HFD3216

125 MHz PIN Plus Preamplified Analog Receiver

FEATURES

- Industry standard ST® fiber connector
- High-speed operation, Rise/Fall times are 3.5 ns typical
- Low pulse width distortion over a wide range of inputs because of 23 dB typical dynamic range
- Wide variety of cable options, operates with 50/125, 62.5/125, and 100/140 µm cables
- Popular Fiber DIP package
- Wide operating temperature range -40 to +85°C
- Conductive plastic ST® barrel

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DESCRIPTION

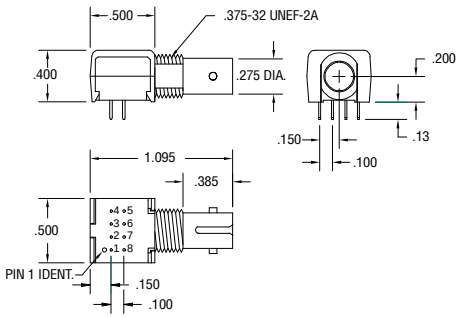
The HFD3216 is designed for use in IEEE 802.3 Ethernet and IEEE 802.5J Token Ring LAN applications such as Repeaters, Bridges, Hubs, Routers, Switches and Gateways. The inexpensive, high speed, analog fiber optic receiver is intended for local area networks (LANs) where data rates up to 125 Mbits/second are needed. The HFD3216 may be used as a low cost alternative to 1300 nm components. The hybrid bipolar fiber optic receiver contains a silicon PIN photodiode for high speed operation and a preamplifier integrated circuit for excellent noise immunity.

The HFD3216s preamplifier stage converts the current output of the PIN photodiode to a voltage and amplifies it. The output is a linear voltage that is proportional to the optical input over an input range of less than 1.0 µW to 175 µW peak (1.225 V typical output voltage swing), providing a dynamic operating range of 23 dB with very low pulse width distortion.

The HFD3216 is designed to operate on the ECL standard of - 5.2 volts and has very good Power Supply Rejection Ratio (typically 20 dB at 10 MHz), making it highly immune to noise pickup. It can also be operated with a +5 Volt supply although some PSRR performance will be sacrificed at less than 1 MHz.

The receiver output is a proportional analog voltage, providing cost-effective design flexibility. The user can tailor the circuit design to the particular application, using inexpensive external components to perform the conversion to the needed logic levels. This allows for an optimized design, making maximum use of the power budget for a given data rate/transmission distance configuration.

OUTLINE DIMENSIONS in inches (mm)



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Pinout

HFD3216-002	HFD3216-003
1. NC	1. NC
2. Output	2. Inv Out
3. V_{EE}	3. V_{CC}
4. NC	4. NC
5. NC	5. NC
6. V_{CC}	6. Non-Inv Out
7. V_{EE}	7. V_{EE}
8. NC	8. NC

Pins 1, 4, 5 and 8 are electrically common and connected to the conductive barrel.

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ELECTRO-OPTICAL CHARACTERISTICS (V_{EE} = -5.2 V, V_{CC} = 0 V (GROUND) T_C = 25°C unless otherwise stated)

PARAMETER		SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Responsivity [1]		R				mV/µW	f = 50 MHz, P_{IN} = 100 µW peak,
T = 25°C	HFD3216-002		5.3	7.5	9.6		λ = 850 nm, 62.5 µm core fiber
	HFD3216-003		6	8	11		
Over temp. range	HFD3216-002		4.5		11.5		
-40 < T < +85°C	HFD3216-003		4.5		13		
Input Power		P_{IN} (peak)	0.8		175	µW	f = 50 MHz, λ = 850 nm PWD = 2.5 ns
DC Output Voltage [2]		V_{ODC}				V	P_{IN} ≤ 0.1 µW
	HFD3216-002		-4.0	-3.65	-3.3		
	HFD3216-003		-2.6	-2.4	-2.2		
Power Supply Current		I_{CC}				mA	R_{LOAD} = 0
	HFD3216-002			9	15		
	HFD3216-003			11	15		
Rise/Fall Time		t_r/t_f				ns	f = 10 MHz, P_{IN} = 150 µW peak
T = 25°C	HFD3216-002			3.6	4.5		λ = 850 nm
	HFD3216-003			2.5	4.5		
Over temp. range	HFD3216-002			3.6	6.3		
-40 < T < +85°C	HFD3216-003		1.0		5.5		
Pulse Width Distortion		PWD		0.2	1.5	ns	f = 50 MHz, P_{IN} = 150 µW peak, λ = 850 nm
Bandwidth		BW				MHz	λ = 850 nm, R = 0.707 R max.
	HFD3216-002			125			
	HFD3216-003			125			
RMS Noise Output Voltage		V_{NO}				mV	P_{IN} = 0 µW, 75 MHz, 3 pole
	HFD3216-002			0.52	0.58		Bessel filter on output
	HFD3216-003			0.46	0.60		
Output PSRR	HFD3216-002			20		dB	f = 10 MHz
	HFD3216-003		17	21		dB	f = 10 MHz
Output Overshoot	HFD3216-002			10	13	%	P_{IN} = 10 µW
	HFD3216-003				6	%	P_{IN} = 10 µW
Output Resistance				20		Ω	f = 50 MHz
RMS Input Noise Power		P_{NI}				nW	P_{IN} = 0 µW, 75 MHz, 3 pole
	HFD3216-002			74	79		Bessel filter on output
	HFD3216-003			60	79		

Notes

1. Photodiode has 600 µm diameter microlens for optical coupling.
2. Quiescent output voltage (V_{ODC}) is -2.4 V (differential) or -3.65 V (single ended) typical. Dynamic output volatge swing is below the quiescent output voltage ($V_O = V_{ODC} + R \times P_{IN}$).
3. Graphs shown are based on -003 product. The -002 product will shift accordingly based on typical values in Electro-Optical Characteristics table.

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ABSOLUTE MAXIMUM RATINGS

(Tcase = 25°C unless otherwise noted)

Storage temperature	-55 to +85°C
Operating temperature	-40 to +85°C
Lead solder temperature	260°C for 10 s

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 (V_{CC} - V_{EE})	-0.5 to -6.0 V
Optical signal input	1.0 to 125 µW

ORDER GUIDE

Description	Catalog Listing
125 MHz PIN plus preamplifier single- ended output analog receiver	HFD3216-002
125 MHz PIN plus preamplified differential output analog receiver	HFD3216-003

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 62.5/125 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.

CIRCUIT DIAGRAM - Single Ended Output
HFD3216-002

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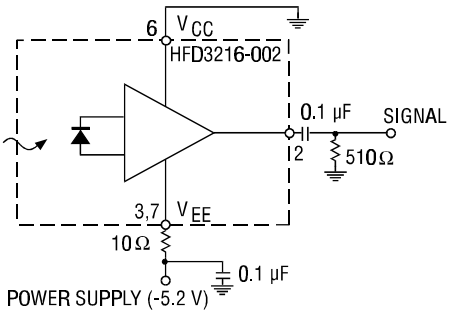

CIRCUIT DIAGRAM - Differential Output
HFD3216-003

FIBER035.SCH

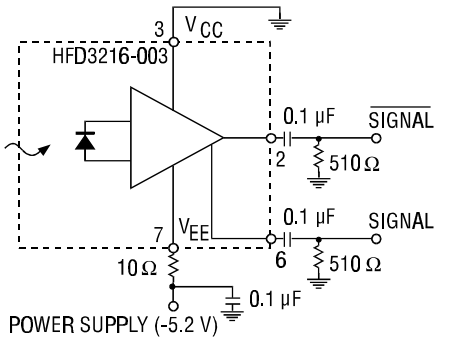

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Fig. 1 Spectral Responsivity

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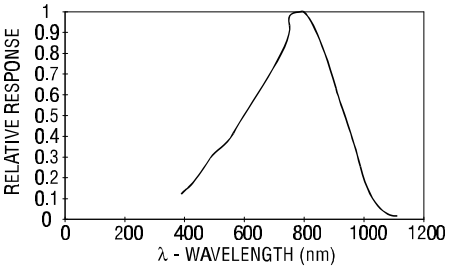

Fig. 2 Responsivity vs Temperature

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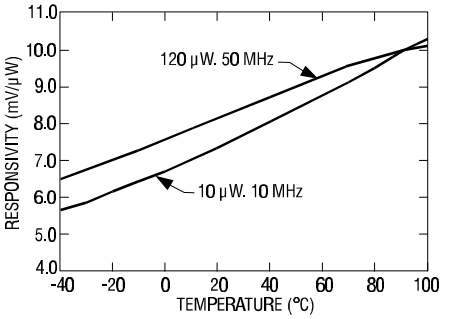

Fig. 3 RMS Noise Voltage vs Temperature

FIBER126.GRA

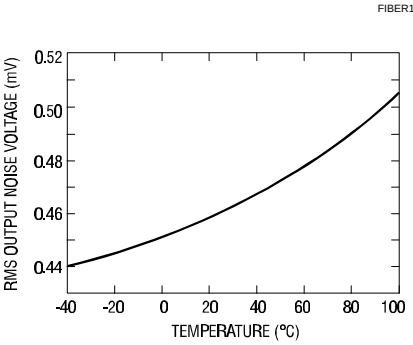

Fig. 4 RMS Input Referred Noise vs Temperature

FIBER127.GRA

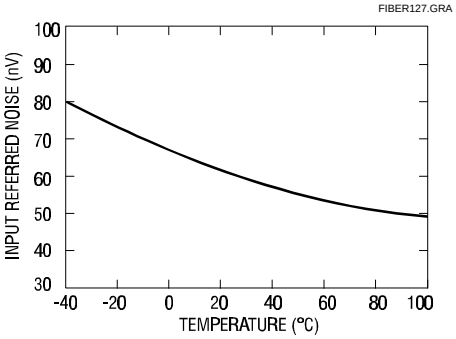

Fig. 5 DC Output Voltage vs Temperature

FIBER128.GRA

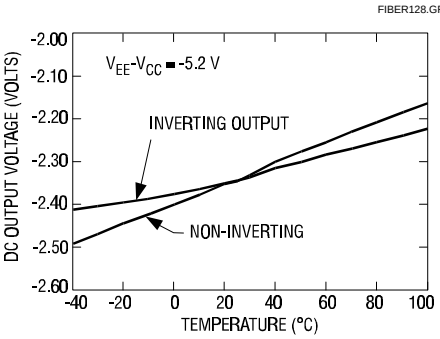

Fig. 6 Pulse Width Distortion vs Optical Input Power

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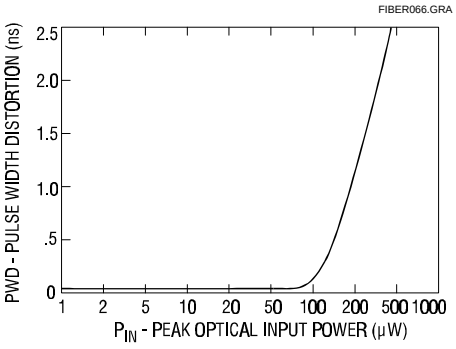

All Performance Curves Show Typical Values