PHOTODARLINGTON
OPTICAL INTERRUPTER SWITCH

H22B1          H22B2          H22B3

PACKAGE DIMENSIONS

NOTES:
1. Dimensions for all drawings are in inches (mm).
2. Tolerance of ± .010 (.25) on all non-nominal dimensions unless otherwise specified.

DESCRIPTION
The H22B1, H22B2 and H22B3 consist of a gallium arsenide infrared emitting diode coupled with a silicon photodarlington in a plastic housing. The packaging system is designed to optimize the mechanical resolution, coupling efficiency, ambient light rejection, cost and reliability. The gap in the housing provides a means of interrupting the signal with an opaque material, switching the output from an “ON” to an “OFF” state.

FEATURES
• Opaque housing
• Low cost
• .035" apertures
• High $I_{(ON)}$
PHOTODARLINGTON
OPTICAL INTERRUPTER SWITCH

H22B1    H22B2    H22B3

| ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise specified) |
|-----------------------------------------------|----------------|--------------|
| Parameter                                    | Symbol         | Rating       | Unit   |
| Operating Temperature                        | T<sub>OPR</sub> | -55 to +100 | °C     |
| Storage Temperature                          | T<sub>STG</sub> | -55 to +100 | °C     |
| Soldering Temperature (Iron)<sup>(2,3 and 4)</sup> | T<sub>SOL-I</sub> | 240 for 5 sec | °C |
| Soldering Temperature (Flow)<sup>(2 and 3)</sup> | T<sub>SOL-F</sub> | 260 for 10 sec | °C |

INPUT (EMITTER)

| Continuous Forward Current                  | I<sub>F</sub>  | 50 | mA |
| Reverse Voltage                             | V<sub>R</sub>   | 6  | V  |
| Power Dissipation<sup>(1)</sup>             | P<sub>D</sub>   | 100 | mW |

OUTPUT (SENSOR)

| Collector to Emitter Voltage                | V<sub>CEO</sub> | 30 | V  |
| Emitter to Collector Voltage                | V<sub>ECO</sub> | 6  | V  |
| Collector Current                           | I<sub>C</sub>   | 40 | mA |
| Power Dissipation (T<sub>C</sub> = 25°C)<sup>(1)</sup> | P<sub>D</sub>   | 150 | mW |

NOTES:
1. Derate power dissipation linearly 1.67 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" (1.6 mm) minimum from housing.
## ELECTRICAL/OPTICAL CHARACTERISTICS ($T_A = 25^\circ C$)

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<tr>
<td>Forward Voltage</td>
<td>$I_F = 60 , mA$</td>
<td>$V_F$</td>
<td>All</td>
<td>—</td>
<td>—</td>
<td>1.7</td>
<td>V</td>
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<tr>
<td>Reverse Breakdown Voltage</td>
<td>$I_R = 10 , \mu A$</td>
<td>$V_R$</td>
<td>All</td>
<td>6.0</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>$V_R = 3 , V$</td>
<td>$I_R$</td>
<td>All</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
<td>$\mu A$</td>
</tr>
<tr>
<td><strong>OUTPUT (SENSOR)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Emitter to Collector Breakdown</td>
<td>$I_F = 100 , \mu A, E_e = 0$</td>
<td>$BVECO$</td>
<td>All</td>
<td>7.0</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td>Collector to Emteor Breakdown</td>
<td>$I_C = 1 , mA, E_e = 0$</td>
<td>$BVCEO$</td>
<td>All</td>
<td>30</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td>Collector to Emitter Leakage</td>
<td>$V_{CE} = 25 , V, E_e = 0$</td>
<td>$I_{CEO}$</td>
<td>All</td>
<td>—</td>
<td>—</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td><strong>COUPLED</strong></td>
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</tr>
<tr>
<td>On-State Collector Current</td>
<td>$I_F = 2 , mA, V_{CE} = 1.5 , V$</td>
<td>$I_{C(ON)}$</td>
<td>H22B1</td>
<td>0.5</td>
<td>—</td>
<td>—</td>
<td>mA</td>
</tr>
<tr>
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<tr>
<td></td>
<td>$I_F = 5 , mA, V_{CE} = 1.5 , V$</td>
<td>$I_{C(ON)}$</td>
<td>H22B2</td>
<td>1.0</td>
<td>—</td>
<td>—</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>$I_F = 10 , mA, V_{CE} = 1.5 , V$</td>
<td>$I_{C(ON)}$</td>
<td>H22B3</td>
<td>2.0</td>
<td>—</td>
<td>—</td>
<td>mA</td>
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<td>Saturation Voltage</td>
<td>$I_F = 10 , mA, I_C = 1.8 , mA$</td>
<td>$V_{CE(SAT)}$</td>
<td>H22B1</td>
<td>0.5</td>
<td>—</td>
<td>—</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>$I_F = 60 , mA, I_C = 50 , mA$</td>
<td>$V_{CE(SAT)}$</td>
<td>H22B1/2</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>Turn-On Time</td>
<td>$I_F = 10 , mA, V_{CC} = 5 , V, R_L = 750 , \Omega$</td>
<td>$t_{on}$</td>
<td>All</td>
<td>—</td>
<td>45</td>
<td>—</td>
<td>$\mu s$</td>
</tr>
<tr>
<td></td>
<td>$I_F = 60 , mA, V_{CC} = 5 , V, R_L = 750 , \Omega$</td>
<td>$t_{on}$</td>
<td>All</td>
<td>—</td>
<td>7</td>
<td>—</td>
<td>$\mu s$</td>
</tr>
<tr>
<td>Turn-Off Time</td>
<td>$I_F = 10 , mA, V_{CC} = 5 , V, R_L = 750 , \Omega$</td>
<td>$t_{off}$</td>
<td>All</td>
<td>—</td>
<td>250</td>
<td>—</td>
<td>$\mu s$</td>
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<tr>
<td></td>
<td>$I_F = 60 , mA, V_{CC} = 5 , V, R_L = 750 , \Omega$</td>
<td>$t_{off}$</td>
<td>All</td>
<td>—</td>
<td>45</td>
<td>—</td>
<td>$\mu s$</td>
</tr>
</tbody>
</table>
Figure 1. Output Current vs. Input Current

- Input Current (mA) vs. Normalized Output Current
- Normalized to IF = 5 mA, VCE = 1.5 V, Pulsed, PRR = 100 pps
- PW = 100 µs

Figure 2. Output Current vs. Temperature

- Ambient Temperature (°C) vs. Normalized Output Current
- Normalized to IF = 5 mA, VCE = 1.5 V, Pulsed
- IF = 10 mA
- IF = 60 mA
- IF = 30 mA
- IF = 20 mA
- IF = 10 mA
- IF = 5 mA
- IF = 2 mA

Figure 3. VCE(SAT) vs. Temperature

- Ambient Temperature (°C) vs. Normalized VCE(SAT)
- Normalized to IC = 1.8 mA, TA = 25 °C, Pulsed
- PW = 100 µs, PRR = 100 pps
- IF = 60 mA
- IF = 50 mA
- IF = 30 mA
- IF = 20 mA
- IF = 10 mA
- IF = 5 mA
- IF = 3 mA
Figure 4. Leakage Current vs. Temperature

**Detector**

- Normalized to $V_{CE} = 25\ V$
- $T_A = 25\ ^\circ C$
- $V_{CE} = 25\ V$
- $V_{CE} = 10\ V$

**Emitter**

- Normalized to $V_R = 5\ V$
- $T_A = 25\ ^\circ C$

Figure 5. Switching Speed vs. RL

- $I_f = 7.5\ \text{amps}$, $V_{CC} = 5V$
- Normalized to $R_L = 750\ \Omega$
- $PW = 300\ \mu s$
- $PPR = 100\ \text{pps}$
- $I_f = 7.5\ \frac{V_R}{R_L}$

Figure 6. Output Current vs. Distance

- Normalized to value with shield removed
- $d$, distance (mm)
- $d$, distance (mils)
- $I_{on}$, ON current
- $I_{off}$, OFF current
- $V_{CC}$
- $V_R = 5V$
- $R_L$
- $RL + VCC$
- $I_f$
- $78.7\ 157.5\ 236.2\ 315\ 393.7$
- BLACK SHIELD
- BLACK SHIELD
- SHIELD REMOVED

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