IS1U20

IrDA1.0 Compliant OPIC Light Detector

Features
1. Compliant with IrDA 1.0 (Transmission rate: 2.4 to 115.2kbps)
2. Compact design due to OPIC
3. For both 5V and 3V power supplies (Operating supply voltage: 2.7 to 5.5V)
4. Visible light cut-off type
5. Pair use with GL1F20 is recommended

Applications
1. Personal computers
2. Personal information tools
3. Printers
4. Word processors

IrDA: Abbreviation of the Infrared Data Association established for standardization of infrared communication specifications

Absolute Maximum Ratings (Tα=25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>VCC</td>
<td>0 to 6.0</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Tmin</td>
<td>−10 to +70</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>−20 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>Tbsf</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1 No dew formation
*2 For MAX. 3s at the position of 2mm from the resin edge.
   At mounting on PCB (Thickness: 1.0mm)

Outline Dimensions (Unit: mm)

Black epoxy resin (visible light cut-off type)

“OPIC” (Optical IC) is a trademark of the SHARP Corporation.
An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a signal chip.

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Internet
Internet address for Electronic Components Group: http://www.sharp.co.jp/ecg/
### Recommended Operating Conditions (Ta=25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>VCC</td>
<td>2.7 to 5.5</td>
<td>V</td>
</tr>
<tr>
<td>Transmission rate</td>
<td>BR</td>
<td>2.4 to 115.2</td>
<td>kbps</td>
</tr>
</tbody>
</table>

### Electro-optical Characteristics (Ta=25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissipation current</td>
<td>Icc1</td>
<td>Vcc=5V, no input light, output terminal OPEN</td>
<td>–</td>
<td>1.0</td>
<td>1.4</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>Icc2</td>
<td>Vcc=3V, no input light, output terminal OPEN</td>
<td>–</td>
<td>0.7</td>
<td>1.0</td>
<td>mA</td>
</tr>
<tr>
<td>High level output voltage</td>
<td>VOH1</td>
<td>Vcc=5V</td>
<td>4.5</td>
<td>–</td>
<td>–</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>VOH2</td>
<td>Vcc=3V</td>
<td>2.5</td>
<td>–</td>
<td>–</td>
<td>V</td>
</tr>
<tr>
<td>Low level output voltage</td>
<td>VOL1</td>
<td>** Vcc=5V, Io=400μA</td>
<td>–</td>
<td>–</td>
<td>0.4</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>VOL2</td>
<td>** Vcc=3V, Io=400μA</td>
<td>–</td>
<td>–</td>
<td>0.4</td>
<td>V</td>
</tr>
<tr>
<td>Low level pulse width</td>
<td>tw1</td>
<td>** BR=2.4kbps</td>
<td>0.8</td>
<td>–</td>
<td>16.0</td>
<td>μs</td>
</tr>
<tr>
<td></td>
<td>tw2</td>
<td>** BR=115.2kbps</td>
<td>0.8</td>
<td>–</td>
<td>8.0</td>
<td>μs</td>
</tr>
<tr>
<td>Rise time</td>
<td>tR</td>
<td>** BR=115.2kbps</td>
<td>–</td>
<td>–</td>
<td>1.2</td>
<td>μs</td>
</tr>
<tr>
<td>Fall time</td>
<td>tF</td>
<td>** BR=115.2kbps</td>
<td>–</td>
<td>–</td>
<td>0.2</td>
<td>μs</td>
</tr>
<tr>
<td>Maximum receiving distance</td>
<td>L</td>
<td>Vcc, Vcc, tR, t and t shall be satisfied at φ=15°</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>m</td>
</tr>
</tbody>
</table>

*3 Refer to Fig.1, Fig.2, Fig.3.

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**Fig.1 Standard Optical System**

- Eₐ: illuminance of detector face <10 lx
- φ: Indicates horizontal and vertical directions.

1) GL1F20 or GL1F201 (λₑ=850 to 900nm) is used for the transmitter, and its radiation intensity shall be adjusted to 40mW/sr.
Fig. 2 Input Signal Waveform

Transmitter radiant intensity: 40mW/sr

At BR=2.4kbps, T1=416.7µs, T2=78.1µs
At BR=115.2kbps, T1=8.68µs, T2=1.63µs

Fig. 3 Output Waveform Specification

V_{OH}

90%
50%
10%

V_{OL}

Fig. 4 Internal Block Diagram
Fig. 5 Example of Infrared Data Communication System

1) UART (Universal Asynchronous Receiver/Transmitter)
2) Please select the most suitable C and R according to the noise level and noise frequency of power supply.
   EX.: C=47μF, R=47Ω
   * GL1F20 (source voltage 5V) or GL1F201 (source voltage 3V) is recommended for infrared emitting diode with this sensor as pair.

Fig. 6 Signal Waveform

- Transmitting data
- Encoder output
- Optical signal
- IS1U20 output
- Receiving data

Data rate: 2.4kbps, 9.6kbps, 19.2kbps,
38.4kbps, 57.6kbps, 115.2kbps
Ambient Light Characteristics

In the optical system of Fig.7, output signal shall satisfy $V_{Oh}, V_{Oh}, t_r,$ $t_f$ shown in electrical characteristics, at $L=0.2$ to $1m$, $Ee^{\mu_s^2}=1000$ lx, $\phi=0^\circ$.

1) Illuminance of detector face.

2) CIE standard light source A shall be used and placed at $30^\circ$ form the perpendicular axis at the center of detector face.

Fig.7 Standard Optical System

3) GL1F20 or GL1F201 ($\lambda_p=850$ to $900nm$) is used for the transmitter, and its radiation intensity shall be adjusted to 40mW/sr.

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Fig.8 Relative Sensitivity vs. Wavelength

Fig.9 Maximum Receiving Distance vs. Supply Voltage

Downloaded from Arrow.com.
Fig. 10 Relative Receiving Distance vs. Ambient Temperature

Fig. 11 Relative Receiving Distance vs. Angular Displacement

Fig. 12 Pulse Width vs. Receiving Distance
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   - Consumer electronics

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