Plastic Fiber Optic IF LEDS





Applications

- ➤ Low Cost Analog and Digital Data Links
- Digitized Audio
- Optical Sensors
- Medical Instruments
- ➤ Robotics Communications ➤ Motor Controller Triggering
- ➤ EMC/EMI Signal Isolation
- ➤ Electronic Games
- ➤ Intra-System Links: Board-to-Board, Rack-to-Rack

Maximum Ratings

$(T_A = 25^{\circ}\text{C})$ Operating and Storage Temperature Range (TOP, TSTG)	Maximum naungs
Temperature Range (TOP, TSTG)	$(T_A = 25^{\circ}C)$
Soldering Temperature (2mm from case bottom) (TS)t ≤ 5 s	Temperature Range
(2mm from case bottom) (TS)t ≤ 5 s	Junction Temperature (TJ)85°C
Power Dissipation (PTOT) TA =25°C80 mW De-rate Above 25°C1.33 mW/°C Forward Current, DC (IF)	(2mm from case bottom)
(PTOT) TÅ =25°C	Reverse Voltage (VR)5 V
Forward Current, DC (IF)50 mA	
50 mA	De-rate Above 25°C 1.33 mW/°C

Description

The IF-E91A is a high-output medium-speed infrared LED in a "connector-less" style plastic fiber optic package. The output spectrum peaks at 930 nm for the IF-E91A. The device package features an internal micro-lens, and a precision-molded PBT housing ensures efficient optical coupling with standard 1000 µm plastic fiber cable.

IF E91A

Application Highlights

The high output and fast transition times of the IF-E91A are suitable for low-cost analog and digital data links. Used with an IF-D96 photologic detector, the IF-E91A can achieve data rates of 500 kbps at link distances up to 7 m. The drive circuit design is simpler than required for laser diodes, making the IF-E91A an excellent lowcost alternative in a variety of analog and digital applications.

Features

- ◆ Excellent Linearity
- No Optical Design Required
- Mates with Standard 1000 μm Core, 2.2 mm Jacketed Plastic Fiber Cable
- ◆ Internal Micro-Lens for Efficient Coupling
- ◆ Inexpensive Plastic Connector Housing
- ◆ Connector-Less Fiber Termination and Connection
- ◆ Interference-Free Transmission from Light-Tight Housing
- ◆ RoHS Compliant

Characteristics (TA = 25°C)

duty cycle <1

Characteristics (IA =25 C)					
Parameter	Symbol	Min.	Тур.	Max.	Unit
Peak Wavelength	$\lambda_{_{PEAK}}$	-	930	-	nm
Spectral Bandwidth (FWHM)	Δλ	-	50	-	nm
Output Power Coupled into Plastic Fiber (1 mm core diameter). Distance Lens to Fiber \leq 0.1 mm, 1m SH4001 fiber, I_F =20 mA	Po	50 -13	70 -11.6	95 -10.2	μW dBm
Switching Times (10% to 90% and 90% to 10%) (Figure 3)	tr, tf	-	0.7	-	μs
Capacitance (F=1 MHz)	C ₀	-	20	-	pF
Forward Voltage (I _F =20 mA) (I _F =50 mA)	Vf	-	1.2 1.27	1.6 1.6	V

CAUTION: The IF E91A is ESD sensitive. To minimize risk of damage observe appropriate precautions during handling and processing.

Plastic Fiber Optic IF LEDS

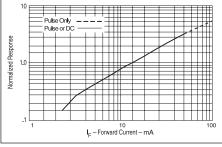


Figure 1. Normalized power launched versus forward current

λ - Wavelength - nm

Typical spectral output versus wavelength

1000

Cross-section of fiber optic device.

- Mounting Hole

LED-

Figure 3.

Fiber Termination Instructions

- 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.
- to a snug fit, locking the fiber in place.

- 1. Cut off the ends of the optical fiber with
- **3.** Screw the connector locking nut down

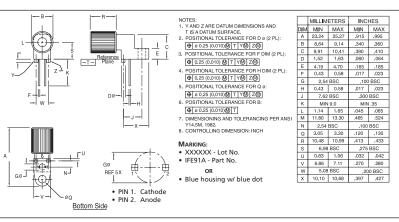


Figure 2.

Figure 4. 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 Case outline. 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

· If washing the device, liquid may become trapped in the part cavity. Ensure that all potentially corrosive

· Ensure that solder flux does not migrate into the device and block the optical path, degrading the performance.

materials are flushed out of the device

12 0055 Rev A

EXPERIMENTER'S KIT - TECHNICAL DATA -

CONTENTS

IF F91A

Optical Fiber

Part Number	Description			
IF-D92	Fiber Optic Phototransistor			
IF-E91A	Fiber Optic Infrared LED			
IF-C-E1000	1000 µm core jacketed optical fiber			

Missing Parts Claims

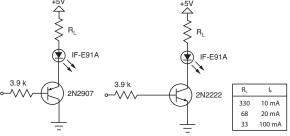
Industrial Fiber Optics products are warranted against missing parts and defects in material for 90 days. Since soldering and incorrect assembly can damage electrical components, no warranty can be made after assembly has begun. If any parts become damaged, replacements may be obtained from the distributor from whom you purchased this kit.

Introduction

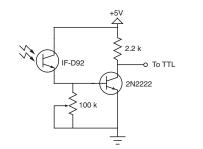
The purpose of this kit is to provide you with an introduction to components, simple circuits and to begin applying basic fiber optic technology. This kit contains the innovative IF-E91A infrared LED and IF-D92 phototransistor, both utilizing integrated connectors which connect to 1000 µm plastic fiber with no additional components needed. Listed below are circuits and applications to try.

Digital Data Transmission

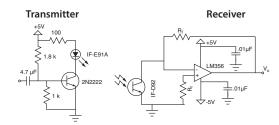




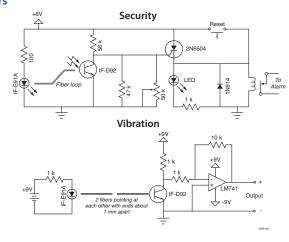
TTL Receiver



Analog Data Transmission (100k Hz)



Sensors



Other Fiber Optic Components

Industrial Fiber Optics offers other fiber optic LEDs and photodetectors in addition to those found in this kit. Listed below are a few of those fiber optic components. We also have many other educational kits and optical fiber in many types and grades. If you would like a catalog or have any questions please feel to contact us.

Part Number	Description		
IF-D91	Photodiode		
IF-D93	Photodarlington		
IF-D95	Photologic		
IF-E91D	Infrared LED, 870 nm		
IF-E92	Blue LED, 430 and 470 nm		
IF-E93	Green LED, 530 nm		
IF-E96	Red LED, 660 nm		
IF-E97	Red LED, 660 nm Super-bright		

Plastic Fiber Optic Phototransistor



Applications

- ➤ Low-Speed Digital Data Links
- ➤ Motor Controller Triggering
- ➤ Audio Links
- Medical Instruments
- Automotive Electronics
- Robotics Communications
- ➤ EMC/EMI Signal Isolation
- ➤ Electronic Games
- ➤ Process Control

Maximum Ratings

Maximum Raungs	
(TA =25°C)	
Operating and Storage	
Temperature Range	
(TOP, TSTG)40° to 85°	C
Junction Temperature (TJ)85°	C
Soldering Temperature (2mm from case bottom)	
(TS) t ≤ 5 s240°	C
Collector Emitter Voltage (VCEO)30	٧
Emitter Collector Voltage	
(VECO)5	٧
Collector Current (IC)50 m	
Collector Peak Current	
(ICM) t =1ms 100 m	۱A
Power Dissipation	
(PTOT) TA =25°C100 m ¹	W
De-rate Above 25°C 1.67 mW/°	С

Description

The IF-D92 is a high-sensitivity NPN phototransistor detector housed in a "connector-less" style plastic fiber optic package. Optical response of the IF-D92 extends from 400 to 1100 nm, making it compatible with a wide range of visible and near-infrared LEDs and laser diode sources. This includes 650 nm visible red LEDs used for optimum transmission in PMMA plastic optic fiber. The detector 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.

IF-D92

Application Highlights

The IF-D92 is suitable for digital data links at rates up to 20 kbps. Analog bandwidths greater than 15 kHz are possible making the IF-D92 usable for high frequency audio transmission. Phototransistor operation provides high internal gain - reducing the amount of postamplification required in many circuits. The integrated design of the IF-D92 makes it a simple, cost-effective solution in a variety of analog and digital applications.

Features

- High Optical Sensitivity
- ◆ Mates with Standard 1000 um Core, 2.2 mm Jacketed Plastic Fiber Optic Cable
- ◆ No Optical Design Required
- ◆ Inexpensive but Rugged Plastic Connector Housing
- ◆ Internal Micro-Lens for Efficient Optical Coupling
- ◆ Connector-Less Fiber Termination
- ◆ Light-Tight Housing provides Interference Free Transmission
- ◆ RoHS Compliant

Characteristics (TA =25°C)

Parameter	Symbol	Min.	Тур.	Max.	Unit
Wavelength for Maximum Photosensitivity	λ_{PEAK}	-	870	-	nm
Spectral Bandwidth (R=10% of RMAX)	Δλ	400	-	1100	nm
Switching Times (10% to 90% and 90% to 10%) (RL=1 k Ω , I _C =1.0 mA, V _{CE} =5 V, λ =850 nm)	t _r t _f	-	25 25	-	μs
Responsivity min. @ 870 nm @ 650 nm	R	-	450 350	-	μΑ/μW
Collector Dark Current (V _{CE} =10 volts)	ICEO	-	-	100	nA
Breakdown Voltage (I _C =100µA)	BVCEO	30	-	-	V
Breakdown Voltage (IC= -100µA)	BVECO	5	-	-	V
Saturation Voltage (IC=250 μA, P _{in} =100μW)	VCE sat	-	0.15	-	V

CAUTION: The IF D92 is ESD sensitive. To minimize risk of damage observe appropriate precautions during handling and processing.

Plastic Fiber Optic Phototransistor

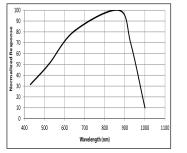
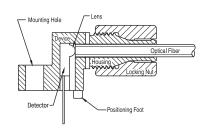


Figure 1. Typical detector response versus wavelength.



IF-D92

Figure 3. Cross-section of fiber optic device.

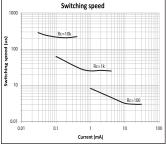
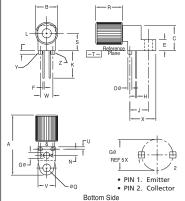


Figure 2.

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.



Rise and fall times of phototransistor.

NOTES: 1. Y AND Z ARE DATUM DIMENSIONS AND T IS A DATUM SURFACE. 2. POSITIONAL TOLERANCE FOR D Ø (2 PL):

- ⊕ ø 0.25 (0.010)@ T Y@ Z@ 3. POSITIONAL TOLERANCE FOR F DIM (2 PL)
- ⊕ 0.25 (0.010) M T YM ZM POSITIONAL TOLEDANCE FOR HIDIM (2 PL
- ⊕ 0.25 (0.010) Ø T YØ ZØ 5. POSITIONAL TOLERANCE FOR Q of ⊕ ø 0.25 (0.010)@ T Y@ Z@ 6 POSITIONAL TOLERANCE FOR B
- Ф Ø 0.25 (0.010)M T 7. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

 8. CONTROLLING DIMENSION: INCH

MARKING

XXXXXX - Lot No. • IFD92 - Part No.

Black housing w/ white dot

A	23,24	25,27	.915	.995		
В	8.64	9.14	.340	.360		
С	9,91	10,41	.390	.410		
D	1.52	1.63	.060	.064		
Е	4.19	4.70	.165	.185		
F	0.43	0.58	.017	.023		
G	2.54 BSC		3C .100 BSC			
Н	0.43	0.58	.017	.023		
J	7.62 BSC		.300 BSC			
K	MIN 9.0		MIN .35			
L	1.14	1.65	.045	.065		
N	2,54	2,54 BSC		2.54 BSC 100 BSC		BSC
Q	3.05	3.30	.120	.130		
R	10.48	10,99	.413	.433		
S	6,98 BSC		.275 BSC			
U	0.83	1.06	.032	.042		
V	6.86	7.11	.270	.280		
W	5.08 BSC		5.08 BSC .200 BS		0 BSC	
Х	10.10	10.68	.397	.427		

MILLIMETERS INCHES

DIM MIN MAX MIN MAX

Figure 4. 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 Case outline. 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.