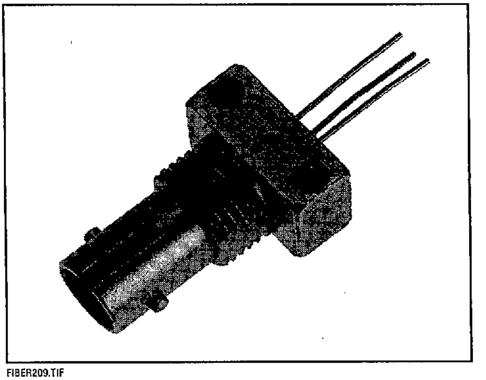
HFD3906

Schmitt Input, Inverting TTL Output Receiver

FEATURES

- Converts fiber optic input signals to TTL totem pole outputs
- Sensitivity is 1.5 µW peak (-28.2 dBm)
- Single 5 V supply requirement
- Schmitt circuitry gives 17 dB dynamic range and low Pulse Width Distortion
- Operates up to 200K bps NRZ
- Designed to operate with Honeywell 850 nm LEDs and integrated transmitters



FIBER209.TIF

DESCRIPTION

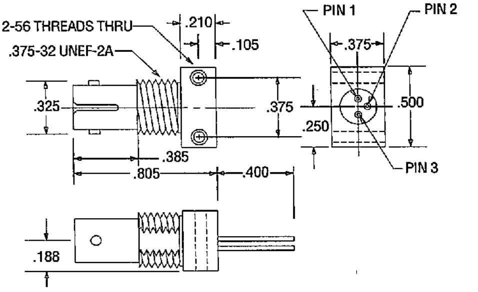
The HFD3906 is a sensitive Schmitt optical receiver designed for use in short distance, 850 nm fiber optic systems. It uses a bipolar integrated receiver circuit with internal voltage regulation and internal photodiode. The TTL inverting output allows the HFD3906 to be directly interfaced with standard digital TTL circuits. The plastic package with a TO-18 collar can be mounted in several types of fiber optic connectors.

APPLICATION

The HFD3906 fiber optic receiver converts the optical signal in a point to point data communications fiber optic link to a TTL output. It is designed to be mounted in a fiber optic connector that aligns the optical axis of the component to the axis of the optical fiber. Its photodiode is mechanically centered within the TO-18 package.

Electrical isolation is important in obtaining the maximum performance of this high sensitivity receiver. Shielding can reduce coupled noise and obtain maximum sensitivity. This can include the use of ground planes in the PCB, shielding around the device, and shielding around the leads. An internal voltage regulator allows operation with a 5 volt supply. An external bypass capacitor (0.1 µF) between V_{CC} (pin 1) and ground (pin 3) is recommended for maximum power supply noise rejection.

OUTLINE DIMENSIONS in inches (mm)



FIBER103.DIM

Pinout

1. V_{CC}
2. Output (TTL)
3. Ground

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

4551830 0022139 1T3

Honeywell

APPLICATION (continued)

Optical power (photons) from the fiber strikes the *photodiode* and is converted to electrical current which is then converted into voltage in the transimpedance preamplifier. The comparator stage incorporates the Schmitt trigger circuitry which ensures proper output signals. The Schmitt detection circuit monitors the input preamplifier, and triggers when its output exceeds preset levels. These levels are established sufficiently above the worst case RMS noise level to allow an excellent BER (bit error rate), while low enought to give enough sensitivity to permit operation over long links. This circuitry recognizes the positive and negative going input signals. When optical input goes from high to low, electrical output changes to "1" (high). The output changes to "0" (low) when optical input goes from low to high. Limited bandwidth minimizes noise problems. The Schmitt trigger detector stage output is designed to ensure good pulse width distortion (PWD).

Honeywell also offers companion transmitters designed to operate in conjunction with the HFD3906.

HFD3906

Schmitt Input, Inverting TTL Output Receiver

ELECTRO-OPTICAL CHARACTERISTICS (V_{CC} = 5 VDC unless otherwise stated)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Sensitivity [1]	P_{IN} (peak)		0.5	1.5	μW	λ_P = 850 nm into 100/140 micron fiber cable, Duty cycle = 50%, square wave
High Level Logic Output Voltage	V_{OH}	2.4	3.3		V	$P_{IN} \leq 0.1$ μW, V_{CC} = 5.0 VDC
Low Level Logic Output Voltage	V_{OL}		0.3	0.4	V	$P_{IN} \geq 1.5$ μW, V_{CC} = 5.0 VDC $I_O \leq 16$ mA
Rise Time	t_R		12		ns	$P_{IN} \leq 0.1$ μW, V_O = 0.4 to 2.4 V
Fall Time	t_F		3		ns	$P_{IN} \geq 1.5$ μW, V_O = 2.4 to 0.4 V
Supply Current	I_{CC}		6	12	mA	V_{CC} = 5 VDC
Pulse Width Distortion [1]	PWD				%	f = 20 kHz, Duty Cycle = 50%
			5	10		$P_{IN} \leq 1.5$ μW
			5	10		P_{IN} = 100 μW
Bandwidth	BW			200	kHz	$P_{IN} \geq 1.0$μW, Duty Cycle = 50%
				200		Duty Cycle = 50%
Output Impedance	I_O		20		Ω	

Notes
1. T_C = +25°C

ABSOLUTE MAXIMUM RATINGS

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

Storage temperature	-40 to 85°C
Operating temperature	-40 to +85°C
Lead solder temperature	260°C, 10 s
Junction temperature	150°C
Supply voltage	+7 V

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

Operating temperature (heat sinked)	0 to +85°C
Supply voltage	+4.5 to +7 V
Optical input power	1.5 to 100 μW
Optical signal pulse width	> 4 μs

HFD3906

Schmitt Input, Inverting TTL Output Receiver

ORDER GUIDE

Description	Catalog Listing
Standard screening, plastic package	HFD3906-002

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.

FIBER INTERFACE

Honeywell detectors are designed to interface with multimode fibers with sizes (core/cladding diameters) ranging from 50/125 to 200/230 microns. Honeywell performs final tests using 100/140 micron core fiber. The fiber chosen by the end user will depend upon a number of application issues (distance, link budget, cable attenuation, splice attenuation, and safety margin). The 50/125 and 62.5/125 micron fibers have the advantages of high bandwidth and low cost, making them ideal for higher bandwidth installations. The use of 100/140 and 200/230 micron core fibers results in greater power being coupled by the transmitter, making it easier to splice or connect in bulkhead areas. Optical cables can be purchased from a number of sources.

4551830 0022142 798

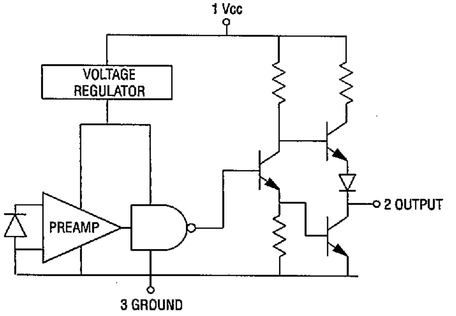
Honeywell

HFD3906

Schmitt Input, Inverting TTL Output Receiver

BLOCK DIAGRAM

FIBER003.SCH



SWITCHING WAVEFORM

FIBER202.CIR

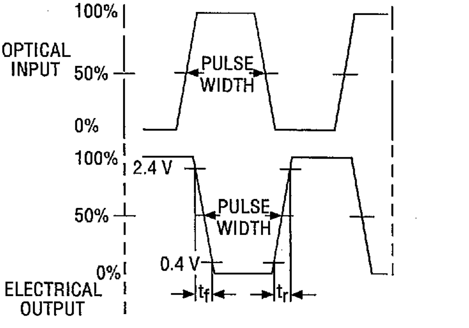


Fig. 1 Pulse Width Distortion vs Temperature

FIBER038.GRA

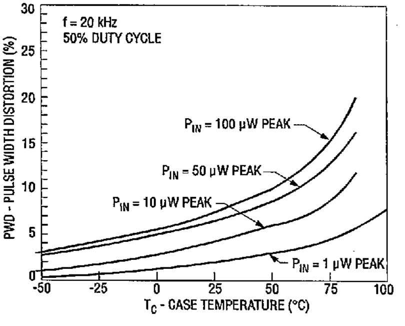


Fig. 2 Pulse Width Distortion vs Frequency

FIBER039.GR

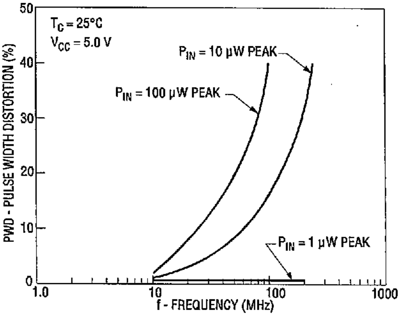


Fig. 3 Pulse Width Distortion vs Optical Input Power

FIBER040.GRA

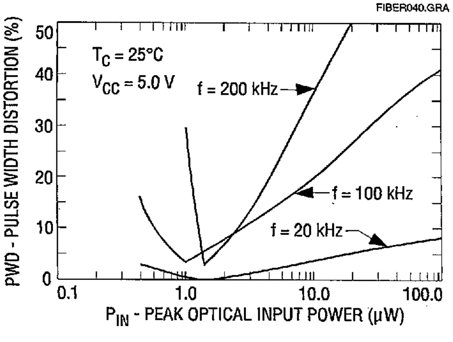


Fig. 4 Propagation Delay vs Optical Input Power

FIBER041.GR