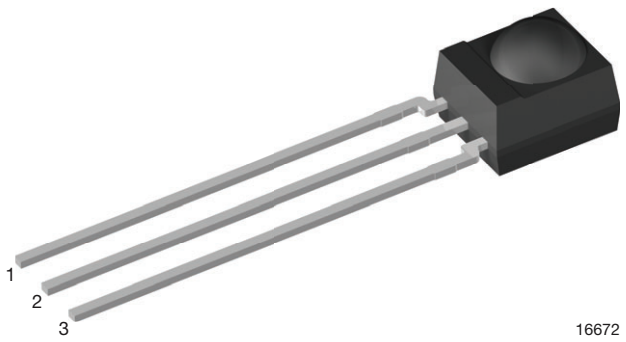
IR Receiver Modules for Remote Control Systems



FEATURES

- Improved dark sensitivity
- Improved immunity against optical noise
- Very low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.0 V to 3.6 V
- Insensitive to supply voltage ripple and noise
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

Product Page | 3D Models | Calculators | Marking | Packages | Holders | Bends and Cuts

DESCRIPTION

The TSOP94... series devices are the latest generation miniaturized IR receiver modules for infrared remote control systems. These series provide improvements in sensitivity to remote control signals in dark ambient as well as in sensitivity in the presence of optical disturbances e.g. from CFLs.

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.

The TSOP942.. and TSOP944.., series devices are designed to receive long burst codes (10 or more carrier cycles per burst). The third digit designates the AGC level (AGC2 or AGC4) and the last two digits designate the band-pass frequency (see table below). The higher the AGC, the better noise is suppressed, but the lower the code compatibility. AGC2 provides basic noise suppression and AGC4 provides enhanced noise suppression. Generally, we advise to select the highest AGC that satisfactorily receives the desired remote code.

These components have not been qualified to automotive specifications.

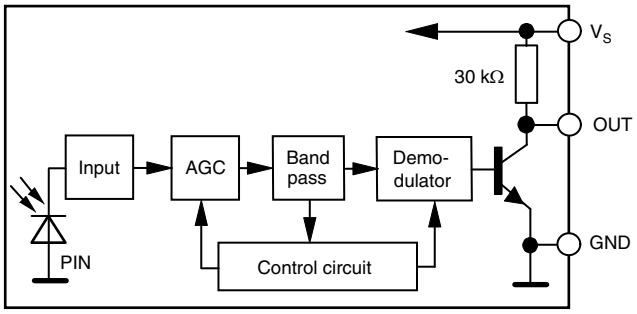
MECHANICAL DATA

1 = OUT, 2 = GND, 3 = V_S

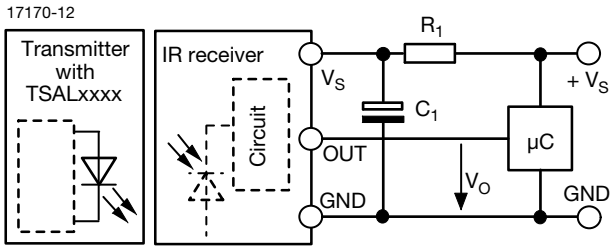
ORDERING CODE

TSOP942.., TSOP944... - 2160 pieces in tubes

BLOCK DIAGRAM



APPLICATION CIRCUIT



R_1 and C_1 recommended to reduce supply ripple for V_S < 2.2 V

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PARTS TABLE			
AGC		**BASIC NOISE SUPPRESSION (AGC2)**	**ENHANCED NOISE SUPPRESSION (AGC4)**
Carrier frequency	30 kHz	TSOP94230	TSOP94430
	33 kHz	TSOP94233	TSOP94433
	36 kHz	TSOP94236	TSOP94436 (6)
	38 kHz	TSOP94238	TSOP94438 (9)
	40 kHz	TSOP94240 (11)	TSOP94440
	56 kHz	TSOP94256 (1)	TSOP94456 (7)(8)
Package		Mold	
Pinning		1 = OUT, 2 = GND, 3 = V_S	
Dimensions (mm)		6.0 W x 6.95 H x 5.6 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	
Special options		• Narrow optical filter: www.vishay.com/doc?81590 • Wide optical filter: www.vishay.com/doc?82726	

Notes
- 30 kHz and 33 kHz only available on written request
- See datasheet for TSOP946.. for preferred devices for (2)(3)(4)(5)(10)

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Supply voltage		V_S	-0.3 to +3.6	V
Supply current		I_S	3	mA
Output voltage		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 ≤ 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 = 3.3 V	I_{SD}	0.25	0.37	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.50	-	mA
Supply voltage		V_S	2.0	-	3.6	V
Transmission distance	E_v = 0, test signal see Fig. 1, IR diode TSAL6200, I_F = 50 mA	d	-	32	-	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	Test signal: NEC code	$E_{e\ min.}$	-	0.07	0.15	mW/m²
Maximum irradiance	$t_{pi} - 4/f_0 < t_{po} < t_{pi} + 4/f_0$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	°

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

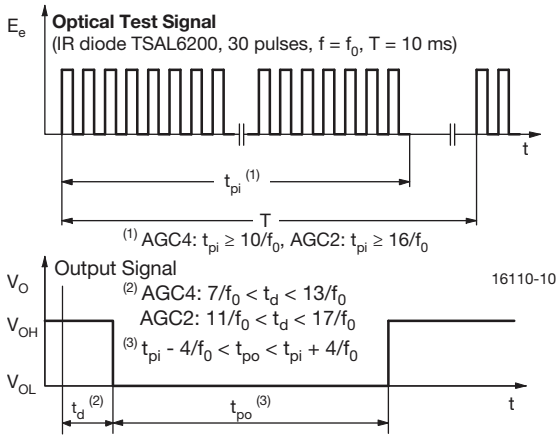


Fig. 1 - Output Delay and Pulse-Width

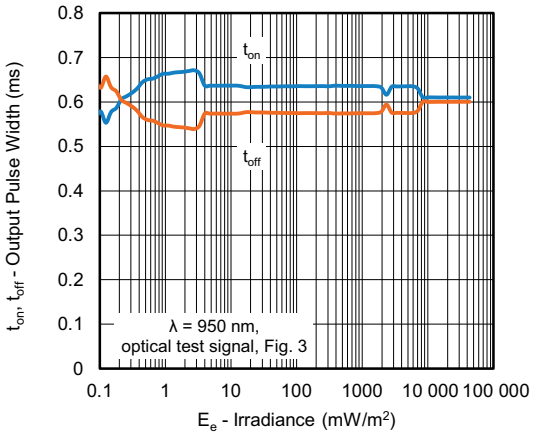


Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

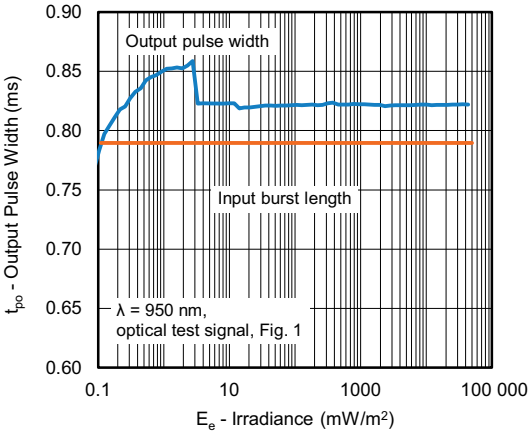


Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient

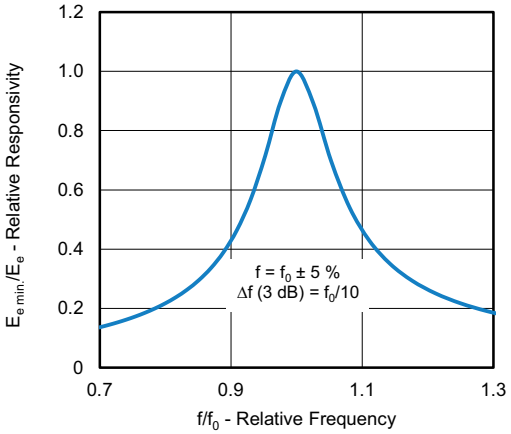


Fig. 5 - Frequency Dependence of Responsivity

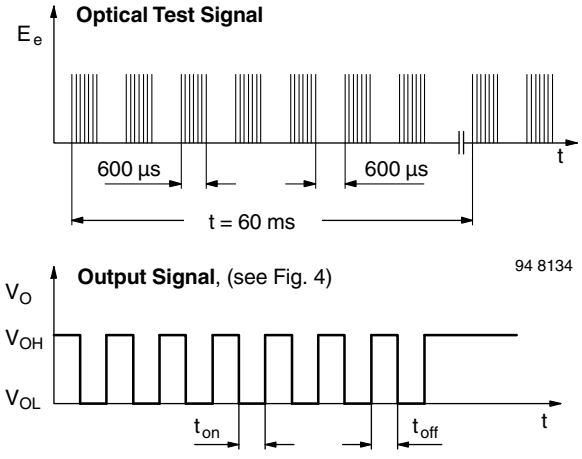


Fig. 3 - Test Signal

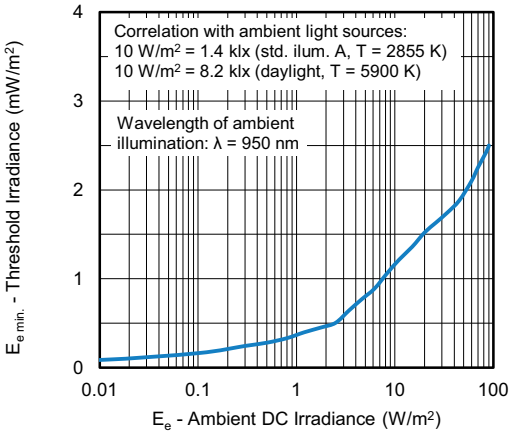


Fig. 6 - Sensitivity in Bright Ambient

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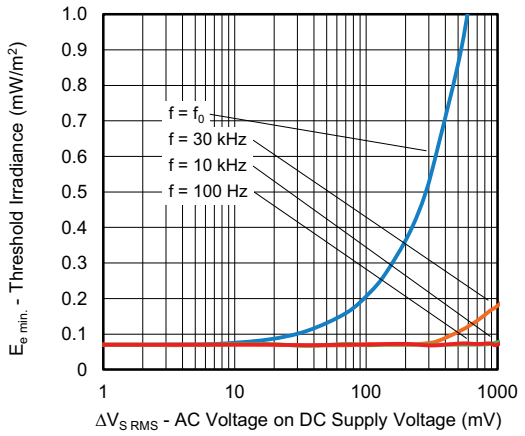


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

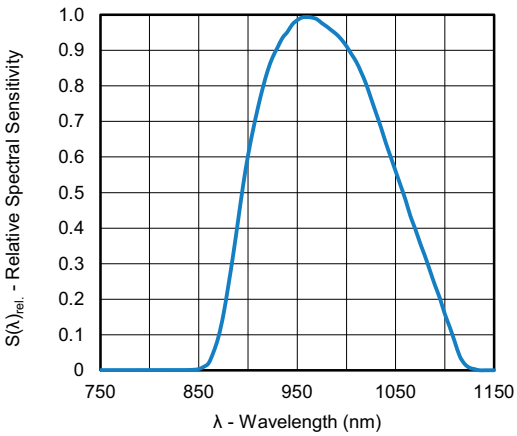


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

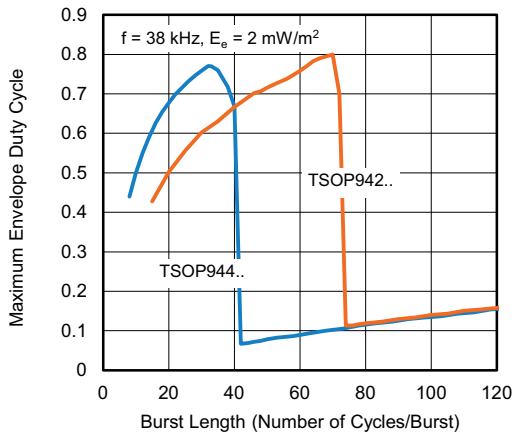


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

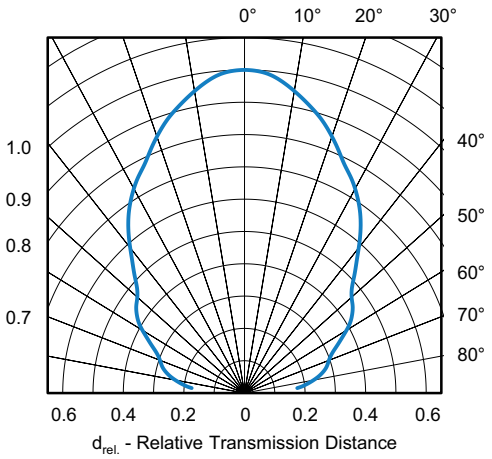


Fig. 11 - Directivity

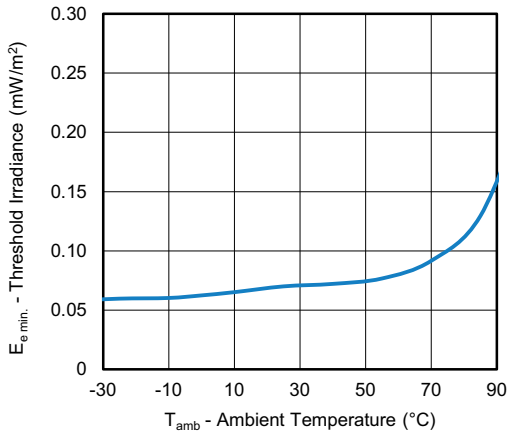


Fig. 9 - Sensitivity vs. Ambient Temperature

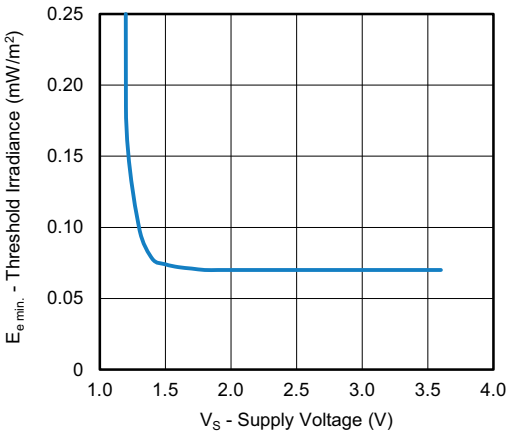


Fig. 12 - Sensitivity vs. Supply Voltage

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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)

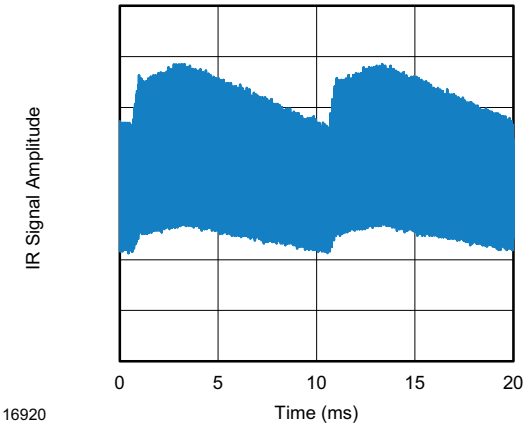


Fig. 13 - IR Emission from Fluorescent Lamp With Low Modulation

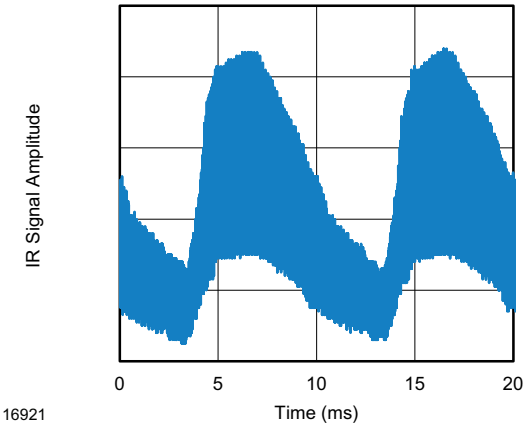


Fig. 14 - IR Emission from Fluorescent Lamp With High Modulation

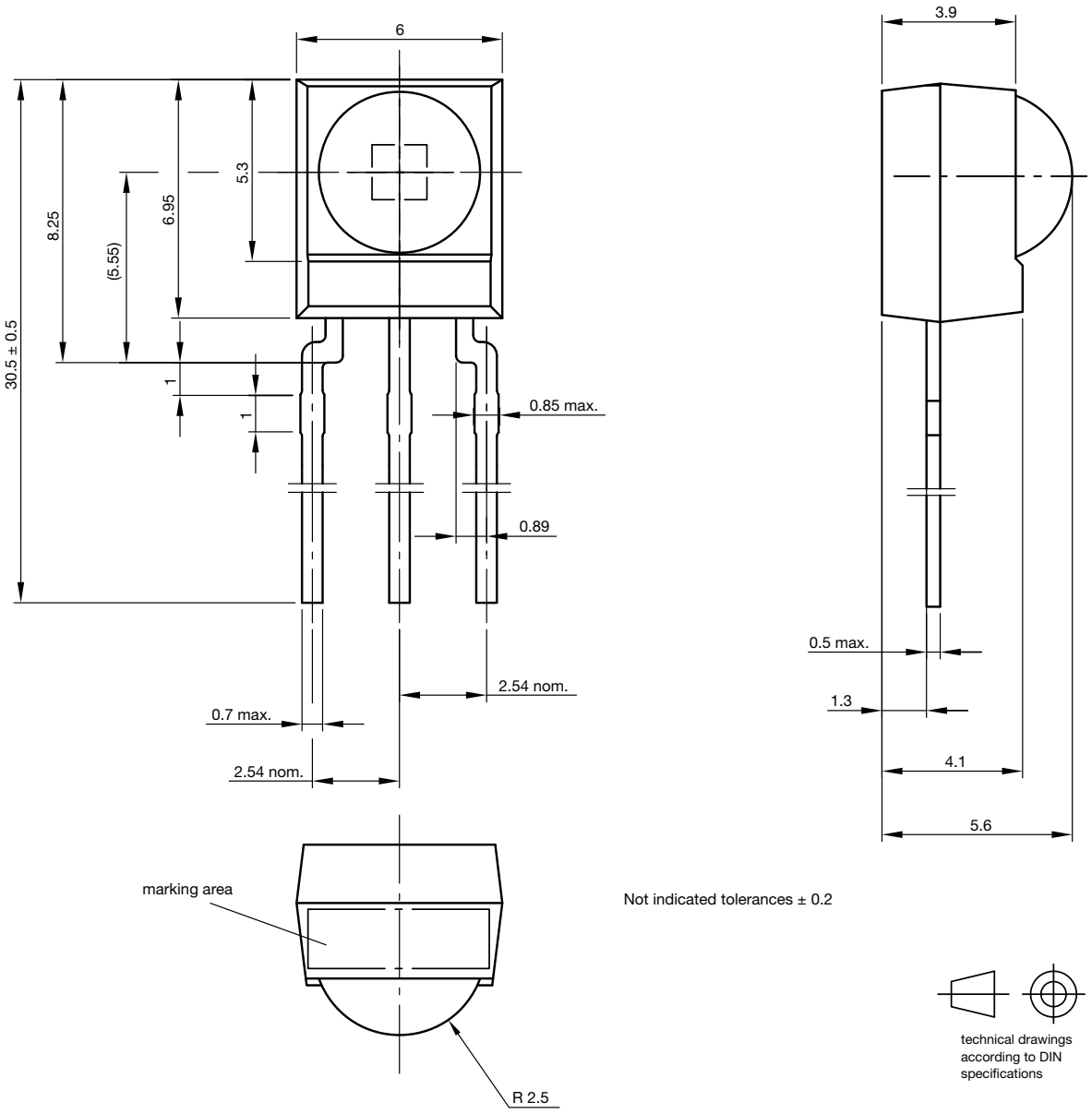
	TSOP942..	TSOP944..
Minimum burst length	16 cycles/burst	10 cycles/burst
After each burst of length a minimum gap time is required of	16 to 70 cycles ≥ 16 cycles	10 to 40 cycles ≥ 12 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 6 x burst length	40 cycles > 10 x burst length
Maximum number of continuous short bursts/second	1000	1800
RC-5 code	Yes	Yes
RC-6 code	Yes	Preferred
NEC code	Yes	Yes
r-step code 56 kHz	No	Preferred
Sony code	Preferred	No
RCA 56 kHz code	Yes	Preferred
Mitsubishi code 38 kHz	Yes	Yes
Suppression of interference from fluorescent lamps	Fig. 13	Fig. 13 and Fig. 14

Note

- For data formats with short bursts please see the datasheet for TSOP943.., TSOP945..

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PACKAGE DIMENSIONS in millimeters



Not indicated tolerances ± 0.2

technical drawings
according to DIN
specifications

Drawing-No.: 6.550-5169.01-4
Issue: 9; 03.11.10
13655

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