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IR Receiver Modules for Remote Control Systems

FEATURES
- Improved immunity against HF and RF noise
- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against optical noise
- 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 IR receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on a leadframe, the epoxy package contains an IR filter. The demodulated output signal can be directly connected to a microprocessor for decoding. The TSOP584.. series devices are optimized to suppress almost all spurious pulses from Wi-Fi and CFL sources. They may suppress some data signals if continuously transmitted. The TSOP582.. series devices are provided primarily for compatibility with old AGC2 designs. New designs should prefer the TSOP584.. series containing the newer AGC4. These components have not been qualified according to automotive specifications.

MECHANICAL DATA
Pinning for TSOP582.., TSOP584: 1 = OUT, 2 = GND, 3 = VS

PARTS TABLE

<table>
<thead>
<tr>
<th>AGC Carrier frequency</th>
<th>LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2)</th>
<th>RECOMMENDED FOR LONG BURST CODES (AGC4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 kHz</td>
<td>TSOP58230</td>
<td>TSOP58430</td>
</tr>
<tr>
<td>33 kHz</td>
<td>TSOP58233</td>
<td>TSOP58433</td>
</tr>
<tr>
<td>36 kHz</td>
<td>TSOP58236</td>
<td>TSOP58436 (1)(2)(3)</td>
</tr>
<tr>
<td>38 kHz</td>
<td>TSOP58238</td>
<td>TSOP58438 (4)(5)</td>
</tr>
<tr>
<td>40 kHz</td>
<td>TSOP58240</td>
<td>TSOP58440</td>
</tr>
<tr>
<td>56 kHz</td>
<td>TSOP58256</td>
<td>TSOP58456 (6)(7)</td>
</tr>
</tbody>
</table>

Package: Minicast
Pinning: 1 = OUT, 2 = GND, 3 = V_S
Dimensions (mm): 5.0 W x 6.95 H x 4.8 D
Mounting: Leaded
Application: Remote control
Best choice for: (1) RC-5 (2) RC-6 (3) Panasonic (4) NEC (5) Sharp (6) r-step (7) Thomson RCA
**ABSOLUTE MAXIMUM RATINGS**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>$V_S$</td>
<td>$V_S$</td>
<td>-0.3 to +6</td>
<td>V</td>
</tr>
<tr>
<td>Supply current</td>
<td>$I_S$</td>
<td>$I_S$</td>
<td>5</td>
<td>mA</td>
</tr>
<tr>
<td>Output voltage</td>
<td>$V_O$</td>
<td>$V_O$</td>
<td>-0.3 to 5.5</td>
<td>V</td>
</tr>
<tr>
<td>Voltage at output to supply</td>
<td>$V_S + V_O$</td>
<td>$V_S + V_O$</td>
<td>-0.3 to ($V_S + 0.3$)</td>
<td>V</td>
</tr>
<tr>
<td>Output current</td>
<td>$I_O$</td>
<td>$I_O$</td>
<td>5</td>
<td>mA</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>$T_J$</td>
<td>$T_J$</td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>$T_STG$</td>
<td>$T_STG$</td>
<td>-25 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>$T_AMB$</td>
<td>$T_AMB$</td>
<td>-25 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Power consumption</td>
<td>$P_{TOT}$</td>
<td>$P_{TOT}$</td>
<td>10</td>
<td>mW</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>$T_SD$</td>
<td>$T_SD$</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>

**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)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>$V_S$</td>
<td>$V_S$</td>
<td>2.5</td>
<td>-</td>
<td>5.5</td>
<td>V</td>
</tr>
<tr>
<td>Supply current</td>
<td>$I_SD$</td>
<td>$I_SD$</td>
<td>0.55</td>
<td>0.7</td>
<td>0.9</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>$E_S$</td>
<td>$E_S$</td>
<td>40 klx</td>
<td>sunlight</td>
<td>-</td>
<td>0.8</td>
</tr>
<tr>
<td>Transmission distance</td>
<td>$d$</td>
<td>$d$</td>
<td>-</td>
<td>18</td>
<td>-</td>
<td>m</td>
</tr>
<tr>
<td>Output voltage low</td>
<td>$I_{OFL}$</td>
<td>$I_{OFL}$</td>
<td>0.5 mA</td>
<td>$E_E$</td>
<td>0.7 mW/m²</td>
<td>test signal see Fig. 1</td>
</tr>
<tr>
<td>Minimum irradiance</td>
<td>$E_{E_{MIN}}$</td>
<td>$E_{E_{MIN}}$</td>
<td>-</td>
<td>0.2</td>
<td>0.4</td>
<td>mW/m²</td>
</tr>
<tr>
<td>Maximum irradiance</td>
<td>$E_{E_{MAX}}$</td>
<td>$E_{E_{MAX}}$</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>W/m²</td>
</tr>
<tr>
<td>Directivity</td>
<td>$\phi$</td>
<td>$\phi$</td>
<td>-</td>
<td>± 45</td>
<td>-</td>
<td>deg</td>
</tr>
</tbody>
</table>

**TYPICAL CHARACTERISTICS** ($T_{AMB} = 25$ °C, unless otherwise specified)

**Fig. 1 - Output Active Low**

**Fig. 2 - Pulse Length and Sensitivity in Dark Ambient**
Optical Test Signal

Output Signal, (see Fig. 4)

Fig. 3 - Output Function

Fig. 4 - Output Pulse Diagram

Fig. 5 - Frequency Dependence of Responsivity

Fig. 6 - Sensitivity in Bright Ambient

Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

Fig. 8 - Sensitivity vs. Electric Field Disturbances

Correlation with ambient light sources:
- 10 W/m² = 1.4 klx (std. illum. A, T = 2855 K)
- 10 W/m² = 8.2 klx (daylight, T = 5900 K)

Wavelength of ambient illumination: \( \lambda = 950 \text{ nm} \)

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Wavelength of ambient illumination: \( \lambda = 950 \text{ nm} \)
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

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 noise from fluorescent lamps with electronic ballasts (see Fig. 15 or Fig. 16)
- 2.4 GHz and 5 GHz Wi-Fi

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Note
- For data formats with short bursts please see the datasheet of TSOP581.., TSOP583..
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