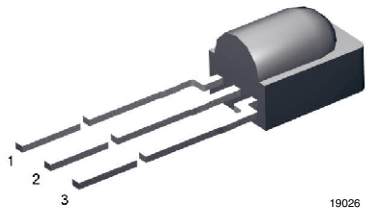
IR Receiver Modules for Remote Control Systems



FEATURES

- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Suitable for short bursts: burst length ≥ 6 carrier cycles
- Improved immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

GREEN (5-2008)**

Note

** Please see document “Vishay Material Category Policy”: www.vishay.com/doc?99902

MECHANICAL DATA

Pinning for TSOP581.., TSOP583.., TSOP585:

1 = OUT, 2 = GND, 3 = V_S

Pinning for TSOP591.., TSOP593.., TSOP595:

1 = OUT, 2 = V_S, 3 = GND

Please see the document “Product Transition Schedule” at www.vishay.com/ir-receiver-modules/ for up-to-date info, when this product will be released.

DESCRIPTION

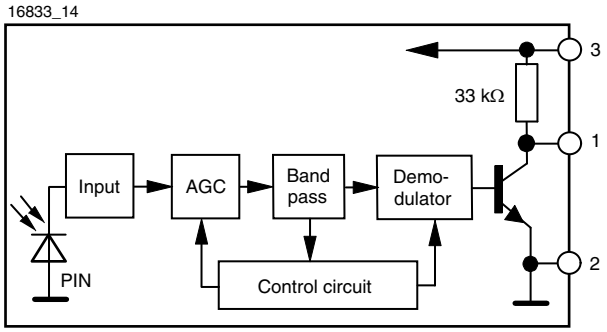
These products are miniaturized receiversfor infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

The demodulated output signal can be directly decoded by a microprocessor. The TSOP581.., TSOP591.. are compatible with all common IR remote control data formats. The TSOP593.., TSOP583.. are optimized to better suppress spurious pulses from energy saving fluorescent lamps. The TSOP585.., TSOP595.. have an excellent noise suppression. It is immune to dimmed LCD backlighting and any fluorescent lamps. AGC3 and AGC5 may also suppress some data signals in case of continuous transmission. This component has not been qualified according to automotive specifications.

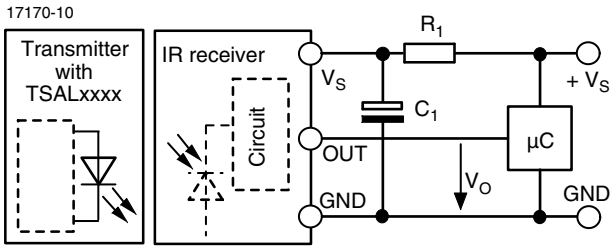
PARTS TABLE

CARRIER FREQUENCY	SHORT BURST AND HIGH DATA RATE (AGC1)		NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)		VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)	
	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
30 kHz	TSOP58130	TSOP59130	TSOP58330	TSOP59330	TSOP58530	TSOP59530
33 kHz	TSOP58133	TSOP59133	TSOP58333	TSOP59333	TSOP58533	TSOP59533
36 kHz	TSOP58136	TSOP59136	TSOP58336	TSOP59336	TSOP58536	TSOP59536
38 kHz	TSOP58138	TSOP59138	TSOP58338	TSOP59338	TSOP58538	TSOP59538
40 kHz	TSOP58140	TSOP59140	TSOP58340	TSOP59340	TSOP58540	TSOP59540
56 kHz	TSOP58156	TSOP59156	TSOP58356	TSOP59356	TSOP58556	TSOP59556

BLOCK DIAGRAM



APPLICATION CIRCUIT



The external components R_1 and C_1 are optional to improve the robustness against electrical overstress (typical values are R_1 = 100 Ω, C_1 = 0.1 µF).

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 ≤ 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 voltage		V_S	2.5		5.5	V
Supply current	V_S = 5 V, E_v = 0	I_{SD}	0.55	0.7	0.9	mA
	E_v = 40 klx, sunlight	I_{SH}		0.8		mA
Transmission distance	E_v = 0, IR diode TSAL6200, I_F = 250 mA, test signal see fig. 1	d		40		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)

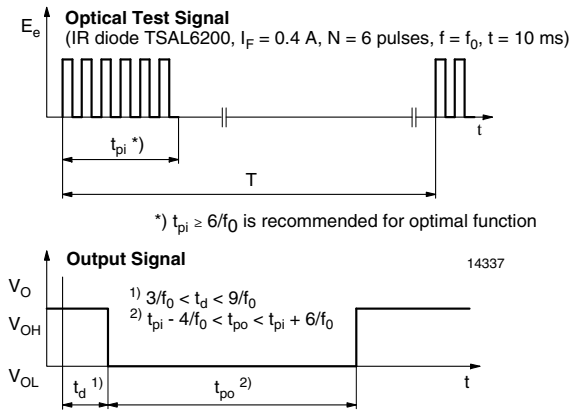


Fig. 1 - Output Active Low

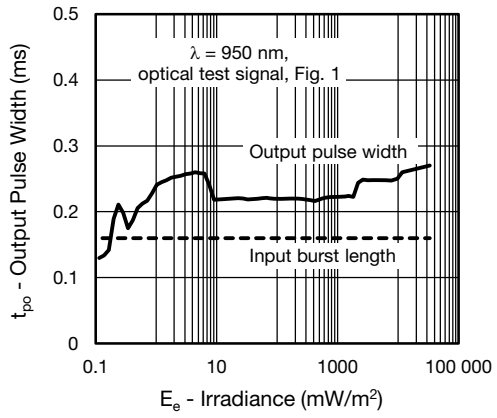


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

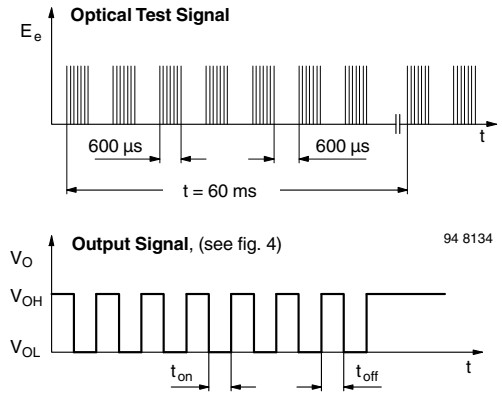


Fig. 3 - Output Function

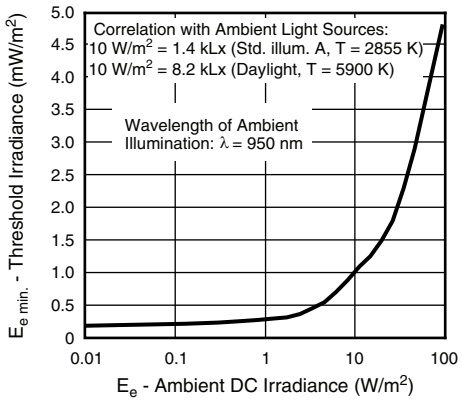


Fig. 6 - Sensitivity in Bright Ambient

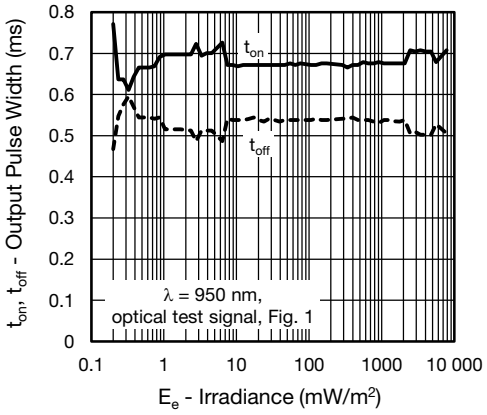


Fig. 4 - Output Pulse Diagram

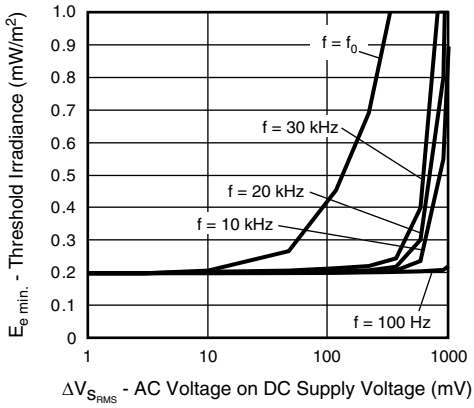


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

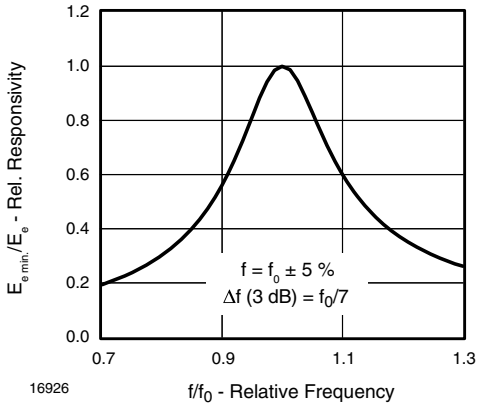


Fig. 5 - Frequency Dependence of Responsivity

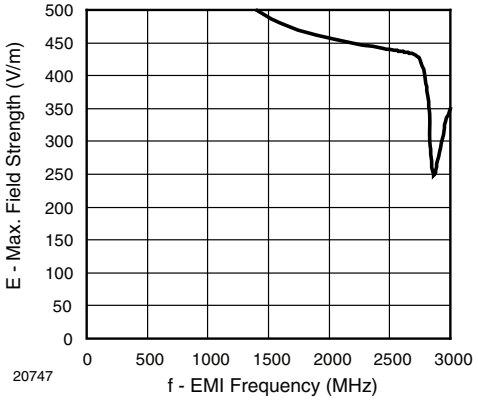


Fig. 8 - Sensitivity vs. Electric Field Disturbances

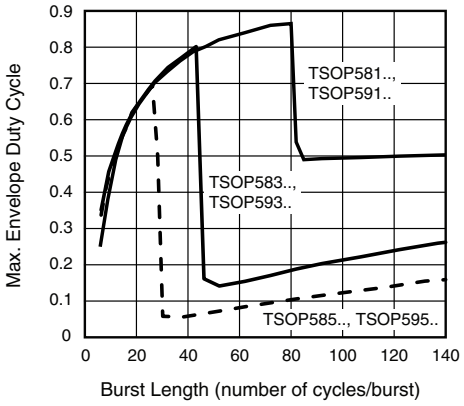


Fig. 9 - Max. Envelope Duty Cycle vs. Burst Length

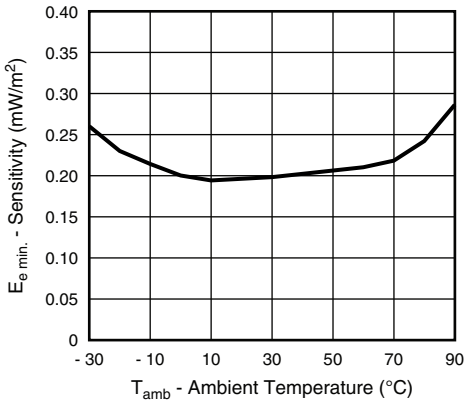


Fig. 10 - Sensitivity vs. Ambient Temperature

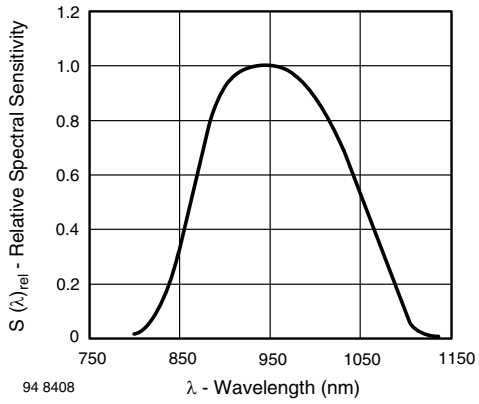


Fig. 11 - Relative Spectral Sensitivity vs. Wavelength

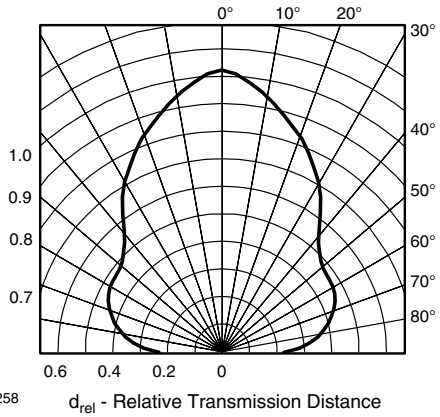


Fig. 12 - Horizontal Directivity

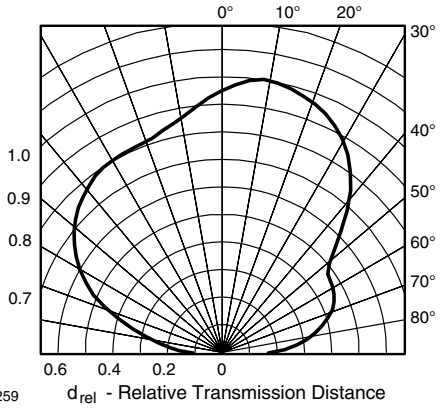


Fig. 13 - Vertical Directivity

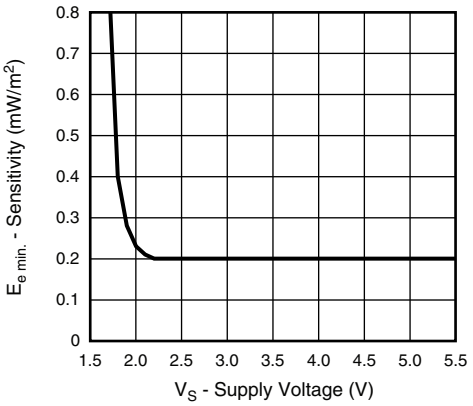


Fig. 14 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

These products are designed to suppress spurious output pulses due to noise or disturbance signals. Data and disturbance signals can be distinguished by the devices according to carrier frequency, burst length and envelope duty cycle. The data signal should be close to the band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the IR receiver in the presence of a disturbance signal, the sensitivity of the receiver is reduced to insure that no spurious pulses are present at the output. Some examples of disturbance signals which are suppressed are:

- DC light (e.g. from tungsten bulb or sunlight)
- Continuous signals at any frequency
- Modulated IR signals from common fluorescent lamps (example of noise pattern is shown in fig. 15 or fig. 16)

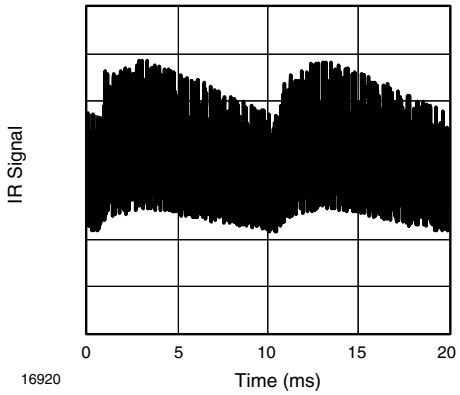


Fig. 15 - IR Signal from Fluorescent Lamp with Low Modulation

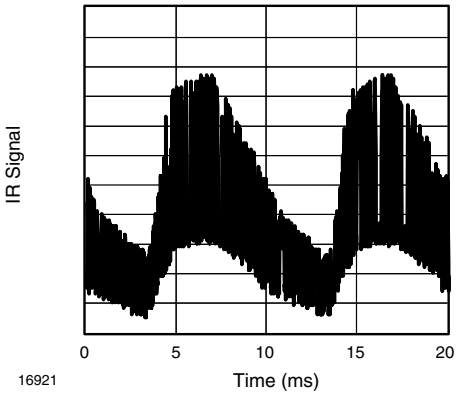


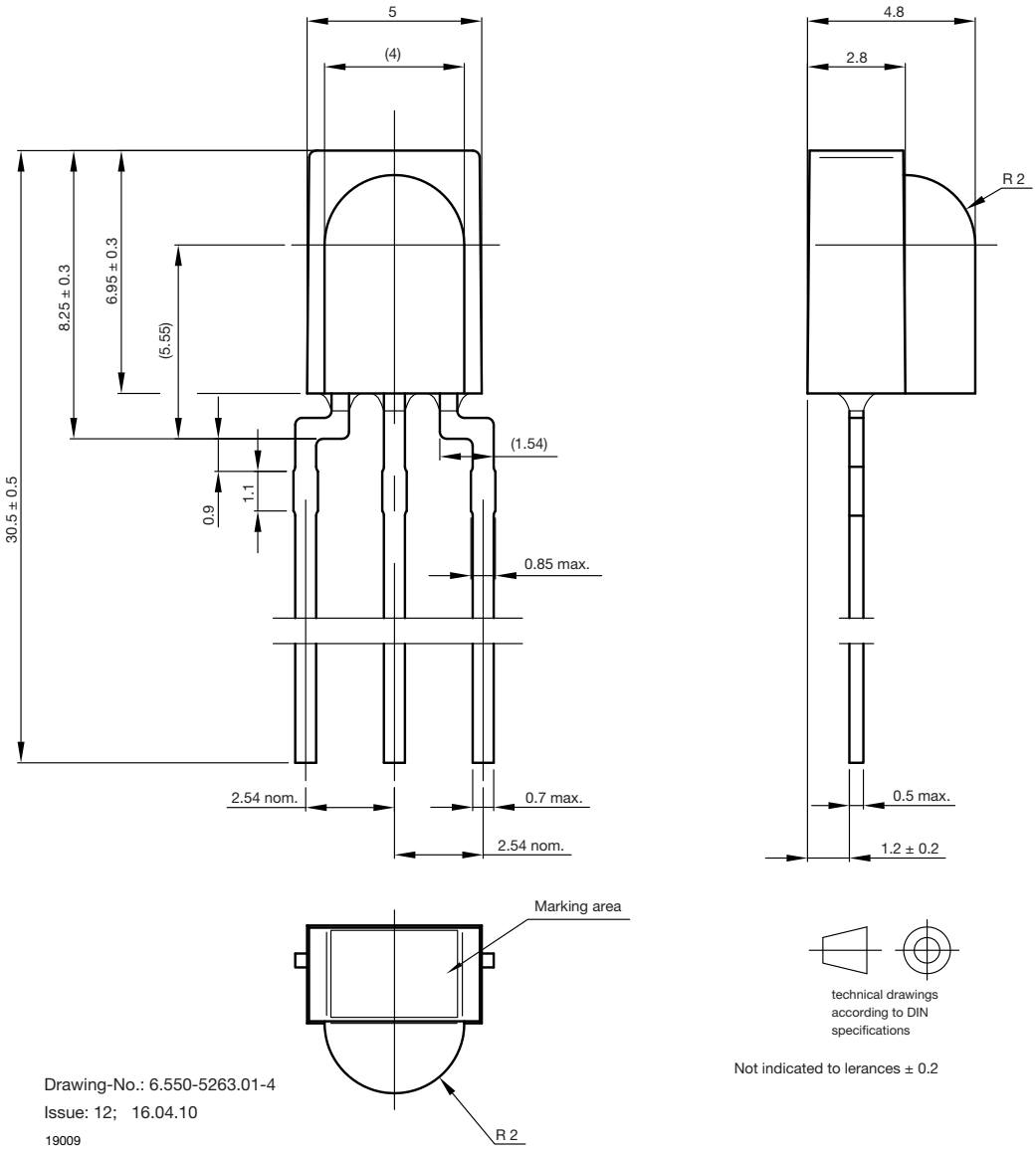
Fig. 16 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP581.., TSOP591..	TSOP583.., TSOP593..	TSOP585.., TSOP595..
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length a minimum gap time is required of	6 to 70 cycles ≥ 10 cycles	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	70 cycles > 1.1 x burst length	35 cycles > 6 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000	2000
Recommended for NEC code	yes	yes	yes
Recommended for RC5/RC6 code	yes	yes	yes
Recommended for Sony code	yes	no	no
Recommended for RECS-80 code	yes	yes	yes
Recommended for RCMM code	yes	yes	yes
Recommended for r-step code	yes	yes	yes
Recommended for XMP code	yes	yes	yes
Suppression of interference from fluorescent lamps	Common disturbance signals are supressed (example: signal pattern of fig. 14)	Internference signals from lamps with high modulation are suppressed (examples: signal pattern of fig. 14 and fig. 15)	Even critical disturbance signals like dimmed LCD backlighting are suppressed

Note

- For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP582.., TSOP592.., TSOP584.., TSOP594..

PACKAGE DIMENSIONS in millimeters



technical drawings
according to DIN
specifications

Not indicated to lerances ± 0.2

Drawing-No.: 6.550-5263.01-4
Issue: 12; 16.04.10
19009

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