

APPLICATIONS

- Low-Cost Digital Data Links
- Optical Sensors
- Audio Systems
- Medical Instruments
- Automotive Electronics
- Robotics Communications
- Local Area Networks (LANs)
- Wavelength Multiplexing
- Electronic Games

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

($T_A = 25^\circ\text{C}$)

Operating and Storage
Temperature Range

(T_{OP} , T_{STG}).....-40°to 85°C

Junction Temperature (T_J).....85°C

Soldering Temperature

(2mm from case bottom)

(T_S) $t \leq 5$ s.....240°C

Reverse Voltage (V_R).....3 V

Power Dissipation

(P_{TOT}) $T_A = 25^\circ\text{C}$60 mW

De-rate Above 25°C.....1.33 mW/°C

Forward Current, DC (I_F).....60 mA

Surge Current (I_{FSM}) $t \leq 10 \mu\text{sec}$

duty cycle <5%.....1 A

CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Peak Wavelength	λ_{PEAK}	860	870	875	nm
Spectral Bandwidth (FWHM)	$\Delta\lambda$	—	50	—	nm
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	P_O	280 -5.5	420 -3.8	560 -2.5	μW dBm
Fiber Transmission Loss SH4001 10 meter cutback	L	—	2.0	—	dB/m
Switching Times (10% to 90% and 90% to 10%) (Figure 3)	t_r, t_f	—	3.0	—	ns
Capacitance ($I_F = 1$ MHz)	C_0	—	60	—	pF
Forward Voltage ($I_F = 20$ mA)	V_f	—	1.38	1.58	V
Temperature Coefficient, λ_{PEAK}	$TC\lambda$	—	0.3	—	nm/K

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

IF E91D 100 Mbps Plastic Fiber Optic IR LED

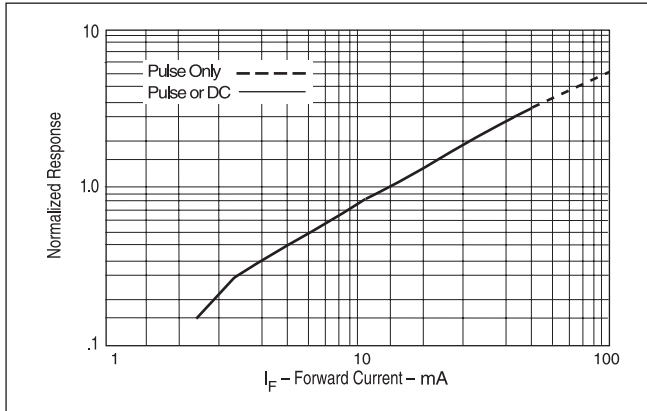


FIGURE 1. Normalized power launched versus forward current.

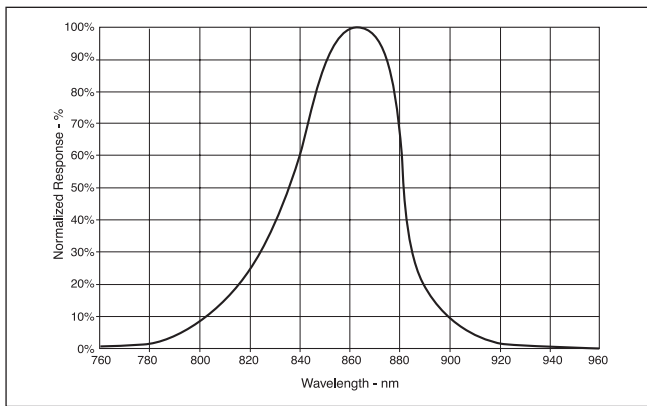


FIGURE 2. Typical spectral output vs. wavelength.

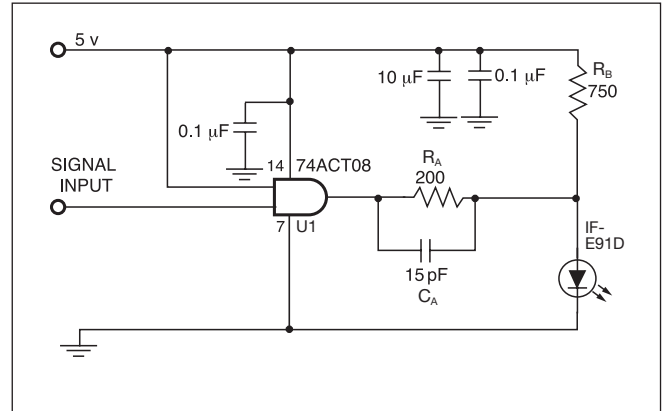


FIGURE 3. Test application circuit (IF = 22mA).

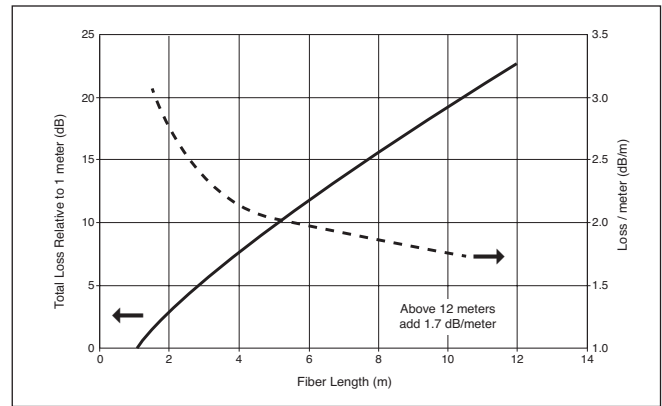


FIGURE 4. Fiber Loss in GH4001

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 $I_A = (V_{U1} - V_f) / R_A$, where V_f is the IF-E91D forward voltage and V_{U1} is the drive circuit's 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 $I_B = (V_{CC} - V_f) / R_B$, 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.

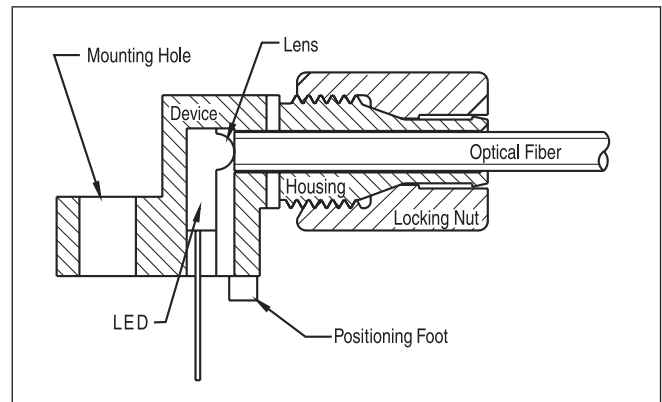


FIGURE 5. Cross-section of fiber optic device.

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. Do not exceed a torque of 0.4 N·m.

IF E91D 100 Mbps Plastic Fiber Optic IR LED

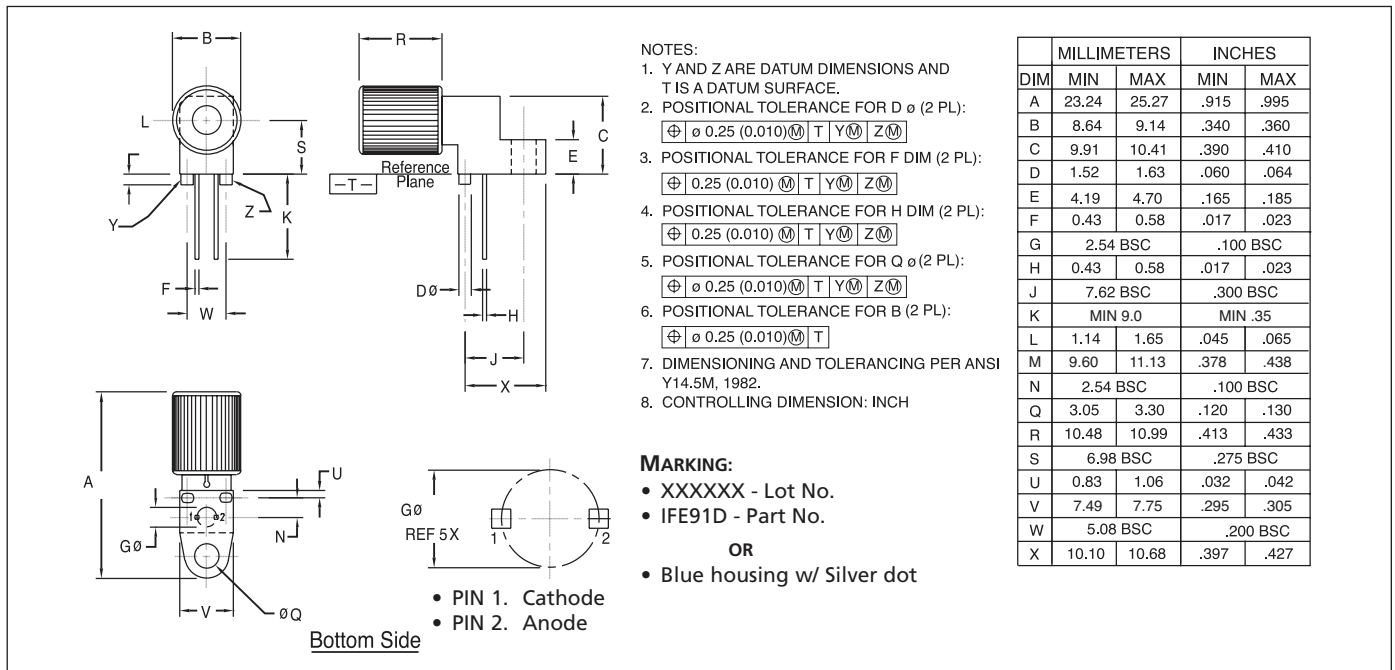


FIGURE 4. Case outline. Specifications are believed to be accurate but are subject to change. Industrial Fiber Optics assumes no responsibility for the consequences of using the information provided beyond replacement warranty for products not meeting stated specifications. Industrial Fiber Optics products are not authorized for use in life support applications without written approval from the President of Industrial Fiber Optics Corporation.

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.