

Product Specification

2.5Gbps 850nm PIN + Preamp

MFD3180-108

PRODUCT FEATURES

- High performance GaAs PIN photodiode with separate trans-impedance amplifier
- Low electrical parasitic
- TO46 package
- Data rates from 155Mbps to 2.5Gbps
- A separate detector bias pin which can be used for receive power monitoring
- Low bias currents and voltages



The MFD3180-108 uses a high-performance GaAs PIN photo-detector packaged with a trans-impedance amplifier designed to meet performance requirements for 2.5Gbps data communication over multi-mode optical fiber at 850nm. Applications include Ethernet, Fiber Channel and ATM protocols. The optical assembly is designed to interface either 50um or 62.5um multi-mode fiber.

PRODUCT SELECTION

Part Number	Description
MFD3180-108	LC, with separate PD bias for RSSI

I. Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-40 to +85°C
Case Operating Temperature	-40 to +85°C
Lead Solder Temperature	260°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

II. Electro-Optical Characteristics (V_{cc} =3.3V, AC coupled to 50W (100W differential), -20°C < TA <95°C unless otherwise specified)

Parameters	Test Condition	Symbol	Min.	Typ.	Max.	Units	Notes
Data Rate		DR	0.15		2.5	Gbps	
Supply Voltage			3.0	3.3	3.6	V	
Supply Current	P _R =0μW, R _L =50Ω AC coupled	I _{CC}		25	35	mA	1
Optical Return Loss	P _R =-12dBm	ORL	12			dB	1
Input Optical Wavelength	0°C to 70°C	λ _p	770	850	870	nm	
Maximum Average Input Power before Overload		P _{MAX}	0	+3		dBm	
Differential Output Voltage Swing	P _{R,OMA} = -12Bm, AC Coupled to R _L =50Ω	V _{o(pk-pk)}	100	150	220	mV	1,2
Differential Transimpedance	P _{R,OMA} = -12dBm, AC Coupled to R _L =50Ω	T	1500	2500	3500	V/W	1,2
-3dB Optical/Electrical Bandwidth	P _{R,OMA} =-12dBm	BW	1.4	2		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<2GHz	S ₂₂	8	12		dB	
RMS Input Referred Noise Equivalent Power	1.875GHz, 4-pole BT Filter, P _R =0uW (Dark), BER 10 ⁻¹²	NEP			20	μW, OMA	4
Sensitivity, OMA	DR <= 2.5Gbps	S		-20	-18	dBm	5
Stressed Sensitivity, OMA	DR <= 2.5Gbps	S _{Stressed}		-17	-14	dBm	5,6
Rise/Fall Time	P _{R,OMA} =-12dBm, (20%-80%)	T _R /T _F		120	150	ps	2,7
Pulse Width Distortion		PWD			5	%	
Power Supply Rejection Ratio	P _R =0μW (Dark), 5MHz<F<2GHz	PSRR	20			dB	1,8
Monitor Current Slope	P _R =-12dBm	I _{MON}	0.45	0.5	0.55	A/W	9
Monitor Current Offset	P _R =0mW	I _{OFFSET}			10	nA	
PD Bias Voltage		PD _{BIAS}	V _{cc} -1	V _{cc}	V _{cc} +0.5	V	
Group Delay	P _{R,OMA} = -12dBm, AC Coupled to R _L =50Ω 2MHz<F<2GHz	Delay	-50		50	ps	10
Deterministic Jitter	P _{R,OMA} = -12dBm, AC Coupled to R _L =50Ω	DJ _{TIA}		30	40	ps	11
Random Jitter	P _{R,OMA} = -12dBm, AC Coupled to R _L =50Ω	RJ _{TIA}		3	5	ps	12

Notes:

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

$$P_{R,OMA} = \frac{2P_R(ER-1)}{ER+1}$$
 where ER is the extinction ratio (linear) of the optical source.
- Bandwidth and Low Frequency Cutoff are measured with a small signal sinusoidal light source with -12dBm average power
- 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.
- Sensitivity is measured with an optical source with an extinction ratio of 3dB.
- Stressed receiver sensitivity is measured with 3.5dB vertical eye closure (inter-symbol interference) and with 0.3UI of jitter added. The measurement technique is defined in IEEE 802.3ae.

7. Rise/Fall times are corrected for optical source Rise/Fall times.

$$T_{TIA}^2 = T_{MEASURED}^2 - T_{OPTICAL}^2$$

8. Value shown is with no external power supply filtering.
9. The monitor current slope is measured as the current into the PD_{BIAS} connection.
10. 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.
11. DJTIA is specified as contributed DJ by the TIA, obtained from

$$DJ_{TIA}^2 = DJ_{TOTAL}^2 - DJ_{OPTICAL}^2$$

12. RJTIA is specified as contributed DJ by the TIA, obtained from

$$RJ_{TIA}^2 = RJ_{TOTAL}^2 - RJ_{OPTICAL}^2$$

13. If external bias voltage is applied to V_{pd} while V_{cc} is externally unbiased, internal biasing of the TIA will occur, resulting in erroneous RSSI current.

III. Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T _{op}	-40		85	°C	
Storage Temperature	T _{sto}	-40		85	°C	

IV. Mechanical Specifications

(Dimensions are in mm)

PIN	Description
1	V _{CC}
2	OUTN
3	GND(Case)
4	OUTP

