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 short 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)

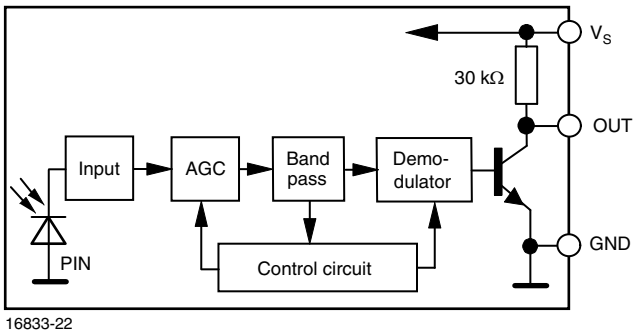
DESIGN SUPPORT TOOLS

- 3D models
- Window size calculator

APPLICATIONS

- Infrared remote control systems

BLOCK DIAGRAM



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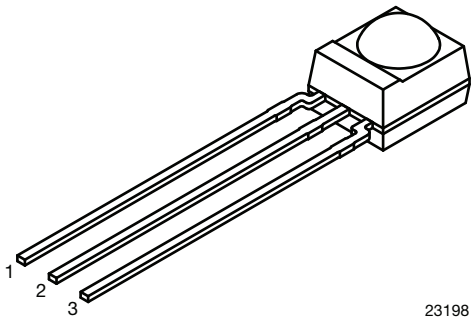
MECHANICAL DATA

Pinning for TSOP14...:

1 = OUT, 2 = GND, 3 = V_S

Pinning for TSOP12...:

1 = OUT, 2 = V_S, 3 = GND



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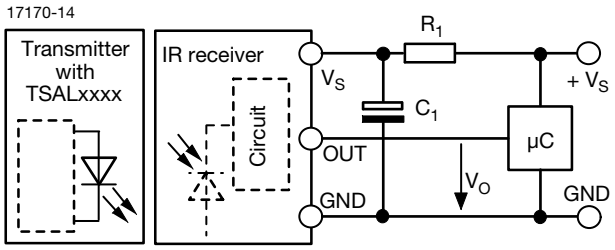
ORDERING CODE

TSOP12..., TSOP14... - 2160 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 (AGC1)		ENHANCED NOISE SUPPRESSION (AGC3)		MAXIMIZED NOISE SUPPRESSION (AGC5)	
Carrier frequency	30 kHz	TSOP14130	TSOP12130	TSOP14330	TSOP12330	TSOP14530	TSOP12530
	33 kHz	TSOP14133	TSOP12133	TSOP14333	TSOP12333	TSOP14533	TSOP12533
	36 kHz	TSOP14136	TSOP12136	TSOP14336 (1)(5)	TSOP12336 (1)(5)	TSOP14536	TSOP12536
	38 kHz	TSOP14138	TSOP12138	TSOP14338 (2)(4)	TSOP12338 (2)(4)	TSOP14538	TSOP12538
	40 kHz	TSOP14140	TSOP12140	TSOP14340	TSOP12340	TSOP14540	TSOP12540
	56 kHz	TSOP14156	TSOP12156	TSOP14356 (3)	TSOP12356 (3)	TSOP14556	TSOP12556
Package		Mold					
Pinning		1 = OUT, 2 = GND, 3 = V_S	1 = OUT, 2 = V_S, 3 = GND	1 = OUT, 2 = GND, 3 = V_S	1 = OUT, 2 = V_S, 3 = GND	1 = OUT, 2 = GND, 3 = V_S	1 = OUT, 2 = V_S, 3 = GND
Dimensions (mm)		6.0 W x 6.95 H x 5.6 D					
Mounting		Leaded					
Application		Remote control					
Best choice for		(1) RCMM (2) RECS-80 Code (3) r-map (4) XMP (5 MCIR					
Special options		• Narrow optical filter: www.vishay.com/doc?81590 • Wide optical filter: www.vishay.com/doc?82726					

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		V_S	-0.3 to +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	0.35	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	-	39	-	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: RC5 code	$E_{e\ min.}$	-	0.05	0.1	mW/m²
	Test signal: XMP code	$E_{e\ min.}$	-	0.1	0.2	mW/m²
Maximum irradiance	t_{pi} - 3.0/f_0 < t_{po} < t_{pi} + 3.5/f_0, 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)

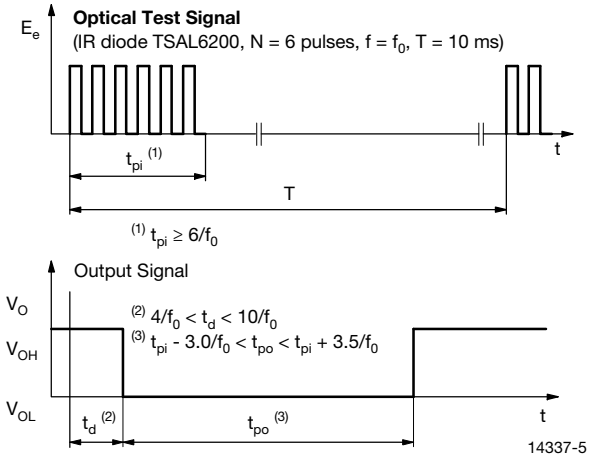


Fig. 1 - Output Delay and Pulse-Width

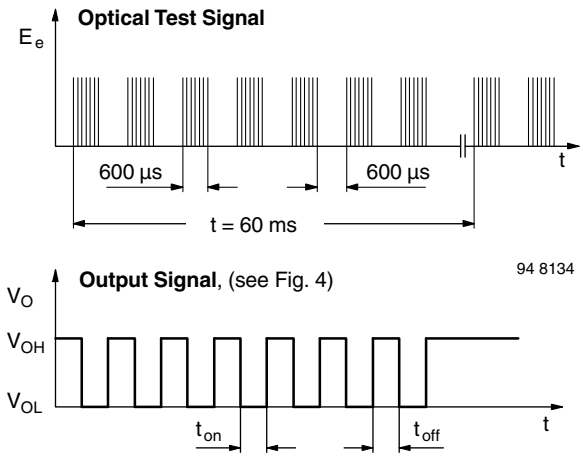


Fig. 3 - Test Signal

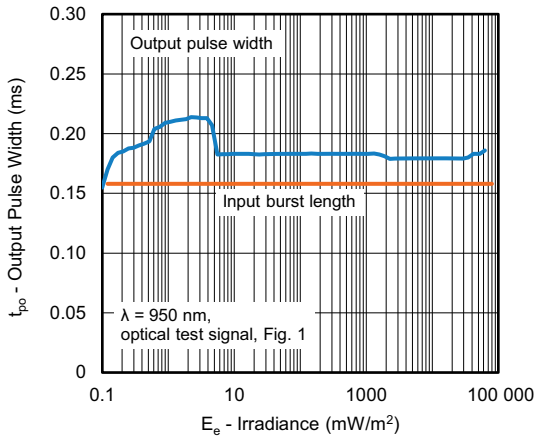


Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient

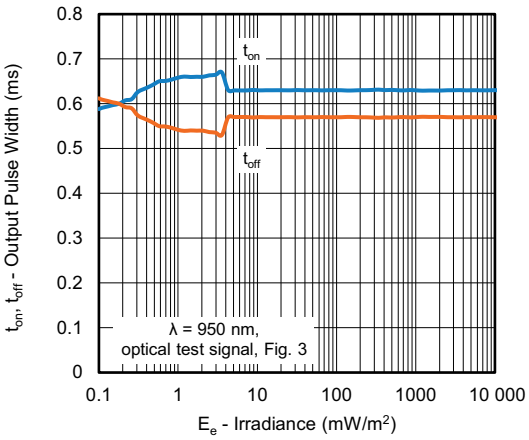


Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

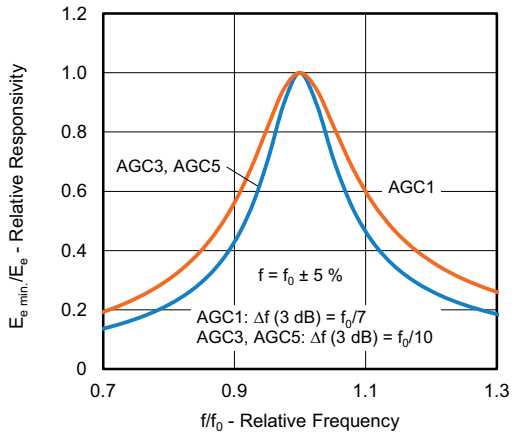


Fig. 5 - Frequency Dependence of Responsivity

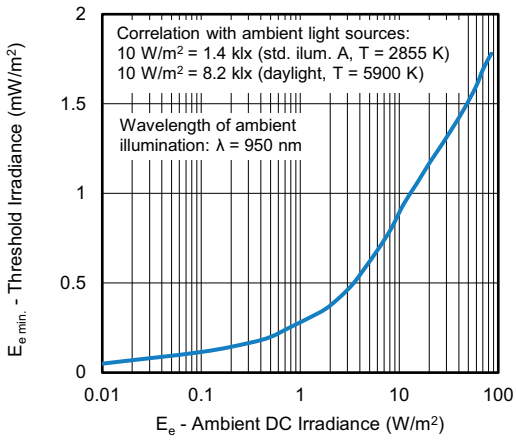


Fig. 6 - Sensitivity in Bright Ambient

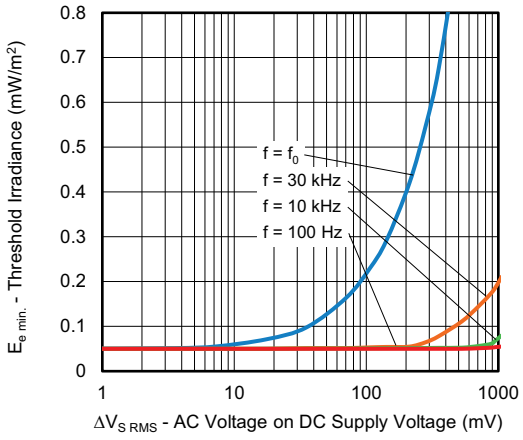


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

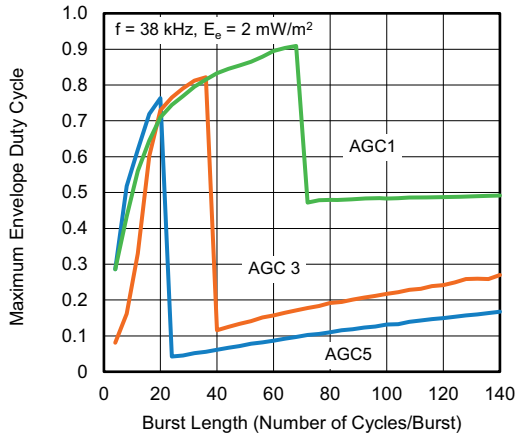


Fig. 8 - Maximum Envelope Duty Cycle vs. Burst Length

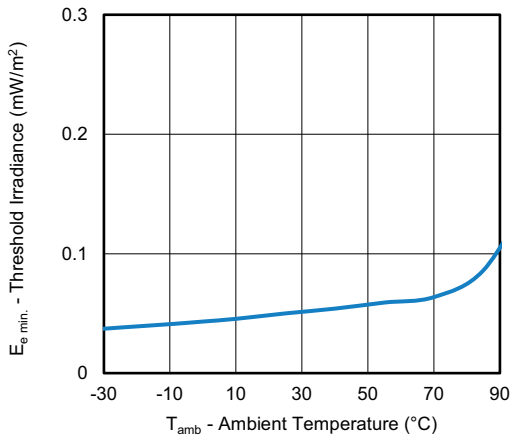


Fig. 9 - Sensitivity vs. Ambient Temperature

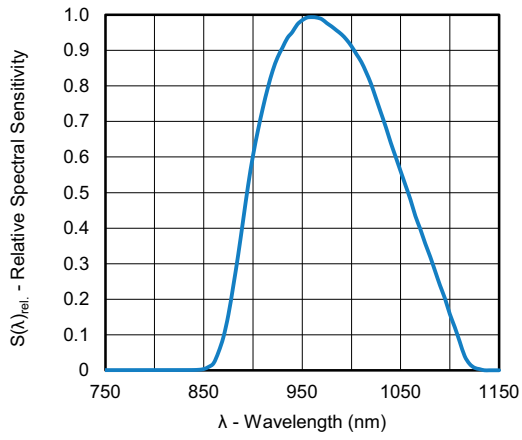


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

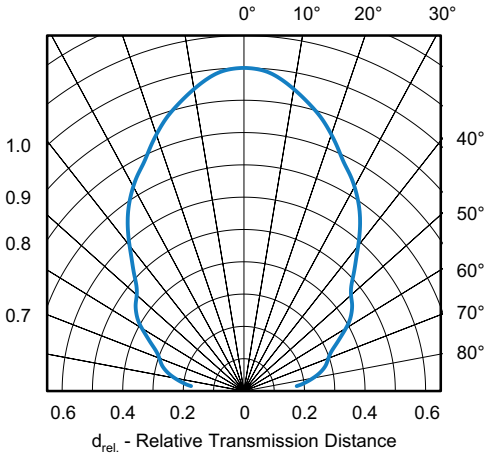


Fig. 11 - Directivity

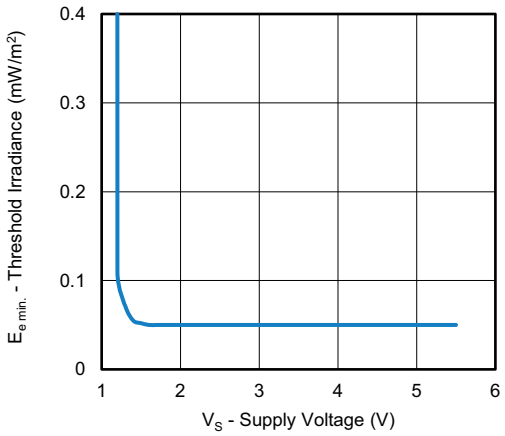


Fig. 12 - Sensitivity vs. Supply Voltage

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

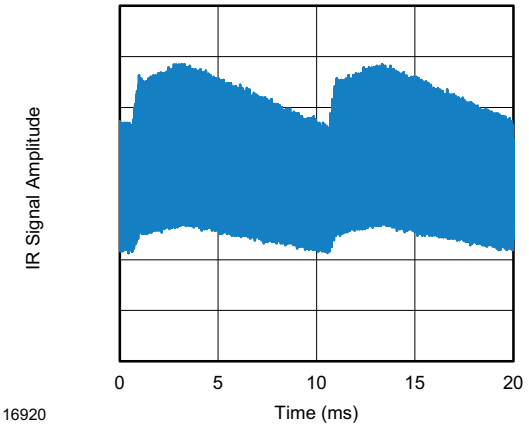


Fig. 13 - IR Emission from Fluorescent Lamp With Low Modulation

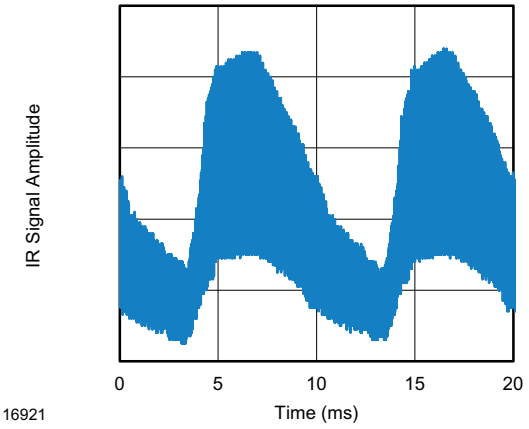


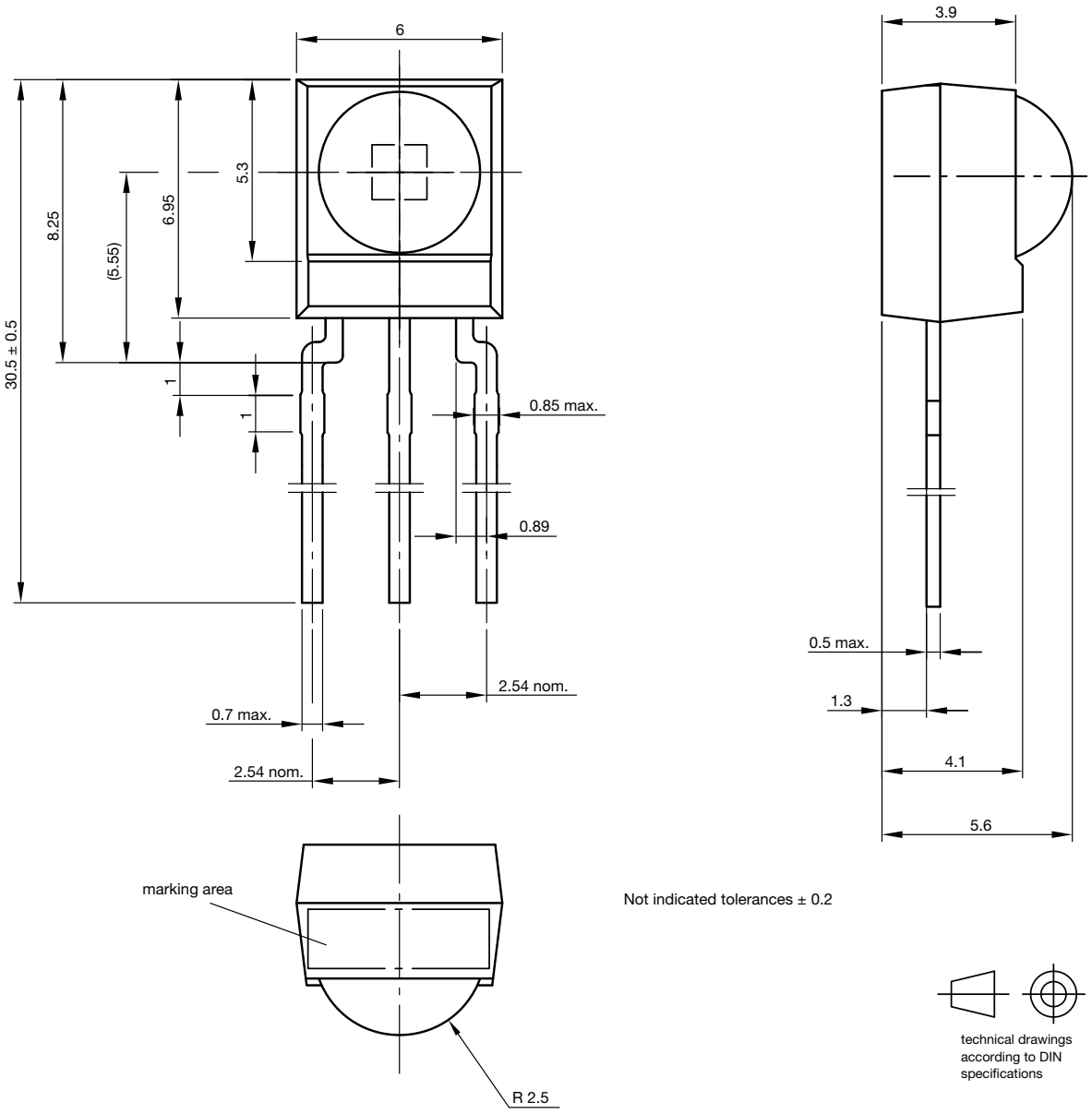
Fig. 14 - IR Emission from Fluorescent Lamp With High Modulation

	TSOP121.., TSOP141..	TSOP123.., TSOP143..	TSOP125.., TSOP145..
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 68 cycles ≥ 7 cycles	6 to 36 cycles ≥ 8 cycles	6 to 19 cycles ≥ 8 cycles
For bursts greater than a minimum gap time in the data stream is needed of	68 cycles > 1 x burst length	36 cycles > 10 x burst length	19 cycles > 10 x burst length
Maximum number of continuous short bursts/second	2100	2100	2100
RCMM code	Yes	Preferred	Yes
XMP code	Yes	Preferred	Yes
r-map code	Yes	Preferred	Yes
Suppression of interference from fluorescent lamps	Fig. 13	Fig. 13 and Fig. 14	Fig. 13 and Fig. 14

Note

- For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP122.., TSOP124.., TSOP126.., TSOP142.., TSOP144.., TSOP146..

PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5169.01-4
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