

HFD3023

5 Mbit Direct Coupled Receiver

FEATURES

- Converts fiber optic input signals to TTL digital outputs
- Typical sensitivity 2 μ W (-27 dBm)
- Single 5 V supply requirement
- Direct coupled receiver circuit
- Open collector output
- Plastic cap with TO-18 header
- Microlens optics for efficient fiber coupling
- Designed to operate with Honeywell 850 nm LEDs and integrated transmitters

DESCRIPTION

The HFD3023 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 HFD3023 receiver is supplied in a Honeywell plastic package, and can be mounted in several types of fiber optic connectors.

APPLICATION

The HFD3023 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 TO-18 package.

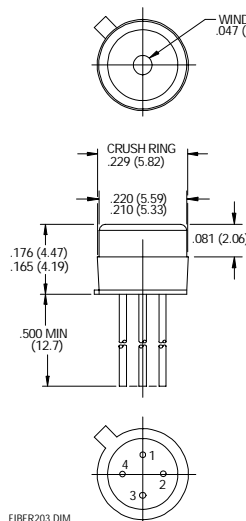
Electrical isolation is important in obtaining the maximum performance. A 0.1 μ F bypass capacitor must be connected between V_{CC} and ground. This minimizes power supply noise, increasing the signal quality. Shielding can also reduce coupled noise, through use of ground plane PCB, shielding around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

The HFD3023 is designed for a wide optical input range. The optical input dynamic range is guaranteed from the maximum sensitivity of 3.0 μ W to 100 μ W or greater than 15 dB.



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OUTLINE DIMENSIONS in inches (mm)



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Pinout

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

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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 HFD3023. 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 HFD3023 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 ($T_C = 25^\circ\text{C}$, $V_{CC} = 5\text{ VDC}$ 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	$\lambda_P = 850\text{ nm}$ into 100/140 optical fiber, $f = 2.5\text{ MHz}$, Duty Cycle = 50%, PWD <10%
High Level Logic Output Voltage	V_{OH}	2.4	4.5		V	$P_{IN} \leq 0.1\text{ }\mu\text{W}$, $R_L = 560\text{ }\Omega$
Low Level Logic Output Voltage	V_{OL}		0.25	0.5	V	$P_{IN} \geq 3\text{ }\mu\text{W}$, $R_L = 560\text{ }\Omega$
Rise Time	t_R		6	9	ns	$P_{IN} = 10\text{ }\mu\text{W}$, $V_O = 0.5\text{ to }2.4\text{ V}$ $R_L = 560\text{ }\Omega$
Fall Time	t_F		6	9	ns	$P_{IN} = 10\text{ }\mu\text{W}$, $V_O = 2.4\text{ to }0.5\text{ V}$ $R_L = 560\text{ }\Omega$
Supply Current	I_{CC}		13 4.5	15 6.5	mA	$P_{IN} \geq 3\text{ }\mu\text{W}$ $P_{IN} \leq 0.1\text{ }\mu\text{W}$
Pulse Width Distortion	PWD		5 25	10 35	%	$f = 2.5\text{ MHz}$, Duty Cycle = 50% $P_{IN} = 3\text{ }\mu\text{W peak}$ $P_{IN} = 80\text{ }\mu\text{W peak}$

ABSOLUTE MAXIMUM RATINGS

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

Storage temperature -40 to $+100^\circ\text{C}$

Lead solder temperature 260°C , 10 s

Supply voltage +6 V

Junction temperature 150°C

Operating temperature -40 to $+100^\circ\text{C}$

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 $+85^\circ\text{C}$

Supply voltage +4.5 to $+5.5\text{ VDC}$

Optical input power 3 to $100\text{ }\mu\text{W}$

Optical signal pulse width > 100 ns

Optical signal edges (10 to 90%) < 20 ns

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Fig. 3 Pulse Width Distortion vs Frequency

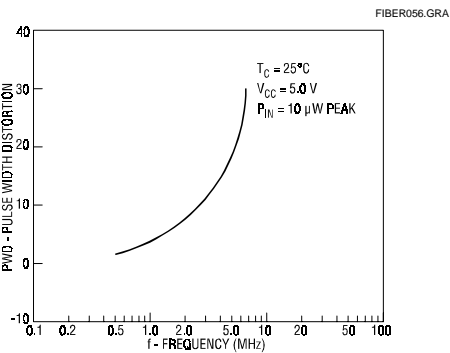


Fig. 4 Propagation Delay Time vs Peak Optical Input Power

