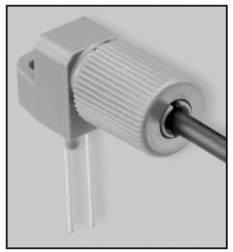


Description

The IF-E91A and IF-E91B are infrared LEDs in Industrial Fiber Optics' family of low-cost, medium-frequency, short-distance fiber optic LEDs and detectors. Each LED and detector consists of a polycarbonate (PC) housing, an internal active element such as an LED or photodetector subcomponent, and a cinch nut to hold the fiber in place. The PC housing retains the active element and the cinch nut while optimizing coupling between the active element and the jacketed 1000 µm plastic fiber.

Working with this family of fiber optics is simple: No special tools or training required. Only a sharp knife or razor blade is needed to terminate the plastic fiber. When the fiber is inserted in the LED or detector housing, tighten the cinch nut. Thereafter, the fiber can be removed simply by loosening the nut.

Applications

- Household Appliances
- Motor Controller Triggering
- PC-to-Peripheral Links
- Medical Instruments
- Automotive Electronics
- Audio Systems
- Electronic Games
- Robotics Communications

Features

- No Optical Design Required
- Mates with Standard 1000 µm Core 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
- Excellent Linearity

Maximum Ratings

(T_A=25°C)

Operating and Storage Temperature Range (T_{OP}, T_{STG}) .....-40° to 85°C

Junction Temperature (T_J) .....85°C

Soldering Temperature (2 mm from case bottom) (T_S) t≤5 s .....240°C

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

Power Dissipation (P_{TOT}) T_A=25°C .....100 mW

De-rate Above 25°C .....1.33 mW/°C

Forward Current, DC (I_F)
IF-E91A .....50 mA
IF-E91B .....100 mA

Surge Current (I_{FSM}) t≤10 µsec
IF-E91A .....2 A
IF-E91B .....2 A

Characteristics (T_A=25°C)

Parameter	Symbol	IF-E91A	IF-E91B	Unit
Peak Wavelength	λ_{PEAK}	950	880	nm
Spectral Bandwidth (50% of I_{MAX})	$\Delta\lambda$	40	80	nm
Output Power Coupled into Plastic Fiber (1 mm core diameter). Distance Lens to Fiber ≤0.1 mm, 10 cm polished fiber, I_F=20 mA	Φmin	>100 -10	>75 -11.2	µW dBm
Switching Times (10% to 90% and 90% to 10%) (R_L=47 Ω, I_F=10 mA)	t_r, t_f	1.0	0.5	µs
Capacitance	C_0	25	25	pF
Forward Voltage (I_F=50 mA)	V_f	1.5 max	1.7 max	V
Temperature Coefficient, λ_{PEAK}	TC_λ	0.3	0.3	nm/K

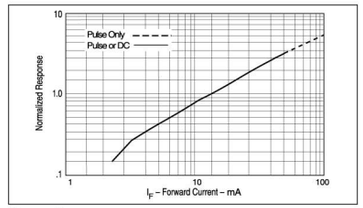


FIGURE 1. Normalized power launched versus forward current.

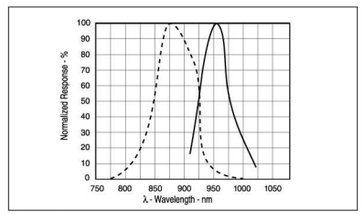


FIGURE 2. Typical spectral output vs. wavelength.

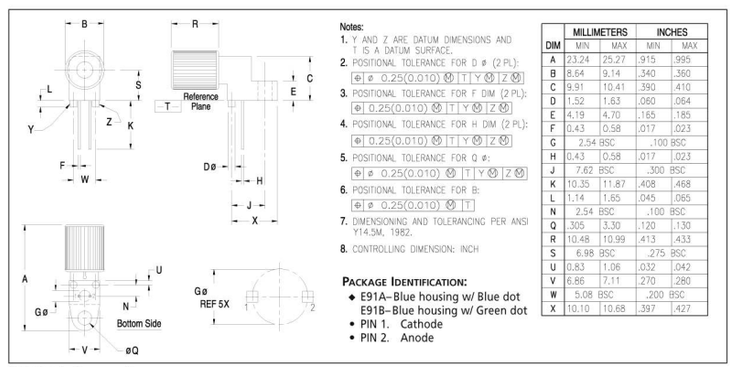


FIGURE 4. Case outline.

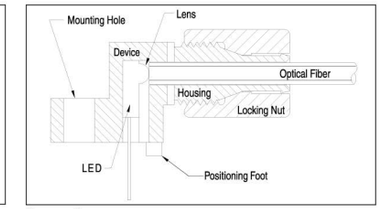


FIGURE 3. Cross-section of fiber optic device.

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.

EXPERIMENTER'S KIT
— TECHNICAL DATA —

IF-E10

CONTENTS

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

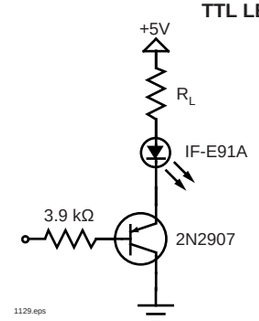
Industrial Fiber Optics products are warranted against missing parts and defects in materials for 90 days. Since soldering and incorrect assembly can damage electrical components, no warranty can be made after assembly has begun. If any parts become damaged, replacements may be obtained from the distributor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

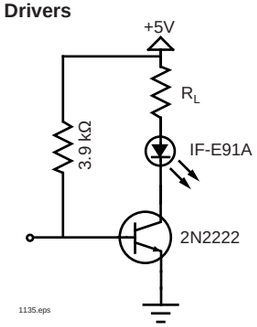
INTRODUCTION

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

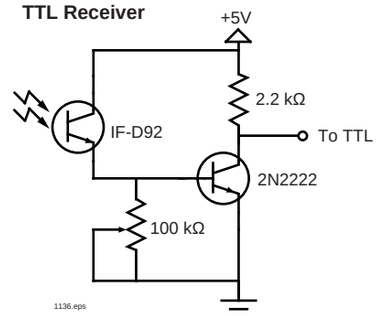
TTL LED Drivers



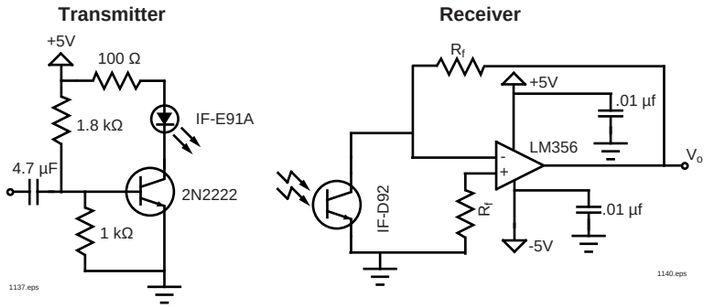


R_L	I_F
330 Ω	10 mA
68 Ω	20 mA
33 Ω	100 mA

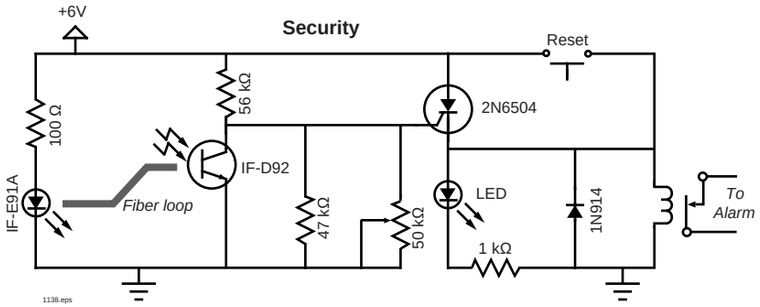
TTL Receiver

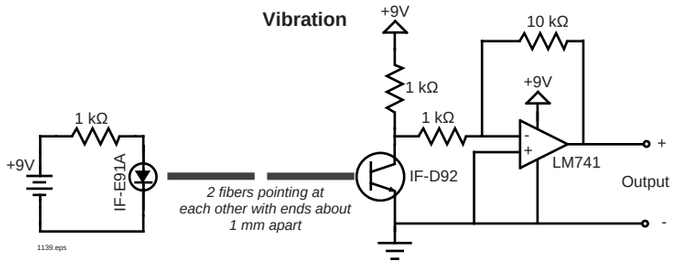


ANALOG DATA TRANSMISSION (100kHz)



SENSORS

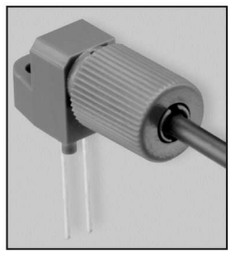




OTHER FIBER OPTIC COMPONENTS

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-E91B	Infrared LED, 880 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



APPLICATIONS

- Household Appliances
- Motor Controller Triggering
- PC-to-Peripheral Links
- Medical Instruments
- Automotive Electronics
- Audio Systems
- Electronic Games
- Robotics Communications

DESCRIPTION

The IF-D92 is the phototransistor in Industrial Fiber Optics' family of low-cost, medium-frequency, short-distance fiber optic LEDs and detectors. Each device consists of a polycarbonate (PC) housing which retains the internal active element such as an LED or photodetector subcomponent, and a cinch nut to hold the fiber in place. The assembly optimizes coupling between the active element and jacketed 1000 µm plastic fiber.

Working with this family of fiber optics requires no special tools or training. Only a sharp knife or razor blade is needed to terminate the plastic fiber. When the fiber is inserted in the LED or detector housing, the cinch nut is tightened. Thereafter, the fiber can be removed simply by loosening the nut.

FEATURES

- Excellent Linearity
- No Optical Design Required
- Mates with Standard 1000 µm Core 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
- Simple PWB Mounting
- Rugged Screw Attachment

MAXIMUM RATINGS

(T_A=25°C)

Operating and Storage Temperature Range (T_{OP}, T_{STG}) .....-40° to 85°C

Junction Temperature (T_J) .....85°C

Soldering Temperature (2 mm from case bottom) (T_S) t ≤ 5 s .....240°C

Collector Emitter Voltage (V_{CEO})....30 V

Emitter Collector Voltage (V_{ECO}) .....5 V

Collector Current (I_C).....50 mA

Collector Peak Current (I_{CM}) t =1ms.....100 mA

Power Dissipation (P_{TOT}) T_A=25°C.....100 mW

De-rate Above 25°C .....1.33 mW/°C

CHARACTERISTICS (T_A=25°C)

Parameter	Symbol	Value	Unit
Wavelength for Maximum Photosensitivity	λ_{PEAK}	870	nm
Spectral Bandwidth (S=10% of S_{MAX})	$\Delta\lambda$	400-1100	nm
Switching Times (10% to 90% and 90% to 10%) (R_L=1 k, I_C=1.0 mA, V_{CE}=5 V, λ=950 nm)	t_r, t_f	20	µs
Responsivity min. @ 880 nm @ 632 nm	R	100 50	µA/µW µA/µW
Collector Dark Current (V_{CE}=15 volts)	I_{CEO}	<100	nA
Breakdown Voltage (I_C=100 µA)	BV_{CEO}	≥ 30	V
Breakdown Voltage (I_C=100 µA)	BV_{ECO}	≥ 5	V
Saturation Voltage (I_C=250 µA, H=100 µW)	$V_{CE\ sat}$	0.15	V

Plastic Fiber Optic Phototransistor IF-D92

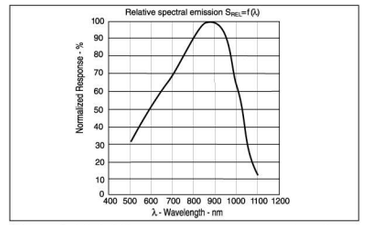


FIGURE 1. Typical detector response versus wavelength.

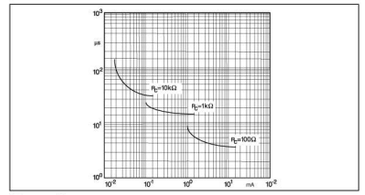


FIGURE 2. Rise and fall times of phototransistor.

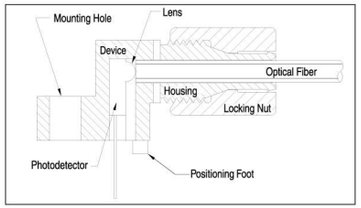
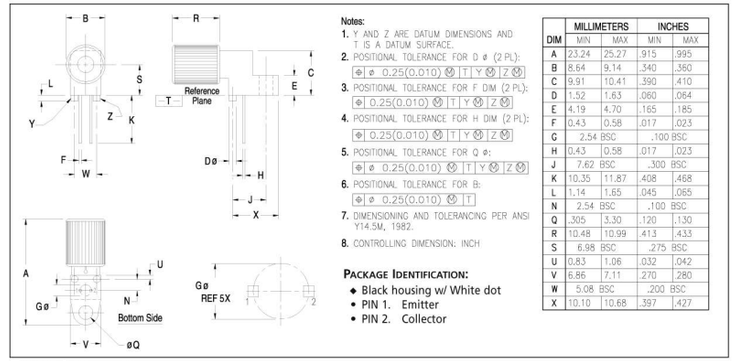


FIGURE 3. Cross-section of fiber optic device.

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.



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	23.24	25.27	.915	.995
B	8.64	9.14	.340	.360
C	9.91	10.41	.390	.410
D	1.52	1.63	.060	.064
E	4.19	4.70	.165	.185
F	0.43	0.58	.017	.023
G	2.54 BSC		.100 BSC	
H	0.43	0.58	.017	.023
J	7.62 BSC		.300 BSC	
K	10.35	11.87	.408	.468
L	1.14	1.65	.045	.065
N	2.54 BSC		.100 BSC	
Q	.305	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		.200 BSC	
X	10.10	10.68	.397	.427

FIGURE 4. Case outline.