

IR Receiver Modules for Data Transmission



16672

DESIGN SUPPORT TOOLS AVAILABLE



MECHANICAL DATA

Pinning for TSDP341.., TSDP343..:

 1 = OUT, 2 = GND, 3 = V_S

FEATURES

- Very low supply current
- Continuous data rates up to 7777 bps
- Range up to 32 m
- Photo detector and preamplifier in one package
- Internal filter tuned to 38.4 kHz for 4800 bps or 57.6 kHz for 9600 bps
- Shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Immunity against ambient light
- Insensitive to supply voltage ripple and noise
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



DESCRIPTION

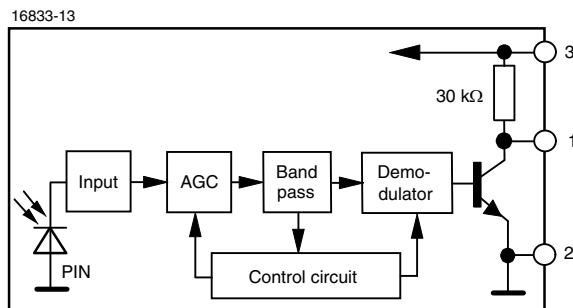
These products are miniaturized receivers for low speed infrared data transmission. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package contains an IR filter.

The demodulated output can be directly connected to a UART or a microprocessor. The TSDP34138 may be used for continuous reception of data according to RS-232 at 4800 bps in noise free environments. Higher data rate RS-232 may require data monitoring of gain levels. Non RS-232 codings may be used to achieve continuous average data rates up to 7800 bps in noisy ambients.

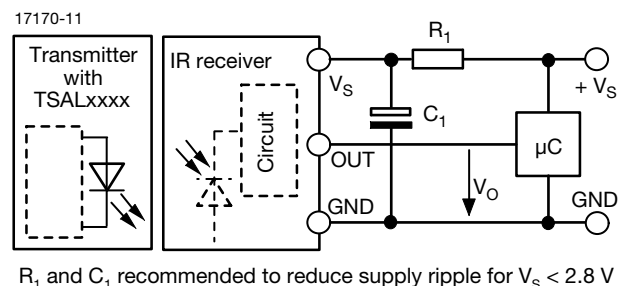
This component has not been qualified according to automotive specifications.

| PARTS TABLE | | | |
|-------------------|----------|-------------------------------|-----------------------------|
| AGC | | LOW NOISE ENVIRONMENTS (AGC1) | NOISY ENVIRONMENTS (AGC3) |
| Carrier frequency | 38.4 kHz | TSDP34138 | TSDP34338 |
| | 57.6 kHz | TSDP34156 | TSDP34356 |
| Package | | Mold | |
| Pinning | | 1 = OUT, 2 = GND, 3 = V_S | 1 = OUT, 2 = GND, 3 = V_S |
| Dimensions (mm) | | 6.0 W x 6.95 H x 5.6 D | |
| Mounting | | Leaded | |
| Application | | Data transmission | |

BLOCK DIAGRAM



APPLICATION CIRCUIT

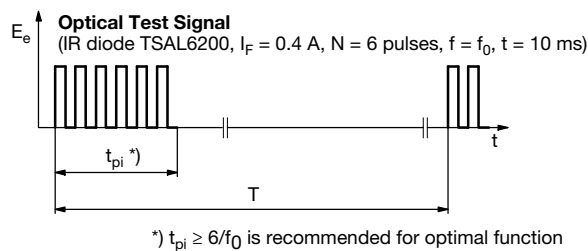


| ABSOLUTE MAXIMUM RATINGS | | | | |
|-----------------------------|---------------------------------------|-----------|-------------------------|------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Supply voltage | | V_S | -0.3 to +6 | V |
| Supply current | | I_S | 3 | mA |
| Output voltage | | 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 | $T_{amb} \leq 85\text{ °C}$ | P_{tot} | 10 | mW |
| Soldering temperature | $t \leq 10\text{ s}$, 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 ($T_{amb} = 25\text{ °C}$, unless otherwise specified) | | | | | | |
|---|--|----------------------|------|----------|------------|-----------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Supply current | $E_v = 0$, $V_S = 3.3\text{ V}$ | I_{SD} | 0.27 | 0.35 | 0.45 | mA |
| | $E_v = 40\text{ klx}$, sunlight | I_{SH} | - | 0.45 | - | mA |
| Supply voltage | | V_S | 2.5 | - | 5.5 | V |
| Transmission distance | $E_v = 0$, test signal see Fig. 1, IR diode TSAL6200, $I_F = 50\text{ mA}$ | d | - | 21 | - | m |
| Output voltage low | $I_{OSL} = 0.5\text{ mA}$, $E_e = 0.7\text{ mW/m}^2$, test signal see Fig. 1 | V_{OSL} | - | - | 100 | mV |
| Minimum irradiance | Pulse width tolerance: $t_{pi} - 1/f_0 < t_{po} < t_{pi} + 4/f_0$, test signal see Fig. 1 | $E_e\text{ min.}$ | - | 0.15 | 0.30 | mW/m^2 |
| Maximum irradiance | $t_{pi} - 1/f_0 < t_{po} < t_{pi} + 4/f_0$, test signal see Fig. 1 | $E_e\text{ max.}$ | 30 | - | - | W/m^2 |
| Maximum pulse width | $E_e\text{ min.} > 10\text{ mW/m}^2$, $t_{pi} = 8/f_0$ | $t_{po}\text{ max.}$ | - | - | $11.5/f_0$ | s |
| Directivity | Angle of half transmission distance | $\phi_{1/2}$ | - | ± 45 | - | deg |

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


*) $t_{pi} \geq 6/f_0$ is recommended for optimal function

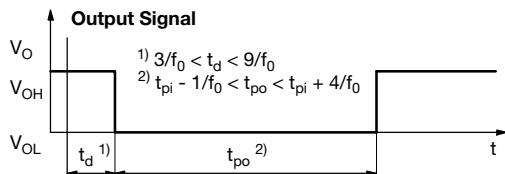


Fig. 1 - Output Active Low

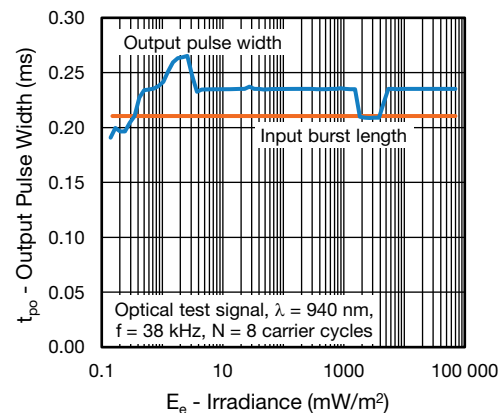


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

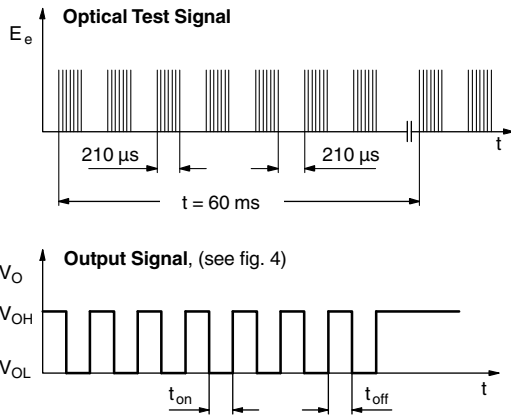


Fig. 3 - Output Function

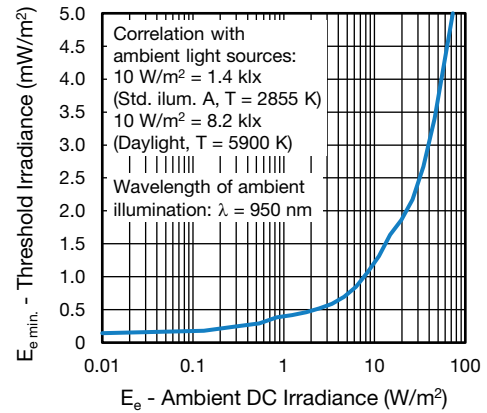


Fig. 6 - Sensitivity in Bright Ambient

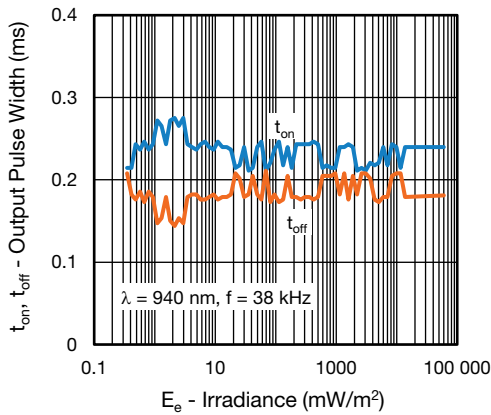


Fig. 4 - Output Pulse Diagram

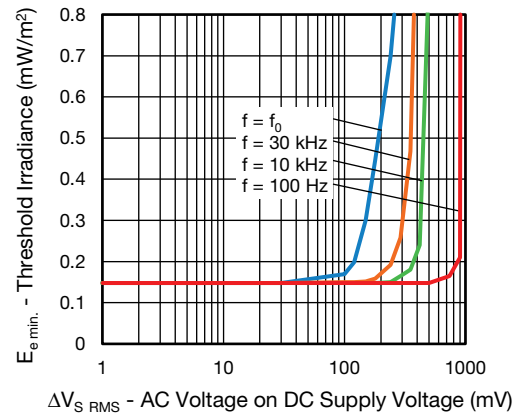


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

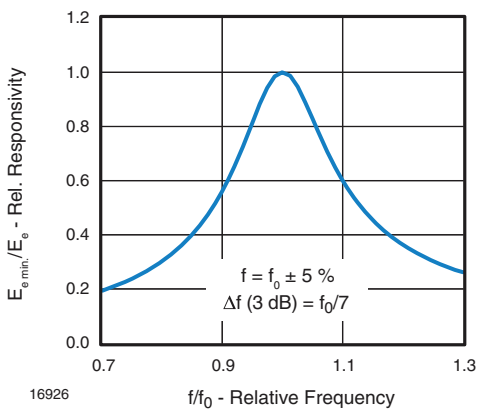


Fig. 5 - Frequency Dependence of Responsivity

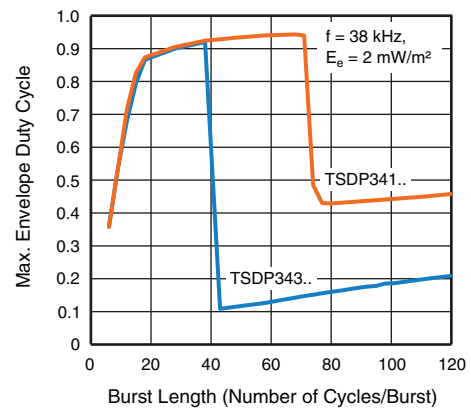


Fig. 8 - Maximum Envelope Duty Cycle vs. Burst Length

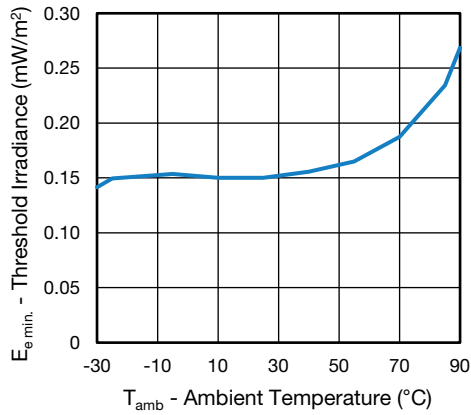


Fig. 9 - Sensitivity vs. Ambient Temperature

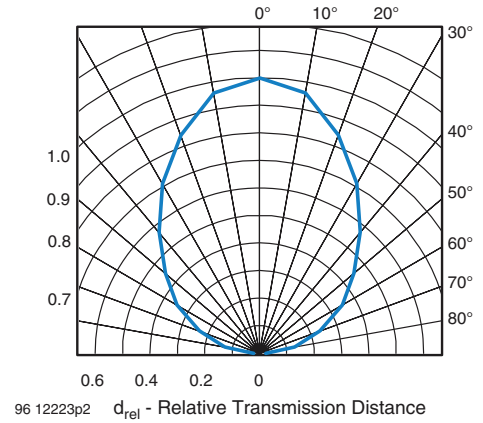


Fig. 11 - Horizontal Directivity

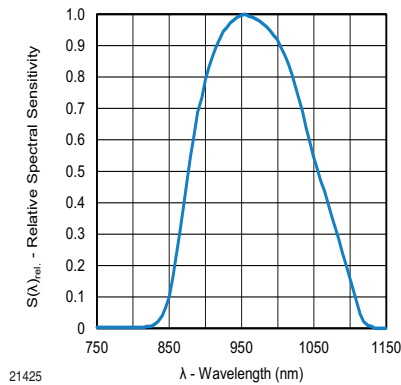


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

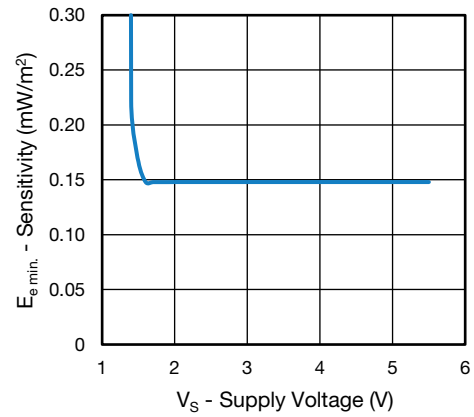


Fig. 12 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

These receivers are designed to suppress spurious output pulses due to noise or optical disturbances. The devices can distinguish data signals from noise due to differences in frequency, burst length, and envelope duty cycle. For optimum sensitivity, the data's modulation frequency should be close to the device's band-pass center frequency (e.g. 38.4 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the receiver in the presence of noise, 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 of noise which is suppressed:

- 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 Disturbance from Fluorescent Lamp With Low Modulation



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

| | TSDP341.. | TSDP343.. |
|---|---|---|
| Minimum burst length | 6 cycles/burst | 6 cycles/burst |
| After each burst of length A gap time is required of | 6 to 70 cycles ≥ 7 cycles | 6 to 35 cycles ≥ 7 cycles |
| For bursts greater than a minimum gap time in the data stream is needed of | 70 cycles > 1.2 x burst length | 35 cycles > 6 x burst length |
| Maximum number of continuous short bursts/second | 3000 | 3000 |
| Suppression of interference from fluorescent lamps | Mildly modulated noise patterns are suppressed (Fig. 13) | Strongly modulated noise patterns are suppressed (Fig. 14) |



PACKAGE DIMENSIONS in millimeters



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