**Description**

The IF-E91D is a high-optical-output, high-speed, infrared LED housed in a “connector-less” style plastic fiber optic package. High performance at economical cost is provided by the IF-E91D in a variety of applications. The device package features an internal micro-lens and a precision-molded PBT housing to ensure efficient optical coupling with standard 1000 μm core plastic fiber cable.

**Application Highlights**

The high output and fast transition times of the IF-E91D make it suitable for low-cost digital data links. Using standard 1000 μm core plastic fiber, the IF-E91D LED is ideally suited for distances up to 10 meters at data rates of 100 Mbps. The drive circuit design is simpler than required for laser diodes, making the IF-E91D a good low-cost device in a variety of short distance analog and digital applications.

**Features**

- High Infrared Optical Power
- Fast Rise and Fall Times
- Economically Priced
- Mates with Standard 1000 μm Core, 2.2 mm Jacketed Plastic Fiber Cable
- Internal Micro-Lens for Maximum Coupling
- Inexpensive Plastic Connector Housing
- Connector-Less Fiber Termination
- Light-Tight Housing Provides Interference-Free Transmission
- RoHS Compliant

**Maximum Ratings**

($T_A = 25°C$)

- Operating and Storage Temperature Range ($T_{OP}, T_{STG}$): -40°C to 85°C
- Junction Temperature ($T_J$): 85°C
- Soldering Temperature (2mm from case bottom) ($T_S$): t ≤ 5 s: 240°C
- Reverse Voltage ($V_R$): 3 V
- Power Dissipation ($P_{TOT}$) $T_A = 25°C$: 60 mW
- De-rate Above 25°C: 1.33 mW/°C
- Forward Current, DC ($I_F$): 60 mA
- Surge Current ($I_{FSM}$) t ≤ 10 µsec duty cycle <5%: 1 A

**Characteristics ($T_A = 25°C$)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Wavelength</td>
<td>$\lambda_{PEAK}$</td>
<td>860</td>
<td>870</td>
<td>875</td>
<td>nm</td>
</tr>
<tr>
<td>Spectral Bandwidth (FWHM)</td>
<td>$\Delta\lambda$</td>
<td>–</td>
<td>50</td>
<td>–</td>
<td>nm</td>
</tr>
<tr>
<td>Output Power Coupled into Plastic Fiber (1 mm core diameter). Distance Lens to Fiber ≤ 0.1 mm, 100 mm SH4001 polished fiber, $I_F = 20 mA$</td>
<td>$P_0$</td>
<td>280 -5.5</td>
<td>420 -3.8</td>
<td>560 -2.5</td>
<td>µW dBm</td>
</tr>
<tr>
<td>Switching Times (10% to 90% and 90% to 10%) (Figure 3)</td>
<td>$t_r, t_f$</td>
<td>–</td>
<td>3.0</td>
<td>–</td>
<td>ns</td>
</tr>
<tr>
<td>Capacitance ($I_F = 1 MHz$)</td>
<td>$C_0$</td>
<td>–</td>
<td>60</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td>Forward Voltage ($I_F = 20 mA$)</td>
<td>$V_F$</td>
<td>–</td>
<td>1.38</td>
<td>1.58</td>
<td>V</td>
</tr>
<tr>
<td>Temperature Coefficient, $\lambda_{PEAK}$</td>
<td>$TCA$</td>
<td>–</td>
<td>0.3</td>
<td>–</td>
<td>nm/K</td>
</tr>
</tbody>
</table>

**CAUTION:** The IF E91D is ESD sensitive. To minimize risk of damage observe appropriate precautions during handling and processing.
**APPLICATION NOTES**

The application circuit given in Figure 3 can be used to drive the IF-E91D for fast applications. Gate U1 represents the circuit being used to drive the IF-E91D. This must be able to supply the desired drive current at the output voltage. Resistor \( R_A \) supplies most of the drive current for the IF-E91D. The amount of current supplied is \( I_A = \frac{(V_{U1} - V_f)}{R_A} \), where \( V_f \) is the IF-E91D forward voltage and \( V_{U1} \) is the drive circuits output voltage under load. Resistor \( R_B \) speeds up the switching time by keeping the voltage across the IF-E91D from going to zero during turn off. It also supplies some of the drive current. The drive current from \( R_B \) is \( I_B = \frac{(V_{CC} - V_f)}{R_B} \), where \( V_{CC} \) is the supply voltage. The total drive current to the IF-E91D is \( I_A + I_B \). Some power is wasted in \( R_B \) when the IF-E91D is off. Capacitor \( C_A \) is used to increase the drive current during switching and speed up the turn on and turn off times. It must not be so large as to overdrive the IF-E91D during turn on or drive the voltage negative during turn off. For lower speed applications, only \( R_A \) is needed and \( C_A \) and \( R_B \) can be omitted.

**FIBER TERMINATION INSTRUCTIONS**

1. Cut off the ends of the optical fiber with a single-edge razor blade or sharp knife. Try to obtain a precise 90-degree angle (square).
2. Insert the fiber through the locking nut and into the connector until the core tip seats against the internal micro-lens.
3. Screw the connector locking nut down to a snug fit, locking the fiber in place.
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CAUTION:
• To avoid degraded device life due to package stress, do not bend or form leads outside the orientation shown on drawing.
• Ensure that solder flux does not migrate into the device and block the optical path, degrading the performance.
• If washing the device, liquid may become trapped in the part cavity. Ensure that all potentially corrosive materials are flushed out of the device.