DATA SHEET

4.25GBPS 1310NM PIN + PREAMP LC ROSA PACKAGE

HFD3141-203

FEATURES:

- LC ROSA
- High performance InGaAs PIN photodiode with separate transimpedance amplifier
- Low electrical parasitic TO46 package
- Data rates from 155Mbps to 4.25Gbps
- A separate detector bias pin which can be used for receive power monitoring
- Low bias currents and voltages

The HFD3141-203 use a high-performance InGaAs PIN photo-detector packaged with a transimpedance amplifier designed to meet performance requirements for data rates up to 4.25Gbps data communication over single-mode optical fiber at 1200nm to 1600nm. Applications include Ethernet, Fiber Channel and ATM protocols.

Part Number	Description
HFD3141-203	LW 5 pin LC ROSA, with separate PD bias for RSSI

Finisar®
Advanced Optical Components Division

ABSOLUTE MAXIMUM RATINGS

Parameter	Rating
Storage Temperature	-40 to +85^{o}C
Case Operating Temperature	-40 to +85^{o}C
Lead Solder Temperature	260^{o}C, 10 sec.
Power Supply Voltage	-0.5V to 4V
Incident Optical Power	+3 dBm average +6 dBm peak

NOTICE: 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 operations section for extended periods of time may affect reliability.

NOTICE: 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.

ELECTRICAL-OPTICAL CHARACTERISTICS

3.0V<Vcc<3.6V, AC coupled to 50Ω (100Ω differential), -40°C<T<85°C unless otherwise specified

Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Data Rate		DR	0.15		4.25	Gbps	
Supply Voltage			3.0	3.3	3.6	V	
Supply Current	P_R=0μ, R_L=50Ω AC Coupled	I_{CC}		30	45	mA	1
Optical Return Loss	P_R=-12 dBm	ORL	12			dB	1
Input Optical Wavelength		λp	1200	1310	1600	nm	
Maximum Input Power Before Overlaod		P_{MAX}	-3.0	0		dBm	
Differential Output Voltage Swing	$P_{R\ OMA}$ = -12dBm AC Coupled toR_L=50Ω	V_o (pk-pk)	150	225	350	mV	1,2
Differential Responsivity	$P_{R\ OMA}$ = -12dBm AC Coupled toR_L=50Ω	R	2250	3750	5250	V/W	1,2
-3dB Optical/Electrical Bandwidth	$P_{R\ OMA}$ = -12dBm	BW	2		4	GHz	1,2,3
Low Frequency –3dB Cutoff	$P_{R\ OMA}$ = -12dBm	BW_{LF}			10	KHz	1,2,3
Output Impedance		Z_{out}	42	50	58	Ω	
Output Return Loss	F<3GHz	S_{22}	8	12		dB	
RMS Input Referred Noise Equivalent Power	3.2GHz, 4-pole BT filter, P_R=0μW (dark), BER 10^{-12}	NEP			20	μW, OMA	4
Sensitivity, OMA	DR = 1.0625, 1.25Gbps, ER=9dB	S		-24	-21	dBm	
	DR = 2.125, 2.5Gbps, ER=9dB			-24	-21		
	DR = 3.125Gbps, ER=5dB			-21	-18		
	DR = 4.25Gbps, ER=5dB			-20	-18		
Rise/Fall Time	$P_{R\ OMA}$ =-12dBm, (20%-80%)	T_R/T_F		80	120	ps	2,6
Pulse Width Distortion		PWD			5	%	
Power Supply Rejection Ratio	PR =0μW (Dark), 6MHz<F<2GHz	PSRR	20			dB	1,7
Monitor Current Slope	P_R =-12dBm	I_{MON}	0.7	0.8	0.95	A/W	8
Monitor Current Offset	P_R = 0mW	I_{OFFSET}			10	nA	
PD Bias Voltage		PD_{BIAS}	2.5	Vcc	Vcc+0.5	V	12
Group Delay	$P_{R\ OMA}$ = -12dBm AC Coupled toR_L=50Ω 2MHz<F<2GHz	Delay	-50		50	ps	9
Deterministic Jitter	$P_{R\ OMA}$ = -12dBm AC Coupled toR_L=50Ω	DJ_{TIA}		30	40	ps	10
Random Jitter	$P_{R\ OMA}$ = -12dBm AC Coupled toR_L=50Ω	RJ_{TIA}		3	5	ps	11

NOTES

1. P_R is the average optical power at the fiber face.
2. $P_{R,OMA}$ is the peak to peak optical power at the fiber face (Optical Modulation Amplitude)

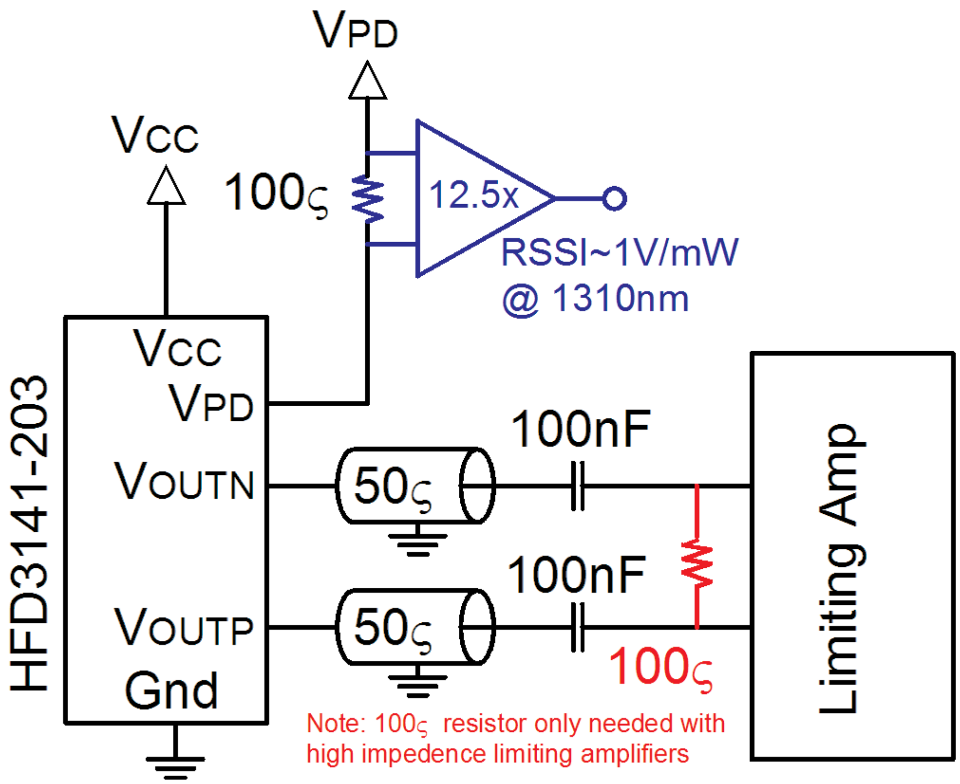
$$P_{R,OMA} \equiv \frac{2P_R(ER-1)}{ER+1}$$

where ER is the extinction ratio (linear) of the optical source.
3. Bandwidth and Low Frequency Cutoff are measured with a small signal sinusoidal light source with –12dBm average power
4. RMS input referred optical noise equivalent power is obtained by measuring the RMS output noise into a 3200 MHz, 4-pole Bessel-Thompson filter then dividing by the responsivity. A scaling factor of 14 is used to predict a BER of 10^{-12}.
5. Stressed receiver sensitivity is measured with 3.5dB vertical eye closure (intersymbol interference) and with 0.3UI of jitter added. The measurement technique is defined in IEEE 802.3ae.
6. Rise/Fall times are corrected for optical source Rise/Fall times. $T^2_{TIA} = T^2_{MEASURED} - T^2_{OPTICAL}$
7. Value shown is with no external power supply filtering.
8. The monitor current slope is measured as the current into the PD_{BIAS} connection.
9. Group delay is a sensitive measurement to package interface, and includes the effects of PD, TIA and package. Measurement is made with TO leads as short as possible.
10. DJ_{TIA} is specified as contributed DJ by the TIA, obtained from $DJ^2_{TIA} = DJ^2_{TOTAL} - DJ^2_{OPTICAL}$
11. RJ_{TIA} is specified as contributed DJ by the TIA, obtained from $RJ^2_{TIA} = RJ^2_{TOTAL} - RJ^2_{OPTICAL}$
12. If external bias voltage is applied to Vpd while Vcc is externally unbiased, internal biasing of the TIA will occur, resulting in erroneous RSSI current.

PINOUT

HFD3141-203	
Number	**Function**
1	OUTP
2	OUTN
3	V_{PD}
4	V_{CC}
5	GND (Case)

INTERFACE CONFIGURATION

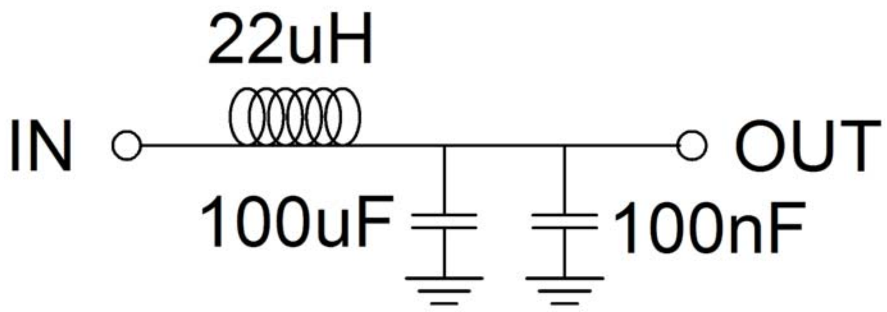


Optional RSSI implementation is shown in blue.

Optional 100Ω differential termination for high impedance limiting amplifiers is shown in red

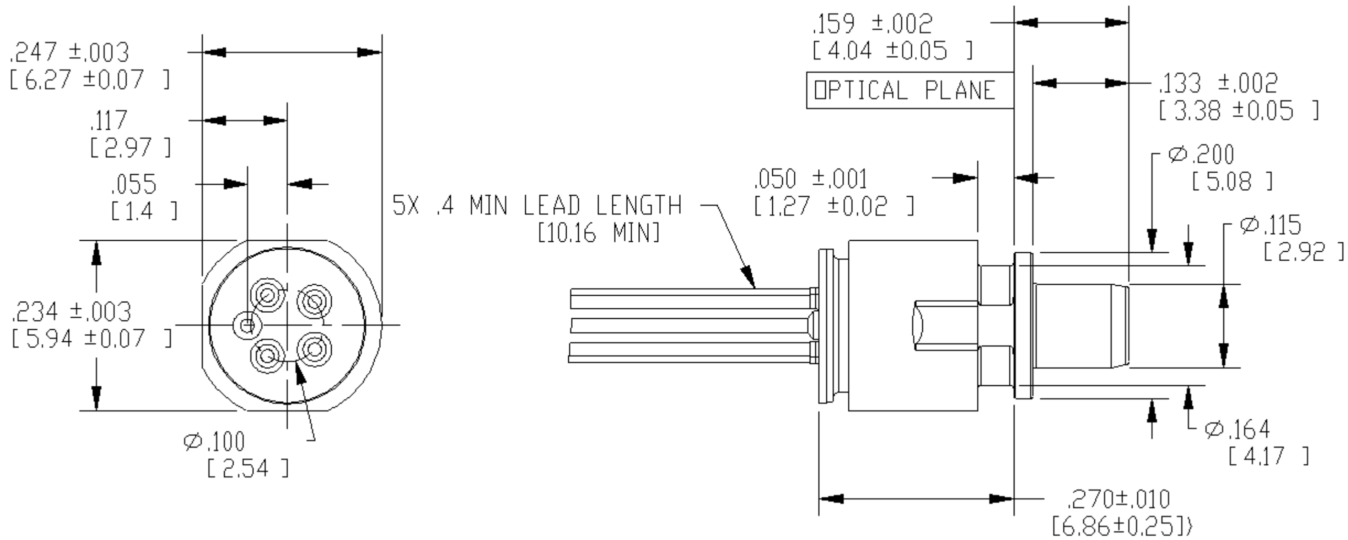
Recommended bias filter network

Note, better performance will be obtained if a ferrite bead is used in place of the inductor.

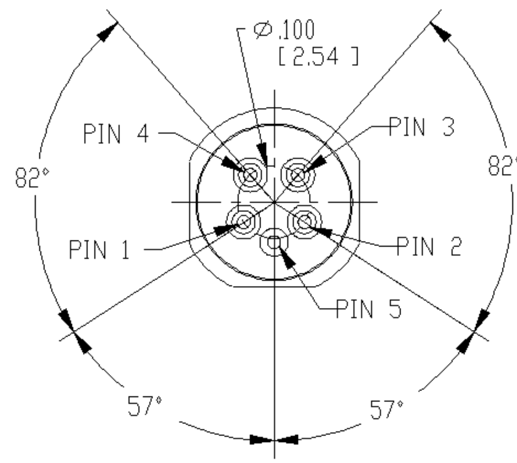


MECHANICAL DIMENSIONS

Dimensions in Inches



PIN #	FUNCTION
1	VOUT+
2	VOUT-
3	VPD
4	VCC
5	GND (CASE)



ADVANCED OPTICAL COMPONENTS

Finisar's ADVANCED OPTICAL COMPONENTS division was formed through strategic acquisition of key optical component suppliers. The company has led the industry in high volume Vertical Cavity Surface Emitting Laser (VCSEL) and associated detector technology since 1996. VCSELs have become the primary laser source for optical data communication, and are rapidly expanding into a wide variety of sensor applications. VCSELs' superior reliability, low drive current, high coupled power, narrow and circularly symmetric beam and versatile packaging options (including arrays) are enabling solutions not possible with other optical technologies. ADVANCED OPTICAL COMPONENTS is also a key supplier of Fabrey-Perot (FP) and Distributed Feedback (DFB) Lasers, and Optical Isolators (OI) for use in single mode fiber data and telecommunications networks

LOCATION

- Allen, TX - Business unit headquarters, VCSEL wafer growth, wafer fabrication and TO package assembly.
- Fremont, CA – Wafer growth and fabrication of 1310 to 1550nm FP and DFB lasers.
- Shanghai, PRC – Optical passives assembly, including optical isolators and splitters.

SALES AND SERVICE

Finisar's ADVANCED OPTICAL COMPONENTS division serves its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact a nearby sales office or call the number listed below.

AOC CAPABILITIES

ADVANCED OPTICAL COMPONENTS' advanced capabilities include:

- 1, 2, 4, 8, and 10Gbps serial VCSEL solutions
- 1, 2, 4, 8, and 10Gbps serial SW DETECTOR solutions
- VCSEL and detector arrays
- 1, 2, 4, 8, and 10Gbps FP and DFB solutions at 1310 and 1550nm
- 1, 2, 4, 8, and 10Gbps serial LW DETECTOR solutions
- Optical Isolators from 1260 to 1600nm range
- Laser packaging in TO46, TO56, and Optical subassemblies with SC, LC, and MU interfaces for communication networks
- VCSELs operating at 670nm, 780nm, 980nm, and 1310nm in development
- Sensor packages include surface mount, various plastics, chip on board, chipscale packages, etc.
- Custom packaging options

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