DESCRIPTION

The IS181 series of optocoupler consists of an infrared light emitting diode optically coupled to an NPN silicon photo transistor in a space efficient Mini Flat Package.

FEATURES

- Low Profile Package
- AC Isolation Voltage 3750V_{RMS}
- CTR Selections Available
- Wide Operating Temperature Range -55°C to +110°C
- Lead Free and RoHS Compliant
- UL File E91231 model “FPT1” and “FPT2”

APPLICATIONS

- Computer Terminals
- Industrial System Controllers
- Measuring Instruments
- Signal Transmission between Systems of Different Potentials and Impedance

ORDER INFORMATION

- Available in Tape and Reel with 3000 pieces per reel

ABSOLUTE MAXIMUM RATINGS (T_{A} = 25°C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

Input

- Forward Current 50mA
- Reverse Voltage 6V
- Power dissipation 70mW

Output

- Collector to Emitter Voltage BV_{CEO} 80V
- Emitter to Collector Voltage BV_{ECC} 6V
- Collector Current 50mA
- Power Dissipation 150mW

Total Package

- Isolation Voltage 3750V_{RMS}
- Total Power Dissipation 170mW
- Operating Temperature -55 to 110 °C
- Storage Temperature -55 to 150 °C
- Lead Soldering Temperature (10s) 260°C
## ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

### INPUT

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Voltage</td>
<td>V_F</td>
<td>I_F = 20mA</td>
<td>1.2</td>
<td></td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Current</td>
<td>I_R</td>
<td>V_R = 4V</td>
<td></td>
<td></td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td>Terminal Capacitance</td>
<td>C_t</td>
<td>V = 0V, f = 1KHz</td>
<td>30</td>
<td></td>
<td>250</td>
<td>pF</td>
</tr>
</tbody>
</table>

### OUTPUT

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector-Emitter Breakdown Voltage</td>
<td>BVCEO</td>
<td>I_C = 0.1mA, I_F = 0 mA</td>
<td>80</td>
<td></td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>Emitter-Collector Breakdown Voltage</td>
<td>BVECO</td>
<td>I_E = 10µA, I_F = 0mA</td>
<td>6</td>
<td></td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>Collector-Emitter Dark Current</td>
<td>ICEO</td>
<td>V_CE = 20V, I_F = 0mA</td>
<td>100</td>
<td></td>
<td>600</td>
<td>nA</td>
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### COUPLED

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Transfer Ratio</td>
<td>CTR</td>
<td>I_F = 5mA, V_CE = 5V</td>
<td>50</td>
<td></td>
<td>600</td>
<td>%</td>
</tr>
<tr>
<td>Optional CTR Grades</td>
<td></td>
<td>IS181A</td>
<td>80</td>
<td></td>
<td>160</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IS181B</td>
<td>130</td>
<td></td>
<td>260</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IS181C</td>
<td>200</td>
<td></td>
<td>400</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IS181D</td>
<td>300</td>
<td></td>
<td>600</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IS181GR</td>
<td>100</td>
<td></td>
<td>300</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IS181GB</td>
<td>100</td>
<td></td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Collector-Emitter Saturation Voltage</td>
<td>V_CE(sat)</td>
<td>I_F = 20mA, I_C = 1mA</td>
<td>0.2</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Floating Capacitance</td>
<td>C_f</td>
<td>V = 0V, f = 1MHz</td>
<td>0.6</td>
<td></td>
<td>1</td>
<td>pF</td>
</tr>
<tr>
<td>Output Rise Time</td>
<td>t_r</td>
<td>V_CE = 2V, I_c = 2mA, R_L = 100Ω</td>
<td>4</td>
<td></td>
<td>18</td>
<td>µs</td>
</tr>
<tr>
<td>Output Fall Time</td>
<td>t_f</td>
<td>V_CE = 2V, I_c = 2mA, R_L = 100Ω</td>
<td>3</td>
<td></td>
<td>18</td>
<td>µs</td>
</tr>
</tbody>
</table>

### ISOLATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Condition</th>
<th>Min</th>
<th>Typ.</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation Voltage</td>
<td>V_ISO</td>
<td>RH = 40% to 60%, t = 1 min,</td>
<td>3750</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Input - Output Resistance</td>
<td>R_L-O</td>
<td>V_L-O = 500VDC</td>
<td>5×10^10</td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
</tbody>
</table>
Fig 1  Forward Current vs $T_A$

Fig 2  Collector Power Dissipation vs $T_A$

Fig 3  Forward Current vs Forward Voltage

Fig 4  Collector Current vs Collector-Emitter Voltage

Fig 5  Collector-Emitter Saturation Voltage vs Forward Current

Fig 6  Collector-Emitter Saturation Voltage vs $T_A$
Fig 7  Normalized Current Transfer Ratio vs Forward Current

Fig 8  Normalized Current Transfer Ratio vs $T_A$

Fig 9  Collector Dark Current vs $T_A$

Fig 10  Frequency response

Fig 11  Response Time vs Load Resistance
ORDER INFORMATION

<table>
<thead>
<tr>
<th>After PN</th>
<th>PN</th>
<th>Description</th>
<th>Packing quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>IS181</td>
<td>Surface Mount Tape &amp; Reel</td>
<td>3000 pcs per reel</td>
</tr>
<tr>
<td>Any CTR Grade</td>
<td>IS181A, IS181B, IS181C, IS181D, IS181GR, IS181GB</td>
<td>Surface Mount Tape &amp; Reel</td>
<td>3000 pcs per reel</td>
</tr>
</tbody>
</table>

NOTE: Multiple Grades may be supplied to meet the requested specification.

DEVICE MARKING

FPT# denotes Device Part Number where “#” is internal control number which can be “1” or “2”

I denotes Isocom

Y denotes 1 digit Year code

WW denotes 2 digit Week code

R denotes CTR Grade
PACKAGE DIMENSIONS (mm)

RECOMMENDED SOLDER PAD LAYOUT (mm)
## TAPE AND REEL PACKAGING

<table>
<thead>
<tr>
<th>Description</th>
<th>Symbol</th>
<th>Dimension (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape Width</td>
<td>W</td>
<td>12 ± 0.3 (0.47)</td>
</tr>
<tr>
<td>Pitch of Sprocket Holes</td>
<td>P₀</td>
<td>4 ± 0.1 (0.15)</td>
</tr>
<tr>
<td>Distance of Compartment to Sprocket Holes</td>
<td>F</td>
<td>5.5 ± 0.1 (0.217)</td>
</tr>
<tr>
<td></td>
<td>P₂</td>
<td>2 ± 0.1 (0.079)</td>
</tr>
<tr>
<td>Distance of Compartment to Compartment</td>
<td>P₁</td>
<td>8 ± 0.1 (0.315)</td>
</tr>
</tbody>
</table>
IR REFLOW SOLDERING TEMPERATURE PROFILE
One Time Reflow Soldering is Recommended.
Do not immerse device body in solder paste.

![Temperature Profile Diagram]

**Profile Details** | **Conditions**
--- | ---
**Preheat**  
- Min Temperature ($T_{SMIN}$)  
- Max Temperature ($T_{MAX}$)  
- Time $T_{SMIN}$ to $T_{MAX}$ ($t_s$)  |  
150°C  
180°C  
60s - 120s

**Soldering Zone**  
- Peak Temperature ($T_P$)  
- Liquidous Temperature ($T_L$)  
- Time within 5°C of Actual Peak Temperature ($T_P - 5°C$)  
- Time maintained above $T_L$ ($t_L$)  
- Ramp Up Rate ($T_L$ to $T_P$)  
- Ramp Down Rate ($T_P$ to $T_L$)  |  
260°C  
217°C  
20s  
60s  
3°C/s max  
3 - 6°C/s

Average Ramp Up Rate ($T_{SMAX}$ to $T_P$)  
Time 25°C to Peak Temperature  |  
3°C/s max  
8 minutes max
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