



| PARTS TABLE       |        |  |                                       |  |                                       |   |                                       |
|-------------------|--------|--|---------------------------------------|--|---------------------------------------|---|---------------------------------------|
| AGC               |        | LEGACY, FOR SHORT BURST REMOTE CONTROLS (AGC1)   |                                       | NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3) |                                       | VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5) |                                       |
| Carrier frequency | 30 kHz | TSOP4130   | TSOP2130                              | TSOP4330                                   | TSOP2330                              | TSOP4530  | TSOP2530                              |
|                   | 33 kHz | TSOP4133   | TSOP2133                              | TSOP4333                                   | TSOP2333                              | TSOP4533  | TSOP2533                              |
|                   | 36 kHz | TSOP4136   | TSOP2136                              | TSOP4336 (1)                               | TSOP2336 (1)                          | TSOP4536  | TSOP2536 (1)                          |
|                   | 38 kHz | TSOP4138   | TSOP2138                              | TSOP4338 (2)(3)(4)(5)                      | TSOP2338 (2)(3)(4)(5)                 | TSOP4538  | TSOP2538 (2)(3)(4)                    |
|                   | 40 kHz | TSOP4140   | TSOP2140                              | TSOP4340                                   | TSOP2340                              | TSOP4540  | TSOP2540                              |
|                   | 56 kHz | TSOP4156   | TSOP2156                              | TSOP4356                                   | TSOP2356                              | TSOP4556  | TSOP2556                              |
| Package           |        | Mold   |                                       |  |                                       |   |                                       |
| Pinning           |        | 1 = OUT, 2 = GND, 3 = V <sub>S</sub>   | 1 = OUT, 2 = V <sub>S</sub> , 3 = GND | 1 = OUT, 2 = GND, 3 = V <sub>S</sub>       | 1 = OUT, 2 = V <sub>S</sub> , 3 = GND | 1 = OUT, 2 = GND, 3 = V <sub>S</sub>            | 1 = OUT, 2 = V <sub>S</sub> , 3 = GND |
| Dimensions (mm)   |        | 6.0 W x 6.95 H x 5.6 D   |                                       |  |                                       |   |                                       |
| Mounting          |        | Leaded   |                                       |  |                                       |   |                                       |
| Application       |        | Remote control   |                                       |  |                                       |   |                                       |
| Best choice for   |        | (1) MCIR (2) Mitsubishi (3) RECS-80 Code (4) r-map (5) XMP-1, XMP-2  |                                       |  |                                       |   |                                       |
| Special options   |        | <ul style="list-style-type: none"> <li>Narrow optical filter: <a href="http://www.vishay.com/doc?81590">www.vishay.com/doc?81590</a></li> <li>Wide optical filter: <a href="http://www.vishay.com/doc?82726">www.vishay.com/doc?82726</a></li> </ul> |                                       |  |                                       |   |                                       |

| ABSOLUTE MAXIMUM RATINGS    |                          |                                 |                                |      |
|-----------------------------|--------------------------|---------------------------------|--------------------------------|------|
| PARAMETER                   | TEST CONDITION           | SYMBOL                          | VALUE                          | UNIT |
| Supply voltage              |                          | V <sub>S</sub>                  | -0.3 to +6                     | V    |
| Supply current              |                          | I <sub>S</sub>                  | 5                              | mA   |
| Output voltage              |                          | V <sub>O</sub>                  | -0.3 to 5.5                    | V    |
| Voltage at output to supply |                          | V <sub>S</sub> - V <sub>O</sub> | -0.3 to (V <sub>S</sub> + 0.3) | V    |
| Output current              |                          | I <sub>O</sub>                  | 5                              | mA   |
| Junction temperature        |                          | T <sub>j</sub>                  | 100                            | °C   |
| Storage temperature range   |                          | T <sub>stg</sub>                | -25 to +85                     | °C   |
| Operating temperature range |                          | T <sub>amb</sub>                | -25 to +85                     | °C   |
| Power consumption           | T <sub>amb</sub> ≤ 85 °C | P <sub>tot</sub>                | 10                             | mW   |
| Soldering temperature       | t ≤ 10 s, 1 mm from case | T <sub>sd</sub>                 | 260                            | °C   |

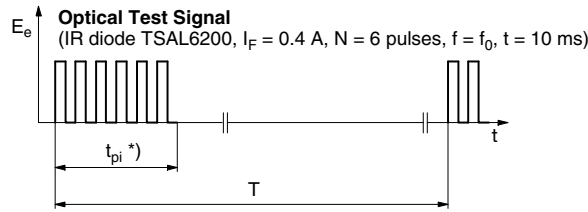
**Note**

- 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 <sub>amb</sub> = 25 °C, unless otherwise specified) |   |                     |      |      |      |                   |
|---|---|---------------------|------|------|------|-------------------|
| PARAMETER   | TEST CONDITION  | SYMBOL              | MIN. | TYP. | MAX. | UNIT              |
| Supply current  | E <sub>v</sub> = 0, V <sub>S</sub> = 5 V  | I <sub>SD</sub>     | 0.55 | 0.7  | 0.9  | mA                |
|   | E <sub>v</sub> = 40 klx, sunlight   | I <sub>SH</sub>     | -    | 0.8  | -    | mA                |
| Supply voltage  |   | V <sub>S</sub>      | 2.5  | -    | 5.5  | V                 |
| Transmission distance   | E <sub>v</sub> = 0, test signal see Fig. 1, IR diode TSAL6200, I <sub>F</sub> = 50 mA   | d                   | -    | 24   | -    | m                 |
| Output voltage low  | I <sub>OSL</sub> = 0.5 mA, E <sub>θ</sub> = 0.7 mW/m <sup>2</sup> , test signal see Fig. 1  | V <sub>OSL</sub>    | -    | -    | 100  | mV                |
| Minimum irradiance  | Pulse width tolerance: t <sub>pi</sub> - 5/f <sub>o</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>o</sub> , test signal see Fig. 1 | E <sub>e min.</sub> | -    | 0.12 | 0.25 | mW/m <sup>2</sup> |
| Maximum irradiance  | t <sub>pi</sub> - 5/f <sub>o</sub> < t <sub>po</sub> < t <sub>pi</sub> + 6/f <sub>o</sub> , test signal see Fig. 1                        | E <sub>e max.</sub> | 50   | -    | -    | W/m <sup>2</sup>  |
| Directivity   | Angle of half transmission distance   | φ <sub>1/2</sub>    | -    | ± 45 | -    | deg               |



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



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

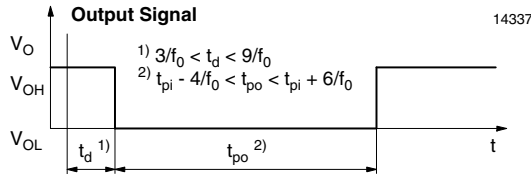


Fig. 1 - Output Active Low

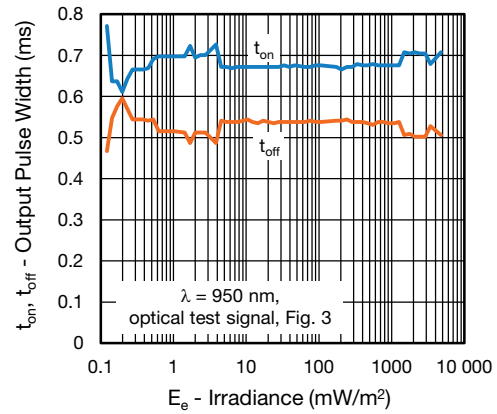


Fig. 4 - Output Pulse Diagram

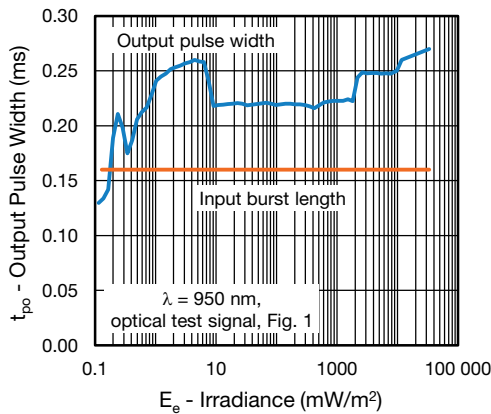


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

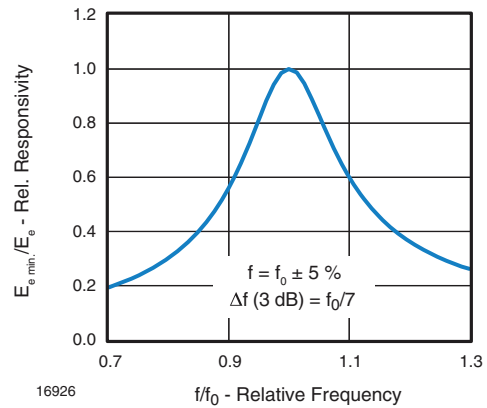


Fig. 5 - Frequency Dependence of Responsivity

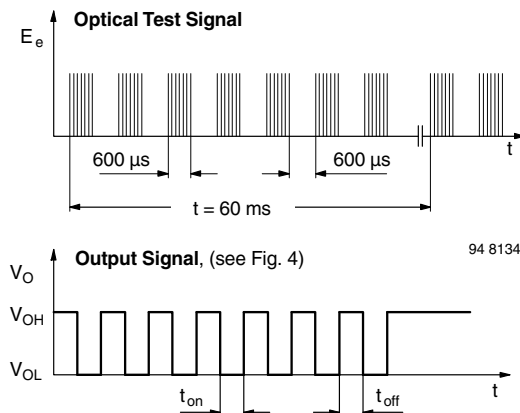


Fig. 3 - Output Function

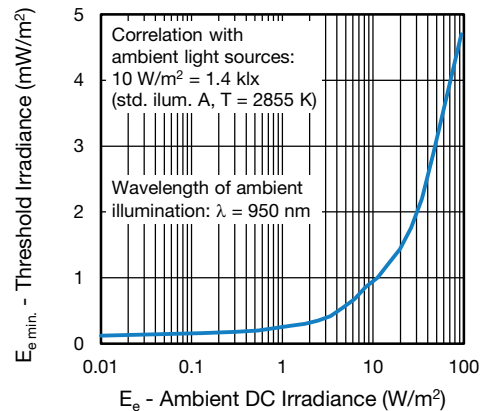


Fig. 6 - Sensitivity in Bright Ambient

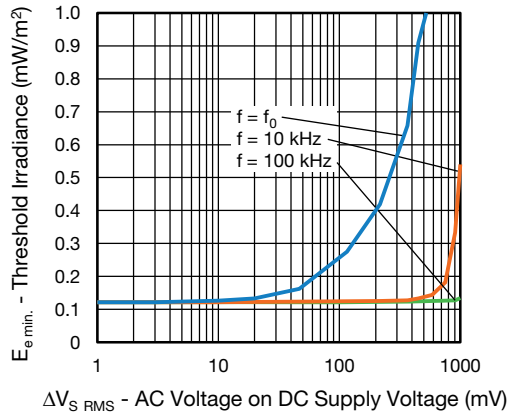


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

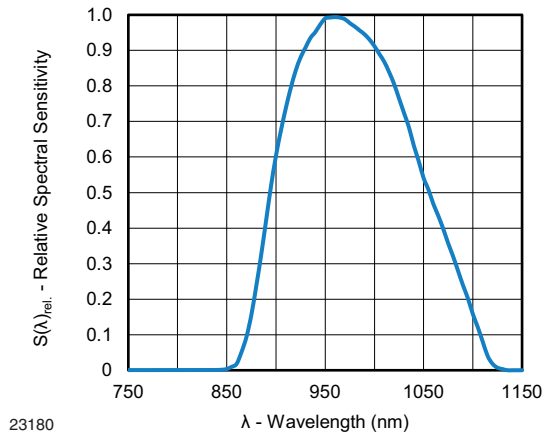


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

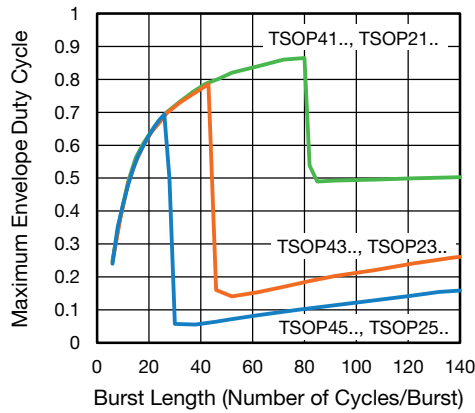


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

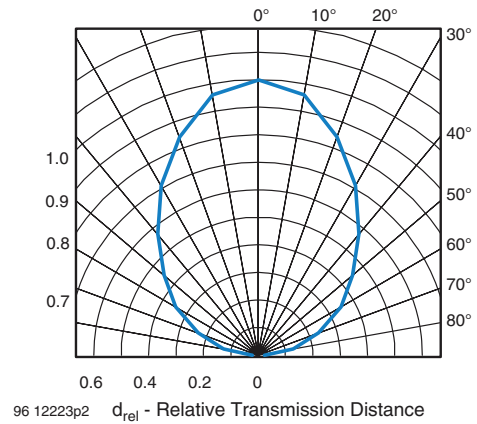


Fig. 11 - Horizontal Directivity

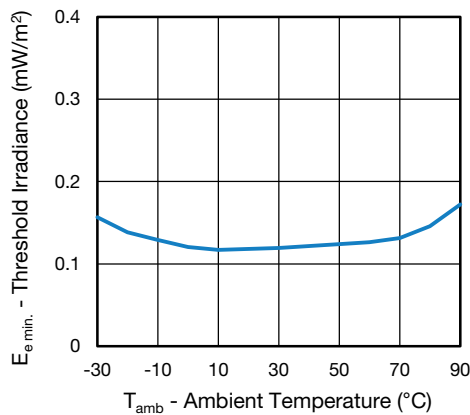


Fig. 9 - Sensitivity vs. Ambient Temperature

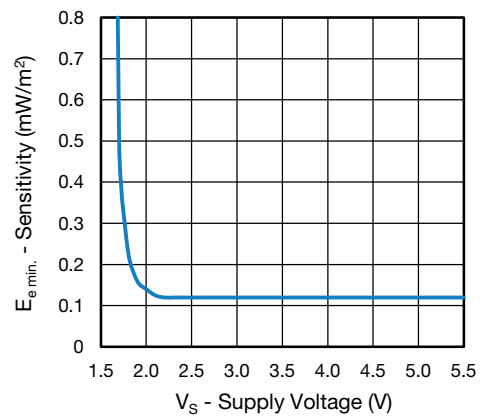


Fig. 12 - Sensitivity vs. Supply Voltage



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

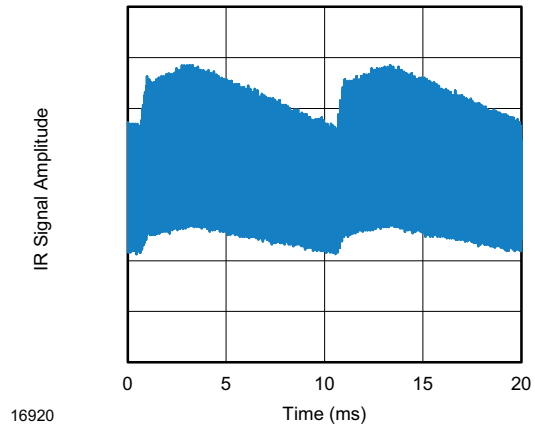


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

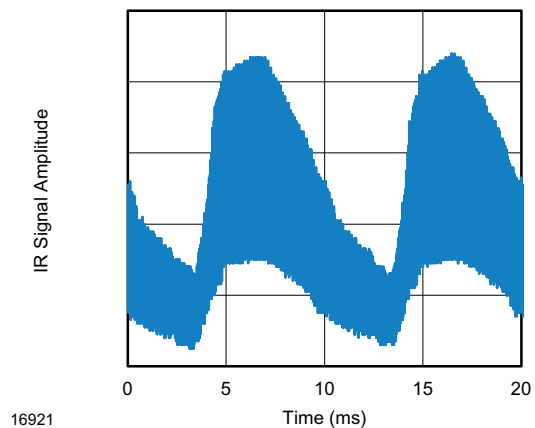


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

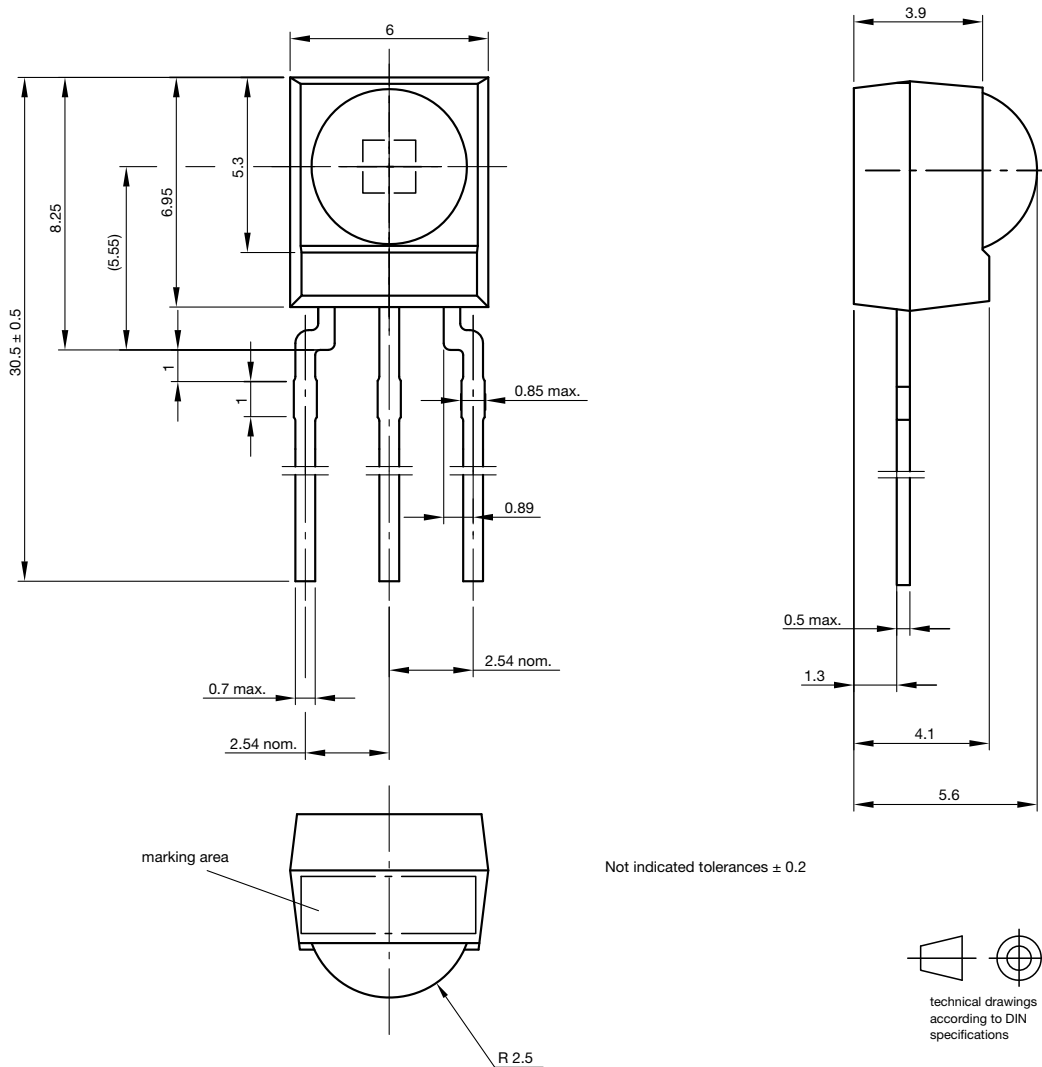
|  | TSOP41..., TSOP21..   | TSOP43..., TSOP23..  | TSOP45..., TSOP25..   |
|--|---|--|---|
| Minimum burst length   | 6 cycles/burst  | 6 cycles/burst   | 6 cycles/burst  |
| After each burst of length A gap time is required of                       | 6 to 70 cycles<br>≥ 10 cycles   | 6 to 35 cycles<br>≥ 10 cycles  | 6 to 24 cycles<br>≥ 10 cycles   |
| For bursts greater than a minimum gap time in the data stream is needed of | 70 cycles<br>> 1.2 x burst length   | 35 cycles<br>> 6 x burst length  | 24 cycles<br>> 25 ms  |
| Maximum number of continuous short bursts/second                           | 2000  | 2000   | 2000  |
| MCIR code  | Yes   | Preferred  | Yes   |
| XMP-1, XMP-2 code  | Yes   | Preferred  | Yes   |
| Suppression of interference from fluorescent lamps                         | Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13) | Complex disturbance patterns are suppressed (example: signal pattern of Fig. 14) | Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs |

Note

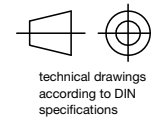
- For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP48..., TSOP44..., TSOP22..., TSOP24..



PACKAGE DIMENSIONS in millimeters



Not indicated tolerances ± 0.2



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