21 October 1997

HFE4010-014/BBA

Fiber Optic LED with TTL Interface

FEATURES

- LED sends 25 µW into 50/125 micron fiber
- TTL data rates up to 20 MHz
- Rated for TTL input signals
- Wave solderable
- Designed to operate with Honeywell fiber optic receivers
- Industry standard ST®-LP fiber connector
- Popular straight lead, low profile package

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DESCRIPTION

The HFE4010-014/BBA is a high radiance GaAlAs 850 nanometer LED optimized for coupling into small fiber core diameters at a forward current upto 50 mA. The "Caprock"™ LED combines high power coupling with wide bandwidth. The peak wavelength is matched for use with Honeywell silicon fiber optic detectors and receivers. The mechanical construction uses a highly reliable ST®-LP fiber optic connector / housing designed for easy mounting on printed circuit boards.

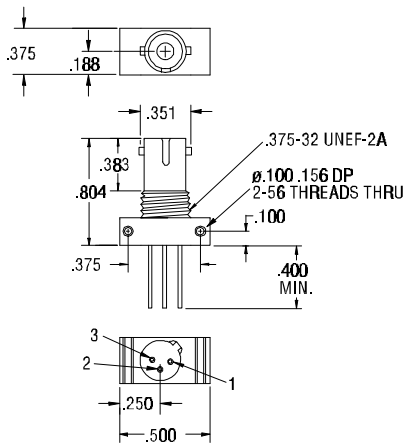
APPLICATION

The HFE4010-014/BBA is a high radiance LED packaged in an ST®-LP metal housing. TTL data rates can vary from DC to above 20 MHz depending upon component application. The HFE4010-014/BBA converts a TTL logic level voltage into optical power that can be used in fiber optic communications. As the input changes TTL state from high to low, the optical output goes from low to high.

The HFE4010-014/BBA LED provides high fiber coupled power (high radiance into a standard fiber optic cable). A 0.25 millimeter diameter glass microlens over the "Caprock"™ junction collimates the light, increasing the intensity. Thus, greater power is directed toward standard fiber optic cables.

Power supply noise rejection is improved by chip filter capacitors in the internal voltage regulator. Maximum noise rejection is provided by an external bypass capacitor of 0.1 µF between V_{CC} and ground. A ground plane PC board is preferred, and lead lengths less than 6.35 mm (0.25 in.).

OUTLINE DIMENSIONS in inches



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Pinout

1. V_{CC}
2. Input
3. Not connected

Pin 1 identified by red sleeve

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ELECTRO-OPTICAL CHARACTERISTICS (T_C = 25°C unless otherwise stated)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
High Level Optical Power Output	P_{OH}	20.0 -17.0	25.0 -16.0		µW dBm	V_{CC} = 5.0 VDC, V_{IN} = 0.4 V, 50/125 micron, 0.20 NA fiber (1)
Low Level Optical Power Output	P_{OL}			0.1	µW	V_{CC} = 5.0 VDC, V_{IN} > 2.4 V, 50/125 micron, 0.20 NA fiber (1)
Supply Current	I_{CCH} I_{CCL}		50 15	75 20	mA mA	V_{CC} = 5.0 V, V_{IN} < 0.4 V V_{CC} = 5.0 V, V_{IN} ≥ 2.4 V
Input Current	I_{INH} I_{INL}		0.01 170		µA µA	V_{CC} = 5.0 V, V_{IN} < 0.4 V V_{CC} = 5.0 V, V_{IN} ≥ 2.4 V
Rise/Fall Time 10-90% 90-10%	 t_R t_F		 14 8	 20 20	ns	V_{CC} = 5.0 VDC
Peak Emission Wavelength	λ_P		850		nm	V_{CC} = 5.0 VDC, V_{IN} ≤ 0.4 V
Pulse Width Distortion	PWD		1	10	%	V_{CC} = 5.0 VDC, V_{IN} f = 2.5 MHz, 50% Duty Cycle
Output Delay Time	T_{DLH} T_{DLL}		50 50		ns ns	Low to High High to Low

Notes

1. HFE4010-014/BBA is tested using a 50/125 micron fiber cable. Actual coupled power values may vary due to mechanical alignment procedures and/or receptacle and fiber tolerances.

ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Storage temperature	-65 to + 150°C
Case operating temperature	-55 to 125°C
Lead solder temperature	260°C, 10 s
Supply voltage	-0.5 to 7 V
Input voltage	-0.5 V to Vcc

Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

RECOMMENDED OPERATING CONDITIONS

Case operating temperature	-40 to +100°C
Supply voltage	4.5 to 5.5V
Input signal pulse width	> 50ns

ORDER GUIDE

Description	Catalog Listing
Standard screening, typical power out 25 µW	HFE4010-014/BBA

WARNING

Under certain application conditions, the infrared optical output of this device may exceed Class 1 eye safety limits, as defined by IEC 825-1 (1993-11). Do not use magnification (such as a microscope or other focusing equipment) when viewing the device's output.

CAUTION

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation to equipment, take normal ESD precautions when handling this product.

Honeywell reserves the right to make changes in order to improve design and supply the best products possible.

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BLOCK DIAGRAM

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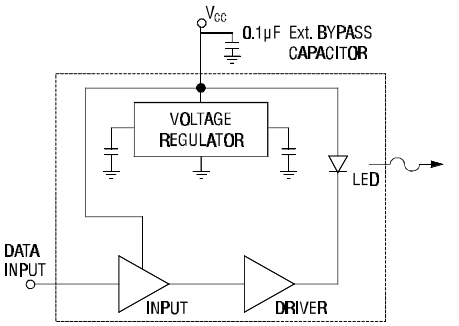

SWITCHING WAVEFORM

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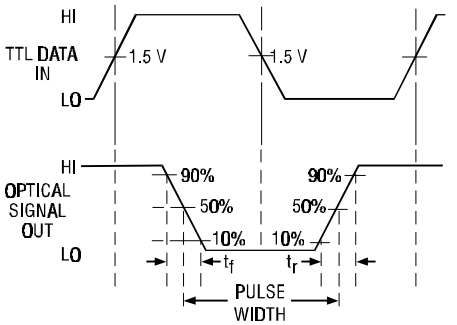

Fig. 1 Typical Spectral Output vs Wavelength

Fig. 2 Uniformity of Optical Output

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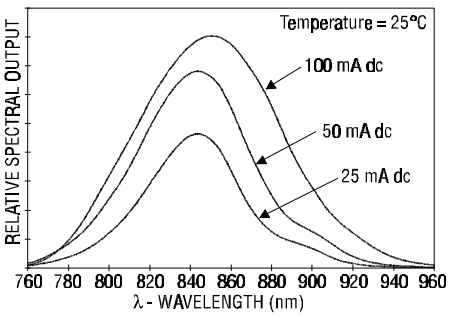

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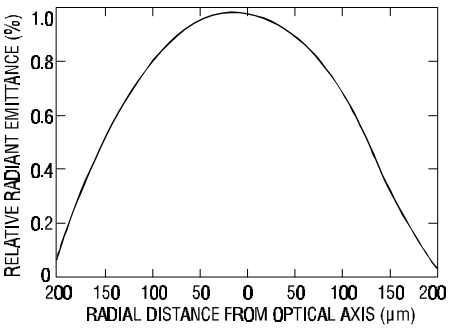

Fig. 3 Radiant Intensity vs Polar Angle

Fig. 4 Average Power Output vs Temperature

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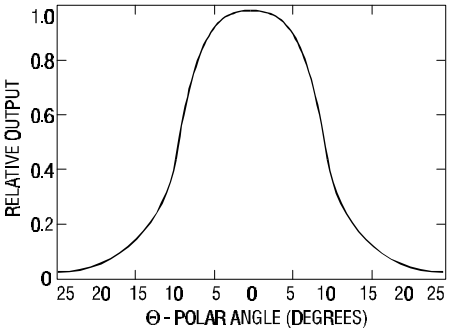

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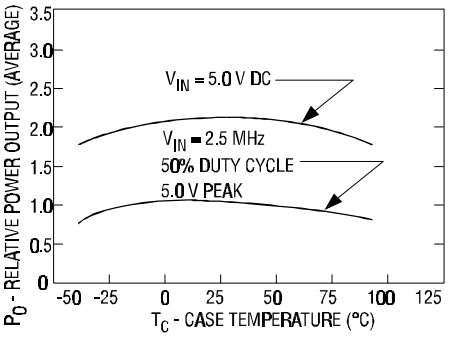

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Fig. 5 Supply Current Vs Temperature

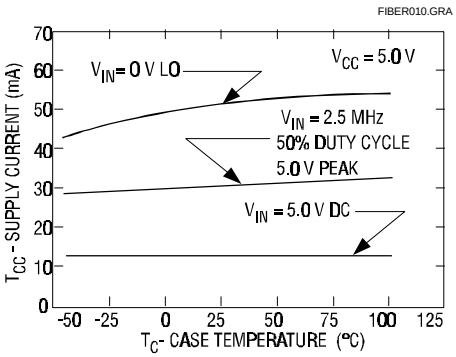


Fig. 6 Pulse Width Distortion vs Temperature

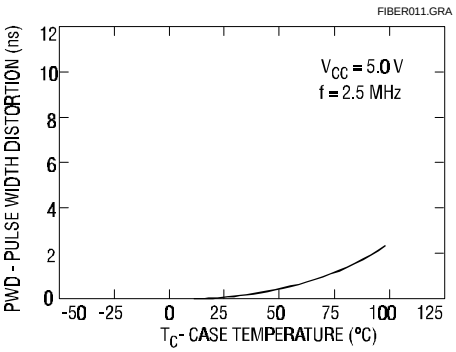


Fig. 7 Rise/Fall Time vs Temperature

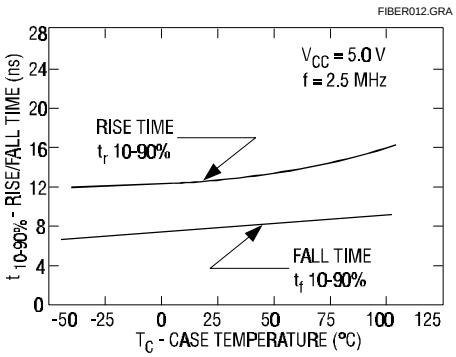


Fig. 8 Power Output vs Frequency

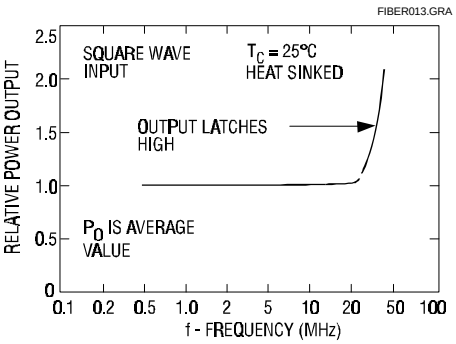


Fig. 9 Pulse Width Distortion vs Frequency

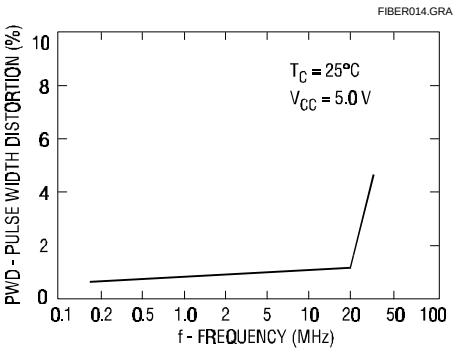
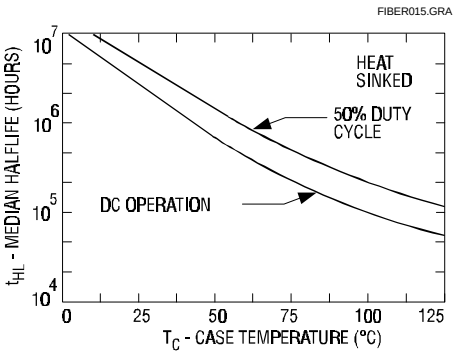


Fig. 10 Operating Lifetime vs Temperature



All Performance Curves Show Typical Values