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LAMPIRAN

Lampiran 1 Tabel perhitungan volume bahan bakar solar

h_n (cm)	Volume (Liter)
0	0
3	0,061
6	0,122
9	0,182
12	0,243
15	0,304
18	0,365
21	0,426
24	0,487
27	0,547
30	0,608

Lampiran 2 Data Sheet LED dan Fototransistor

EXPERIMENTER'S KIT — TECHNICAL DATA —

Part Number	Description
IF-092	Fiber Optic Phototransistor
IF-ES1A	Fiber Optic Infrared LED
IF-C-E1000	1000 µm core jacketed optical fiber

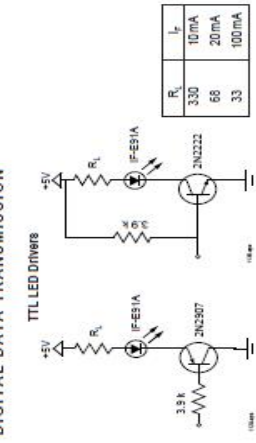
MISSING PARTS CLAIMS

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-ES1A Infrared LED and IF-092 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



IF-E91

Plastic Fiber Optic IR LEDs

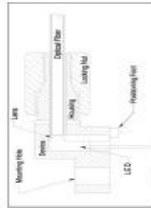


FIGURE 3. Cross-section of fiber optic device.

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 auto lock.
3. Screw the connector locking nut down to a snug fit. **WARNING: Do Not Over-Tighten.**

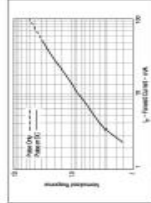


FIGURE 1. Normalized power launch versus forward current.

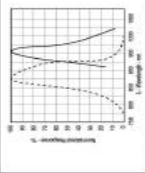


FIGURE 2. Typical spectral output vs. wavelength.

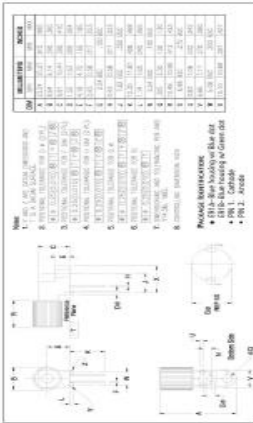


FIGURE 4. Core end view.

IF-E91

Plastic Fiber Optic IR LEDs



DESCRIPTION

The IF-E91A and IF-E91B are infrared LEDs in Industrial Fiber Optics™ family of low cost, medium-frequency, short duration fiber optic LEDs and detectors. Each LED and detector consists of a polycarbonate (PC) housing, an internal active element such as an LED or phototransistor subcomponent, and a circular optical fiber. The fiber is held in place by a locking nut. The fiber is jacketed 1000 µm plastic fiber.

Working with this family of fiber optics is simple. No special tools or special requires. 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, light the circuit. Naturally, the fiber can be removed simply by loosening the nut.

FEATURES

- No Optical Output Required
- Sizes with Standard 1000 µm Core Jacketed Plastic Fiber Cable
- Internal Fibers-Lens for Efficient Coupling
- Inexpensive Plastic Connector Housing
- Connector Loss Fiber Termination and Connection
- Inexpensive Free Transmission from Light-Right Housing
- Excellent Reliability

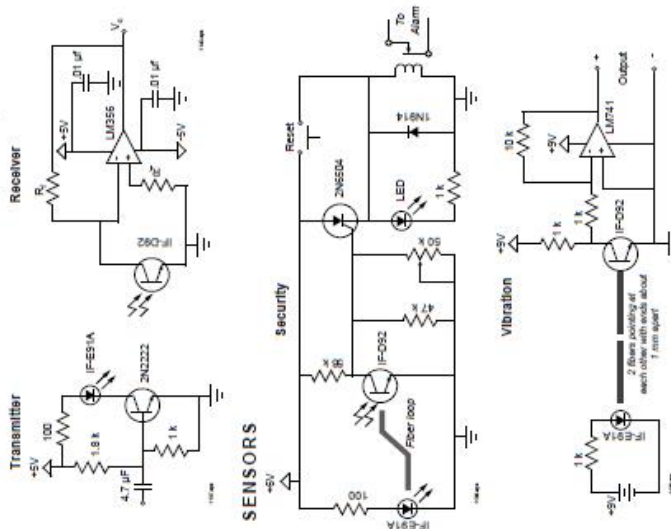
APPLICATIONS

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

MAXIMUM RATINGS

Parameter	Symbol	IF-E91A	IF-E91B	Unit
Peak Wavelength	λ_{pk}	950	980	nm
Storage Temperature (T _{stg})	T_{stg}	-40	80	°C
Operating Temperature (T _{op})	T_{op}	-40	80	°C
Forward Current (I _f)	I_f	20	25	mA
Reverse Current (I _r)	I_r	1.0	1.0	µA
Forward Voltage (V _f)	V_f	1.5	1.5	V
Reverse Voltage (V _r)	V_r	5	5	V
Power Dissipation (P _{tot})	P_{tot}	100	100	mW
Device Above 25°C		133	133	mW/°C
IF-E91A		50	50	mA
IF-E91B		100	100	mA
Storage Current (I _{stg}) (at 10 V)		1.0	1.0	µA
IF-E91A		1.0	1.0	µA
IF-E91B		1.0	1.0	µA

ANALOG DATA TRANSMISSION (100kHz)



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	Photodiarrington
IF-D95	Photologic
IF-E91B	Infrared LED, 660 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

IF-D92



DESCRIPTION

The IF-D92 is the phototransistor in Industrial Fiber Optics' family of low-cost, high-performance fiber optic components. It consists of a photodiode (PIN) junction with an internal active element such as an LED or photodiode subcomponent, and a chip-out to hold the fiber in place. The assembly optimizes coupling between the active element and a 1000 µm plastic fiber.

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

FEATURES

- Available in several colors
- No Optical Isolation Required
- Works with Standard 1000µm Core Jacketed Plastic Fiber Cable
- Internal Micro Lens for Efficient Coupling
- Inexpensive Plastic Connector Housing
- Transmits Low Fiber Termination and Connection
- Interchangeable Fiber Termination (from Light Tight Housing)
- Simple PCB Mounting
- Budget Sensitive Attachment

APPLICATIONS

- Household Appliances
- Motor Control/Tightening
- PC to Peripheral Links
- Medical Instruments
- Automotive Electronics
- Audio Systems
- Electronic Games
- Robotics Communications

MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Operating and Storage Temperature Range	T _{op} , T _{stg}	-40 to 85°C	
Reverse Bias Voltage (V _{rb})	V _{rb}	5	V
Reverse Bias Current (I _{rb})	I _{rb}	100	nA
Forward Bias Voltage (V _{fb})	V _{fb}	30	V
Forward Bias Current (I _{fb})	I _{fb}	100	µA
Collector Current (I _c)	I _c	10	mA
Collector-Emitter Voltage (V _{ce})	V _{ce}	30	V
Emitter-Collector Voltage (V _{ec})	V _{ec}	30	V
Power Dissipation (P _d)	P _d	100	mW
Storage Temperature Range	T _{stg}	-40 to 85°C	

Plastic Fiber Optic Phototransistor

IF-D92

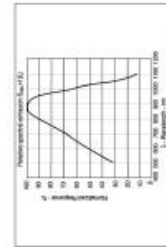


FIGURE 1. Typical Detector Response versus Wavelength.

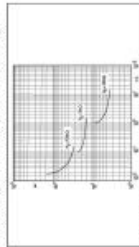


FIGURE 2. Fiber and LED Times of Phototransistor.

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 backing nut and into the connector until the core tip rests against the internal micro lens.
3. Screw the connector backing nut down to a snug fit, locking the fiber in place.

PACKAGE INFORMATION

- Black Housing or White dot
- 1000 µm Core
- PWB J. Connector

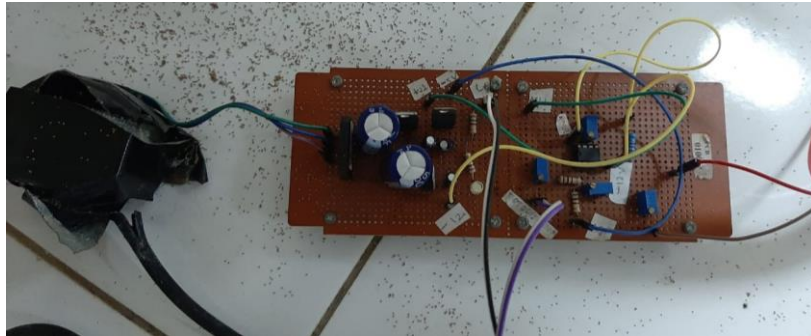
Part Number	Wavelength (nm)	Core Diameter (µm)	Length (mm)
IF-D91	660	1000	10
IF-D92	660	1000	10
IF-D93	660	1000	10
IF-D94	660	1000	10
IF-D95	660	1000	10
IF-D96	660	1000	10
IF-D97	660	1000	10
IF-D98	660	1000	10
IF-D99	660	1000	10
IF-D100	660	1000	10

FIGURE 4. Case outline.

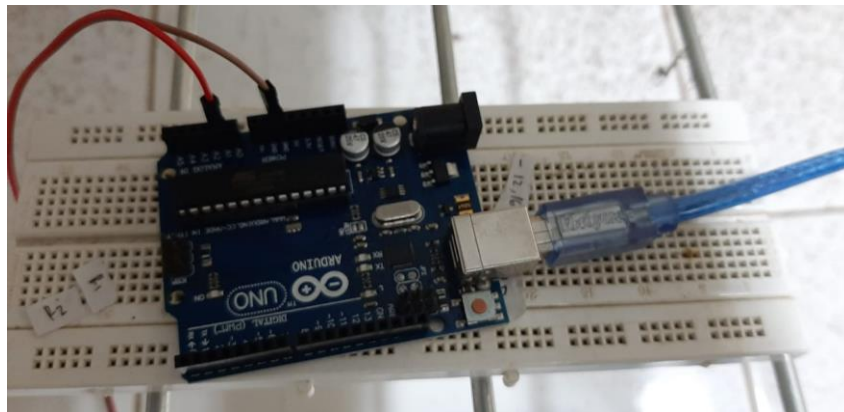
Lampiran 3 Gambar Serat Optik Plastik, LED Inframerah dan Fototransistor



Lampiran 4 Rangkaian Catu Daya dan Penguat Selisih



Lampiran 5 Rangkaian Mikromontroler Arduino UNO



Lampiran 6 Foto Pengukuran Sensor Serat Optik Plastik untuk Pengukuran Volume Bahan Bakar Solar



Lampiran 7 Foto Sensor Serat Optik Plastik Konfigurasi U dengan Selubung, Loop dengan Selubung, U tanpa Selubung dan Gamma tanpa Selubung

