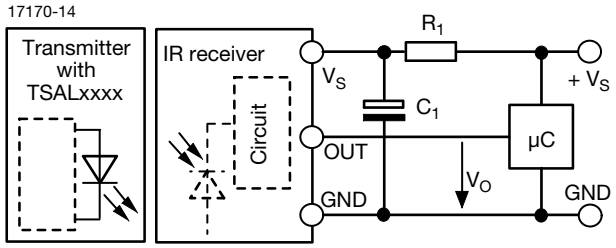
1 = GND, 2 = V_S, 3 = OUT



ORDERING CODE

TSOP11... - 1000 pieces in tubes

APPLICATION CIRCUIT



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

PARTS TABLE				
AGC		**BASIC NOISE SUPPRESSION (AGC2)**	**ENHANCED NOISE SUPPRESSION (AGC4)**	**MAXIMIZED NOISE SUPPRESSION (AGC6)**
Carrier frequency	30 kHz	TSOP11230	TSOP11430	TSOP11630
	33 kHz	TSOP11233	TSOP11433	TSOP11633
	36 kHz	TSOP11236	TSOP11436 (4)(6)	TSOP11636 (5)
	38 kHz	TSOP11238	TSOP11438 (2)(3)(9)(10)	TSOP11638
	40 kHz	TSOP11240 (11)	TSOP11440	TSOP11640
	56 kHz	TSOP11256 (1)	TSOP11456 (8)	TSOP11656 (7)
Package		Cast		
Pinning		1 = GND, 2 = V_S, 3 = OUT		
Dimensions (mm)		10.0 W x 12.5 H x 5.8 D		
Mounting		Leaded		
Application		Remote control		
Best choice for		(1) Cisco (2) Mitsubishi (3) NEC (4) Panasonic (5) RC-5 (6) RC-6 (7) RCA (8) r-step (9) Sejin 4PPM (10) Sharp (11) Sony		

Note

- 30 kHz and 33 kHz only available on written request

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Supply voltage (pin 2)		V_S	-0.3 to +6.0	V
Supply current (pin 2)		I_S	3	mA
Output voltage (pin 3)		V_O	-0.3 to (V_S + 0.3)	V
Output current (pin 3)		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 ≤ 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 (pin 2)	E_v = 0, V_S = 3.3 V	I_{SD}	0.25	0.35	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.45	-	mA
Supply voltage		V_S	2.0	-	5.5	V
Transmission distance	E_v = 0, test signal see Fig. 1, IR diode TSAL6200, I_F = 50 mA	d	-	30	-	m
Output voltage low (pin 3)	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m², test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Test signal: RC5 code	$E_{e\ min.}$	-	0.08	0.20	mW/m²
	Test signal: NEC code	$E_{e\ min.}$	-	0.12	0.25	mW/m²
Maximum irradiance	Pulse width tolerance: t_{pi} - 5/f_o < t_{po} < t_{pi} + 5/f_o, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	°

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

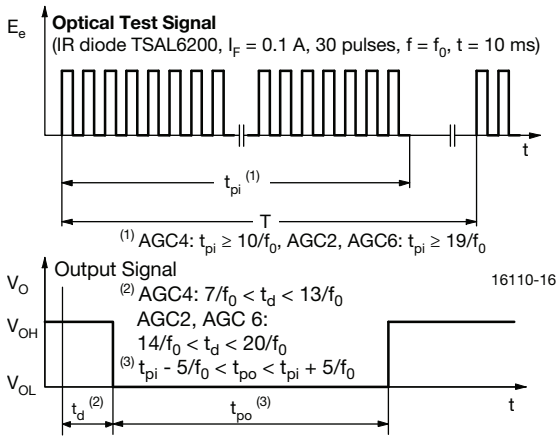


Fig. 1 - Output Delay and Pulse-Width

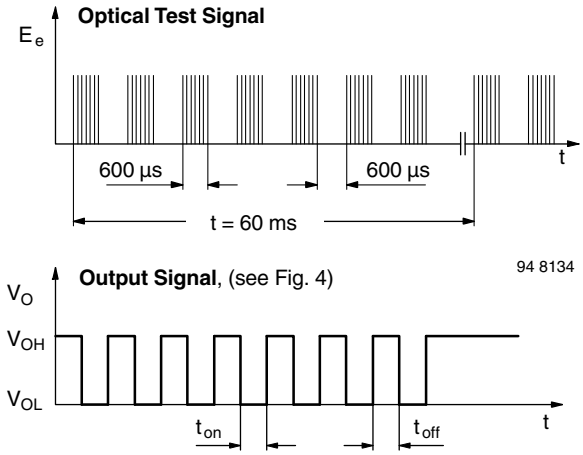


Fig. 3 - Test Signal

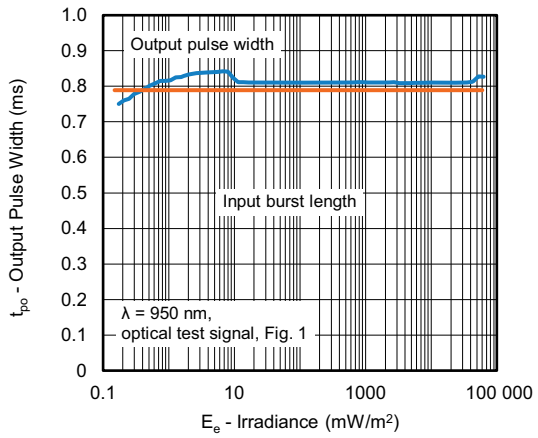


Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient

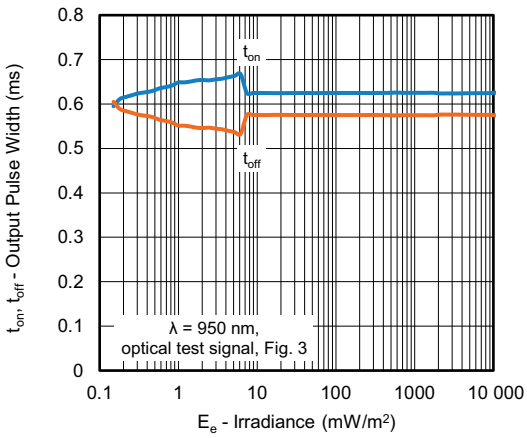


Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

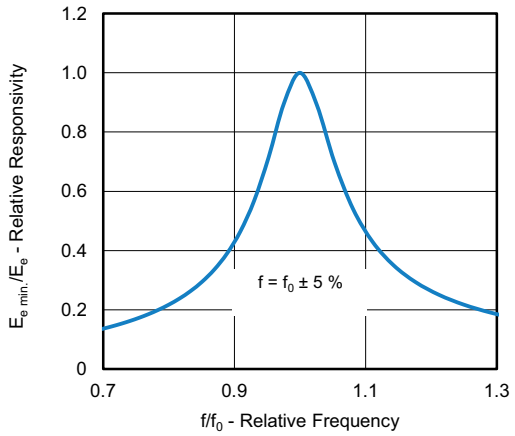


Fig. 5 - Frequency Dependence of Responsivity

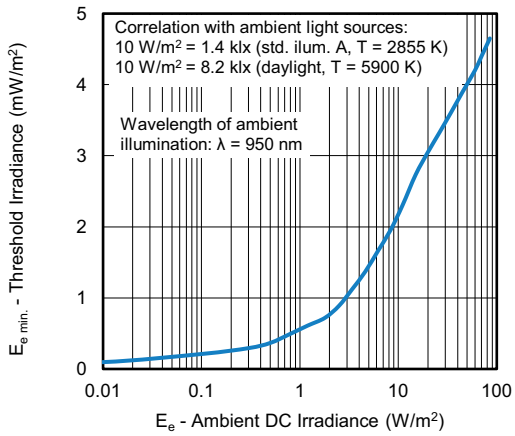


Fig. 6 - Sensitivity in Bright Ambient

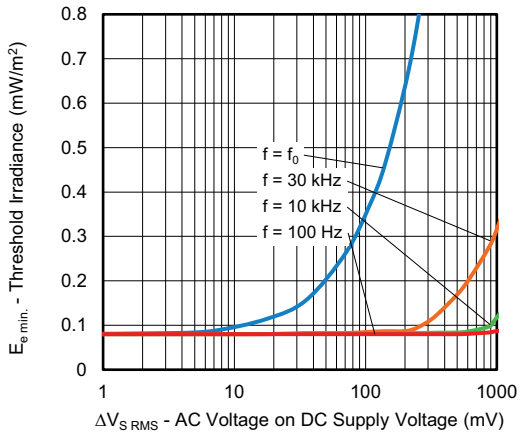


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

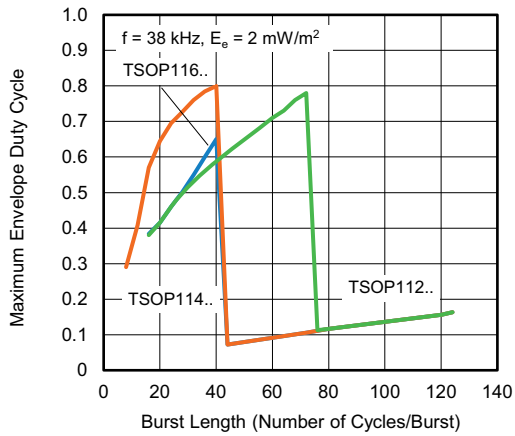


Fig. 8 - Maximum Envelope Duty Cycle vs. Burst Length

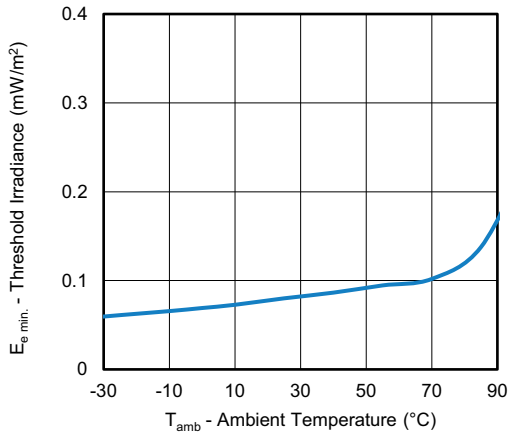


Fig. 9 - Sensitivity vs. Ambient Temperature

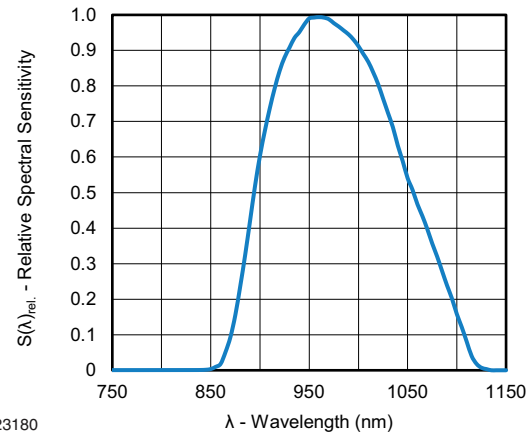


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

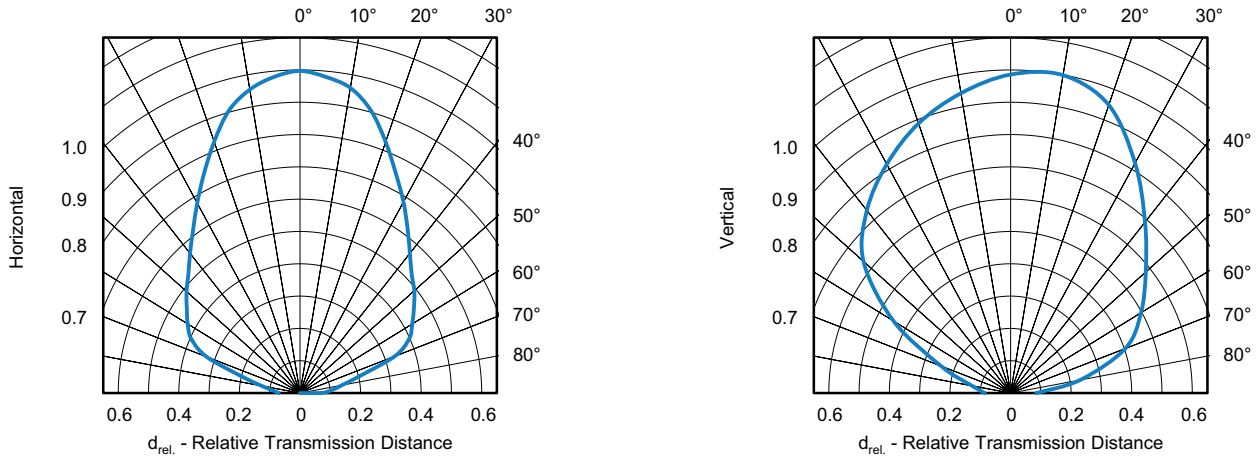


Fig. 11 - Horizontal and Vertical Directivity

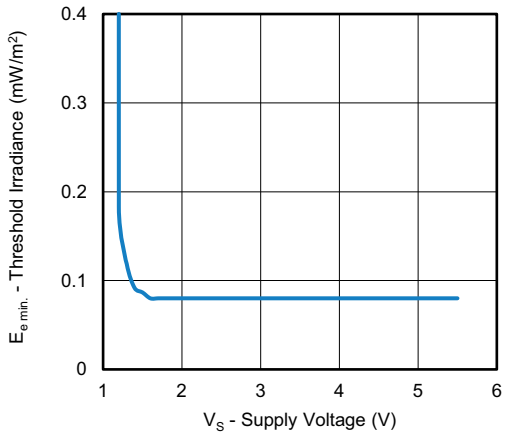


Fig. 12 - Sensitivity vs. Supply Voltage

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 patterns from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14).
- 2.4 GHz and 5 GHz Wi-Fi

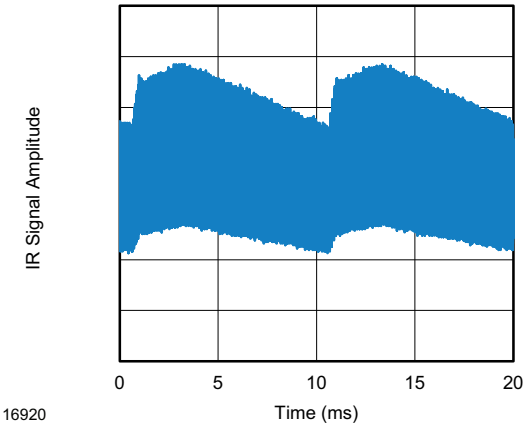


Fig. 13 - IR Emission from Fluorescent Lamp with Low Modulation

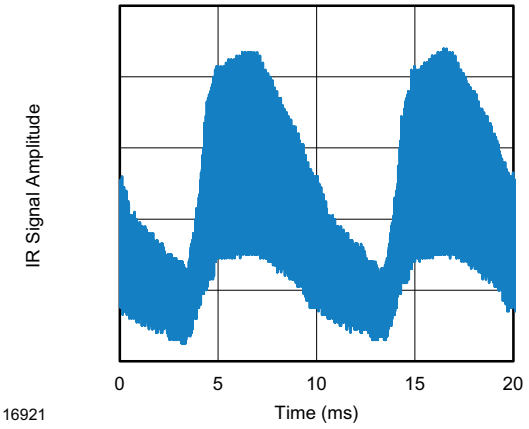


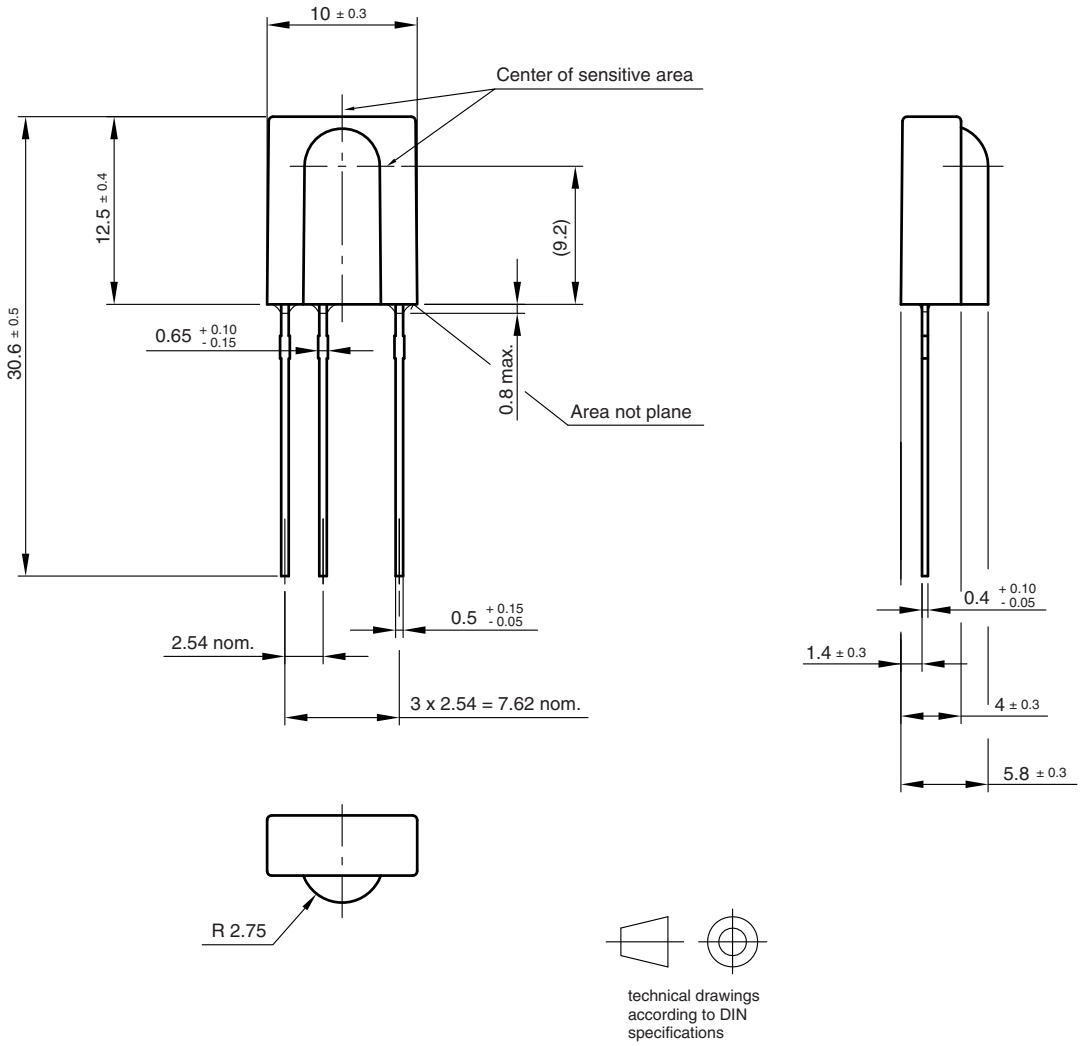
Fig. 14 - IR Emission from Fluorescent Lamp with High Modulation

	TSOP112..	TSOP114..	TSOP116..
Minimum burst length	19 cycles/burst	10 cycles/burst	19 cycles/burst
After each burst of length a minimum gap time is required of	19 to 72 cycles ≥ 20 cycles	10 to 40 cycles ≥ 11 cycles	19 to 40 cycles ≥ 20 cycles
For bursts greater than a minimum gap time in the data stream is needed of	72 cycles > 6 x burst length	40 cycles > 10 x burst length	40 cycles > 10 x burst length
Maximum number of continuous short bursts/second	720	1300	750
RC-5 code	Yes	Yes	Preferred
RC-6 code	No	Preferred	No
NEC code	Yes	Preferred	Yes
r-step code	No	Preferred	No
Sony code	Preferred	No	No
RCA 56 kHz code	Yes	Yes	Preferred
Suppression of interference from fluorescent lamps	Fig. 13	Fig. 13 and Fig. 14	Fig. 13 and Fig. 14

Note

- For data formats with short bursts please see the datasheet for TSOP111.., TSOP113.., TSOP115..

PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5095.01-4

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