QSC112, QSC113, QSC114
Plastic Silicon Infrared Phototransistor

Features
- Tight production distribution
- Steel lead frames for improved reliability in solder mounting
- Good optical-to-mechanical alignment
- Plastic package is infrared transparent black to attenuate visible light
- Can be used with QECXXX LED
- Black plastic body allows easy recognition from LED

Description
The QSC112/113/114 is a silicon phototransistor encapsulated in an infrared transparent, black T-1 package.

Package Dimensions

Notes:
1. Dimensions of all drawings are in inches (mm).
2. Tolerance is ±0.10 (.25) on all non-nominal dimensions unless otherwise specified.
Absolute Maximum Ratings \((T_A = 25^\circ C \text{ unless otherwise specified})\)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(T_{OPR})</td>
<td>Operating Temperature</td>
<td>-40 to +100</td>
<td>(^\circ C)</td>
</tr>
<tr>
<td>(T_{STG})</td>
<td>Storage Temperature</td>
<td>-40 to +100</td>
<td>(^\circ C)</td>
</tr>
<tr>
<td>(T_{SOL-I})</td>
<td>Soldering Temperature (Iron)(^{(2,3,4)})</td>
<td>240 for 5 sec</td>
<td>(^\circ C)</td>
</tr>
<tr>
<td>(T_{SOL-F})</td>
<td>Soldering Temperature (Flow)(^{(2,3)})</td>
<td>260 for 10 sec</td>
<td>(^\circ C)</td>
</tr>
<tr>
<td>(V_{CE})</td>
<td>Collector-Emitter Voltage</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>(V_{EC})</td>
<td>Emitter-Collector Voltage</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>(P_D)</td>
<td>Power Dissipation(^{(1)})</td>
<td>100</td>
<td>mW</td>
</tr>
</tbody>
</table>

Notes:
1. Derate power dissipation linearly 1.33 mW/°C above 25°C.
2. RMA flux is recommended.
3. Methanol or isopropyl alcohols are recommended as cleaning agents.
4. Soldering iron 1/16" (1.6mm) minimum from housing.

Electrical/Optical Characteristics \((T_A = 25^\circ C)\)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\lambda_{PS})</td>
<td>Peak Sensitivity Wavelength</td>
<td></td>
<td>880</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Theta)</td>
<td>Reception Angle</td>
<td>±4</td>
<td>°</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(I_{CEO})</td>
<td>Collector-Emitter Dark Current</td>
<td>(V_{CE} = 10\ V, E_e = 0)</td>
<td>100</td>
<td>nA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(BV_{CEO})</td>
<td>Collector-Emitter Breakdown</td>
<td>(I_C = 1\ mA)</td>
<td>30</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(BV_{EO})</td>
<td>Emitter-Collector Breakdown</td>
<td>(I_E = 100\ \mu A)</td>
<td>5</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(I_{C(ON)})</td>
<td>On-State Collector Current QSC112</td>
<td>(E_e = 0.5 \text{ mW/cm}^2, V_{CE} = 5\ V^{(5)})</td>
<td>1</td>
<td>4</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On-State Collector Current QSC113</td>
<td>(E_e = 0.5 \text{ mW/cm}^2, I_C = 0.5 mA^{(5)})</td>
<td>2.40</td>
<td>9.60</td>
<td>mA</td>
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</tr>
<tr>
<td></td>
<td>On-State Collector Current QSC114</td>
<td>(V_{CC} = 5\ V, R_L = 100 \Omega, I_C = 2\ mA)</td>
<td>4.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(V_{CE(sat)})</td>
<td>Saturation Voltage</td>
<td>(E_e = 0.5 \text{ mW/cm}^2, I_C = 0.5mA^{(5)})</td>
<td>0.4</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(t_r)</td>
<td>Rise Time</td>
<td>(V_{CC} = 5\ V, R_L = 100 \Omega, I_C = 2\ mA)</td>
<td>5.0</td>
<td>(\mu s)</td>
<td>5.0</td>
<td></td>
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Note:
5. \(\lambda = 880\ nm, \text{ AlGaAs}\).
Typical Performance Curves

**Figure 1. Light Current vs. Radiant Intensity**

- $V_{CE} = 5V$
- GaAs Light Source

**Figure 2. Angular Response Curve**

- $V_{CE} = 5V$
- $I_e = 0.5mW/cm^2$
- $I_e = 0.2mW/cm^2$
- $I_e = 0.1mW/cm^2$

**Figure 3. Dark Current vs. Collector - Emitter Voltage**

- $I_{CEO}$ - Normalized Dark Current
- $V_{CE} = 25V$
- $T_A = 25^\circ C$

**Figure 4. Light Current vs. Collector - Emitter Voltage**

- $I_e = 0.5mW/cm^2$
- $I_e = 0.2mW/cm^2$
- $I_e = 0.1mW/cm^2$

**Figure 5. Dark Current vs. Ambient Temperature**

- $I_{CEO}$ - Normalized Dark Current
- $V_{CE} = 25V$
- $T_A = 25^\circ C$
- $V_{CE} = 10V$
- $T_A = 75^\circ C$
- $T_A = 100^\circ C$
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