Plastic Fiber Optic Photodarlington IF-D93

Applications

- Low-Speed Optical Links
- Optical Interrupter/Reflective Sensors
- Process Control
- Motor Controller Triggering
- Medical Instruments
- Automotive Electronics
- Robotics Control
- EMC/EMI Signal Isolation
- Electronic Games

Description

The IF-D93 is a very high-sensitivity photodarlington detector housed in a "connector-less" style plastic fiber optic package. Optical response of the IF-D93 extends from 400 to 1100 nm making it compatible with a wide range of visible and near-infrared LEDs and other optical 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 into standard 1000 µm core plastic fiber cable.

Application Highlights

The IF-D93 is suitable for low-speed optical links requiring high sensitivity. Triggering rates up to 1k are possible using the IF-D93 and a suitable LED source. Photodarlington transistor operation provides very high optical gain, eliminating the need for post amplification in many circuits. The integrated design of the IF-D93 makes it a simple, cost-effective solution in a variety of applications.

Features

- Mates with Standard 1000 µm Core 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
- Very High Optical Sensitivity

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})....15 V

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

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

Collector Peak Current (I_{CM}) t = 1 ms .....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	Min	Typ	Max	Unit
Wavelength for Maximum Photosensitivity	λ_{PEAK}	–	850	–	nm
Spectral Bandwidth (S=10% of S_{MAX})	$\Delta\lambda$	400	–	1100	nm
Switching Times (10% to 90% and 90% to 10%) (R_L=1kΩ, V_{CE}=5 V, λ=880 nm) See Figure 2.	t_r, t_f	–	5, 2.5	–	ms
Responsivity min. @ 880 nm @ 632 nm	R	– –	400 200	– –	µA/µW µA/µW
Collector Dark Current (V_{CE}=15 volts)	I_{CEO}	–	–	100	nA
Breakdown Voltage (I_C=1 mA)	BV_{CEO}	15	–	–	V
Breakdown Voltage (I_C=100 µA)	BV_{ECO}	5	–	–	V
Saturation Voltage (I_C=0.4 µA, H=10 µW)	$V_{CE\ sat}$	–	1.10	–	V

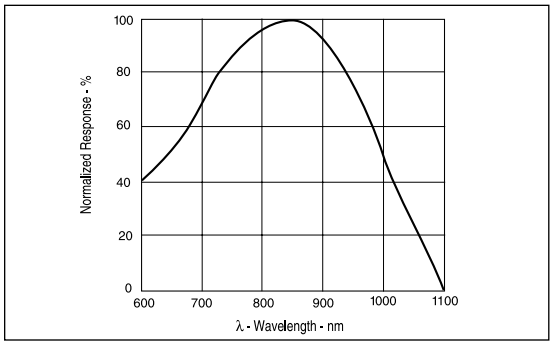


FIGURE 1. Typical detector response versus wavelength.

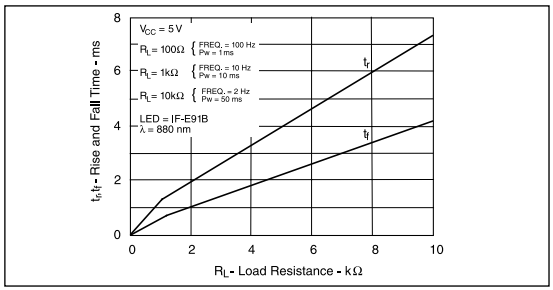


FIGURE 2. Rise and fall times versus load resistance.

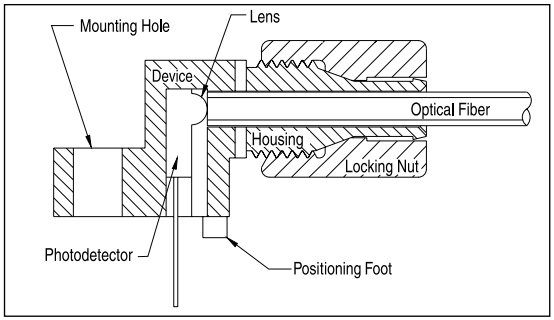
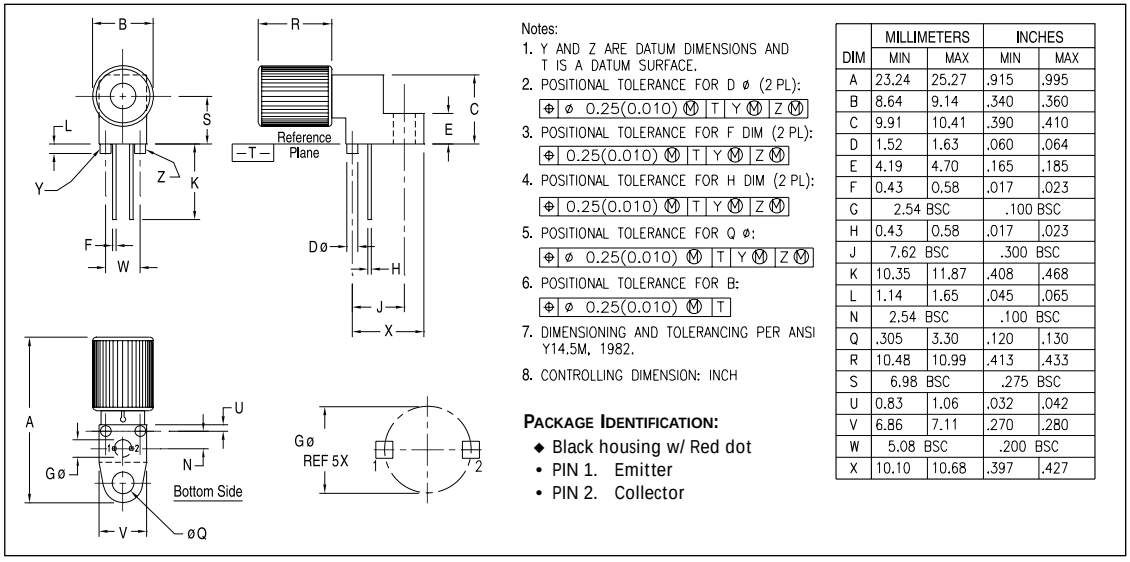


FIGURE 3. Cross-section of fiber optic device.

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.



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) Ⓜ | T | Y Ⓜ | Z Ⓜ
4. POSITIONAL TOLERANCE FOR H DIM (2 PL): ⌖ | 0.25(0.010) Ⓜ | T | Y Ⓜ | Z Ⓜ
5. POSITIONAL TOLERANCE FOR Q ø: ⌖ | ø 0.25(0.010) Ⓜ | T | Y Ⓜ | Z Ⓜ
6. POSITIONAL TOLERANCE FOR B: ⌖ | ø 0.25(0.010) Ⓜ | T
7. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
8. CONTROLLING DIMENSION: INCH

PACKAGE IDENTIFICATION:
- ◆ Black housing w/ Red dot
- • PIN 1. Emitter
- • PIN 2. Collector

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.