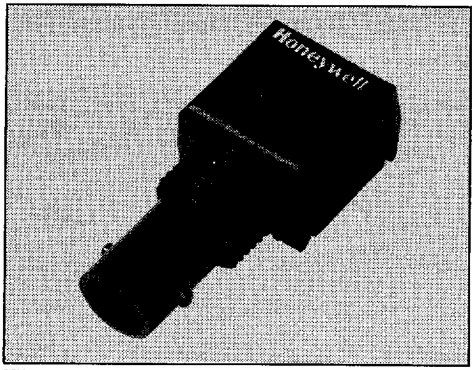
HFD3213

5 Mbit Direct Coupled Receiver

FEATURES

- Converts fiber optic input signals to TTL digital outputs
- Typical sensitivity 2 μW (-27 dBm)
- Single 5 V supply requirement
- Direct coupled receiver circuit
- Open collector output
- Microlens optics for efficient fiber coupling
- Designed to operate with Honeywell 850 nm LEDs and integrated transmitters
- Popular Fiber DIP package
- Conductive plastic barrel



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DESCRIPTION

The HFD3213 is a sensitive Direct Coupled (DC) optical receiver designed for use in short distance, 850 nm fiber optic systems. The receiver contains a monolithic IC, consisting of a photodiode, DC amplifier, and open collector Schottky output transistor. The output allows it to be directly interfaced with standard TTL circuits. The HFD3213 receiver is supplied in a Honeywell plastic Fiber DIP package.

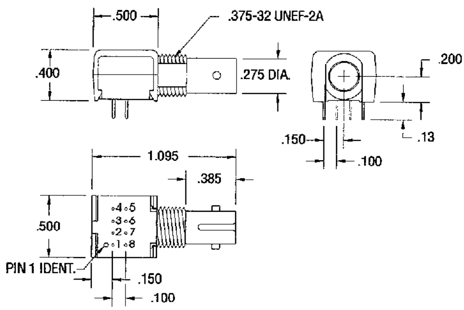
APPLICATION

The HFD3213 fiber optic receiver converts the optical signal in a point to point data communications fiber optic link to a TTL output. Its 0.006 in. photodiode with a 0.024 in. microlens (to enhance the optics) is mechanically centered within the package.

Electrical isolation is important in obtaining the maximum performance. A 0.1 μF bypass capacitor must be connected between V_{CC} and ground. This minimizes power supply noise, increasing the signal quality. Shielding can also reduce coupled noise, through use of ground plane PCB, shielding around the device, and shielding around the leads.

The HFD3213 is designed for a wide optical input range. The optical input dynamic range is guaranteed from the maximum sensitivity of 3.0 μW to 100 μW or greater than 15 dB.

OUTLINE DIMENSIONS in inches (mm)



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Pinout

1. Shield*	5. Shield*
2. V_{CC}	6. Output (TTL)
3. Ground	7. Ground
4. Shield*	8. Shield*

Notes

1 * Shield pins are common and electrically connected to the conductive plastic barrel.

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APPLICATION (continued)

Optical power from the fiber strikes the photodiode and is converted to electrical current. This current couples to the DC amplifier, which drives an open collector transistor output. The output when connected to a pull up resistor can interface to TTL loads. The electrical signal is the inverse of the input light signal. When light strikes the photodiode, the output is a low logic level. When no light strikes the photodiode, the output is a high logic level.

Pulse Width Distortion (PWD) is an increase in the output pulse width (for high level optical input). The typical performance curves illustrate how PWD varies with optical power, temperature and frequency for the HFD3213. The amount of PWD that a given system can tolerate without an error due to a missing bit of information, is dependent upon system considerations. The output of the HFD3213 will typically connect to the input of some form of a serial interface adaptor IC. The specifications for that IC govern the amount of PWD that can be tolerated in the system.

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ELECTRO-OPTICAL CHARACTERISTICS (T_C = 25°C, V_{CC} = 5 VDC unless otherwise stated)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Minimum Input Sensitivity	P_{IN} (peak)		2.0 -27.0	3.0 -25.2	µW dBm	λ_P = 850 nm into 100/140 optical fiber, f = 2.5 MHz, Duty Cycle = 50%, PWD <10%
High Level Logic Output Voltage	V_{OH}	2.4	4.5		V	$P_{IN} \leq 0.1$ µW, R_L = 560 Ω
Low Level Logic Output Voltage	V_{OL}		0.25	0.5	V	$P_{IN} \geq 3$ µW, R_L = 560 Ω
Rise Time	t_R		6	9	ns	P_{IN} = 10µW, V_O = 0.5 to 2.4V R_L = 560 Ω
Fall Time	t_F		6	9	ns	P_{IN} = 10 µW, V_O = 2.4 to 0.5 V R_L = 560 Ω
Supply Current	I_{CC}		13 4.5	15 6.5	mA	$P_{IN} \geq 3$ µW $P_{IN} \leq 0.1$ µW
Pulse Width Distortion	PWD		5 25	10 35	%	f = 2.5MHz, Duty Cycle = 50% P_{IN} = 3 µW peak P_{IN} = 80 µW peak

ABSOLUTE MAXIMUM RATINGS

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

Storage temperature	-40 to +100°C
Lead solder temperature	260°C, 10 s
Supply voltage	+6 V
Junction temperature	150°C
Operating temperature	-40 to +100°C

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	-40 to +85°C
Supply voltage	+4.5 to +5.5 VDC
Optical input power	3 to 100 µW
Optical signal pulse width	> 100 ns
Optical signal edges (10 to 90%)	< 20 ns

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ORDER GUIDE

Description	Catalog Listing
Standard screening, plastic package	HFD3213-002

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.

BLOCK DIAGRAM

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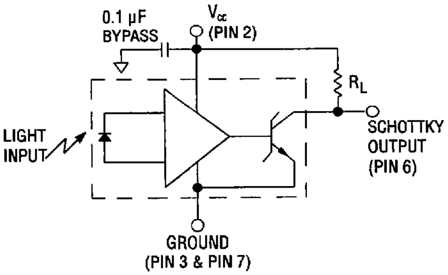

SWITCHING WAVEFORM

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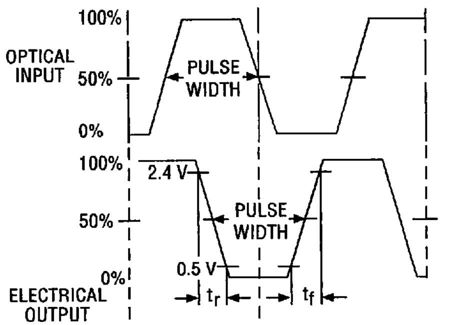

Fig. 1 Pulse Width Distortion vs Optical Input Power

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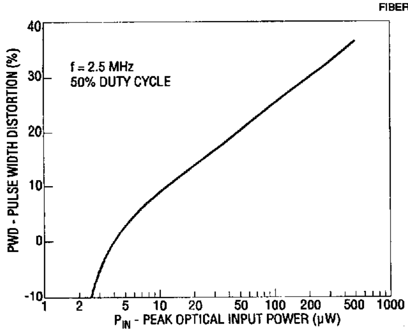

Fig. 2 Pulse Width Distortion vs Temperature

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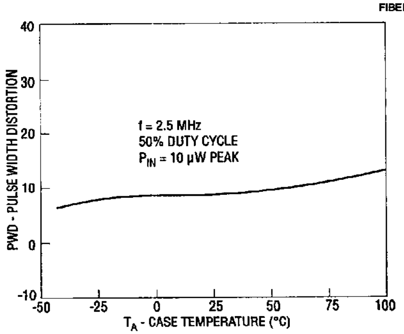

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Honeywell reserves the right to make changes in order to improve design and supply the best products possible.

Fig. 3 Pulse Width Distortion vs Frequency

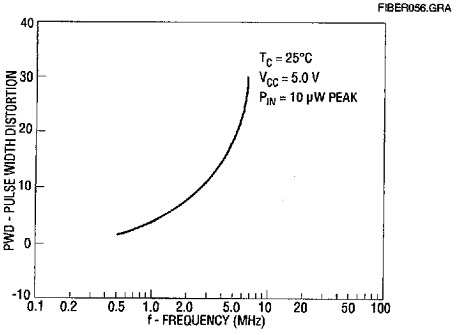

Fig. 4 Propagation Delay Time vs Peak Optical Input Power