

PD78D5A OC-192 PIN-TIA Surface-mount Receiver

Features

- 15-pin Surface-mountable Small-form Package
- Differential RF-Output (G-S-G-S-G type)
- High Sensitivity of -20 dBm
- High Overload of $+1$ dBm
- Low Capacitance and High Speed InGaAs-PIN Detector
- Fully Operation from $1.2\ \mu\text{m}$ to $1.6\ \mu\text{m}$ Wavelength Range
- High Transimpedance Gain of $4000\ \Omega$
- Operation Temperature: -5°C to $+85^{\circ}\text{C}$
- Bellcore GR468-CORE Controlled Environment compliant



Applications

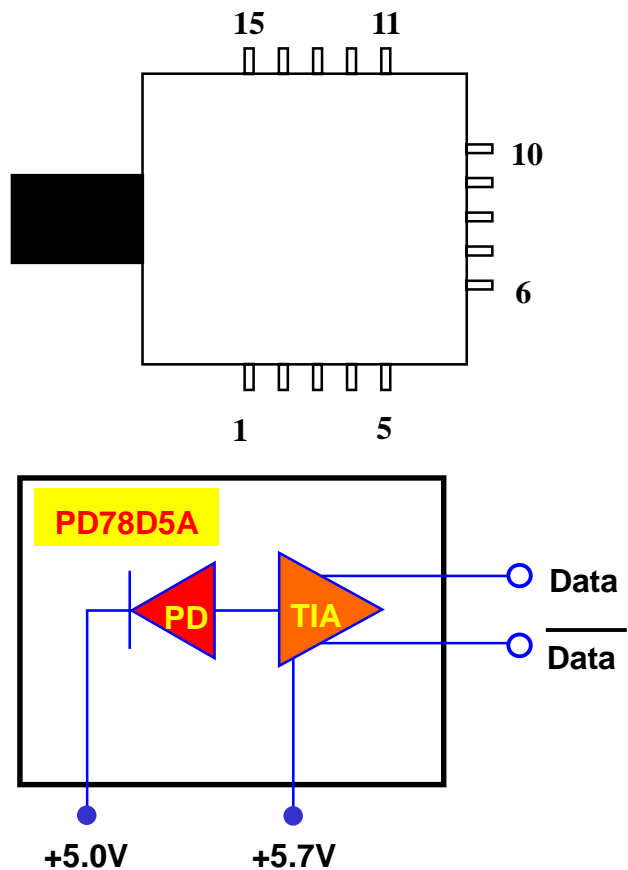
- 10 Gbps Short, Intermediate, and Long-reach Systems
- SONET OC-192 / SDH STM-64 System
- DWDM & Datacom System
- 10GbE-MSA Transponder System
- Up to 10.7Gbps FEC System

Description

The PD78D5A PIN-TIA optical-receiver is optimized for 10Gbps Metro application system. The InGaAs-PIN photodiode has a planar structure, contributing to its high reliability. The Receiver consists of the high speed PIN photo diode and a high performance transimpedance amplifier (TIA). The module is manufactured in a compact, 15-pin surface-mountable small-form package with a single-mode optical fiber pigtail.

Pin Information

PIN #	PD78D5A
1	NC
2	NC
3	GND
4	$V_{PD}(+5.0V)$
5	$V_{TIA}(+5.7V)$
6	GND
7	Output(-)
8	GND
9	Output(+)
10	GND
11	NC
12	NC
13	NC
14	GND
15	NC



Optical & Electrical Characteristics



Condition : 25°C case temperature, 9.95328 Gbps, NRZ, BOL unless noted otherwise

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Optical Wavelength	λ		1.2		1.6	μm
PIN Responsivity	R_{PIN}	$\lambda = 1550 \text{ nm}$	0.70			A/W
PIN Dark Current	I_{D}				0.5	nA
Bandwidth	$f_{3\text{dB}}$		8	9		GHz
Sensitivity ⁽¹⁾	P_{LOW}	PRBS = $2^{31}-1$ BER = 10^{-12}		-20	- 18	dBm
Overload ⁽¹⁾	P_{HIGH}	PRBS = $2^{31}-1$ BER = 10^{-12}	0	1		dBm
Output Return Loss	S_{22}	< 8 GHz	10			dB
Optical Return Loss	RL	Not Including Connector	27			dB
Transimpedance Gain	T_Z	Single Ended, 50 Ω , 130MHz		2000		Ω
Power Consumption	P_{CON}			400	600	mW
Supply Voltage (TIA) ⁽²⁾	V_{TIA}		5.4	5.7	6.0	V
Supply Voltage (PIN)	V_{PIN}		3.3	5	10	V

⁽¹⁾ Test transmitter: LiNbO₃ modulator with DFB laser, BW>10GHz, $\lambda = 1550 \pm 30 \text{ nm}$; Extinction ratio: 11dB

⁽²⁾ + 5 V of TIA may be available in the next version.

Absolute Maximum Ratings



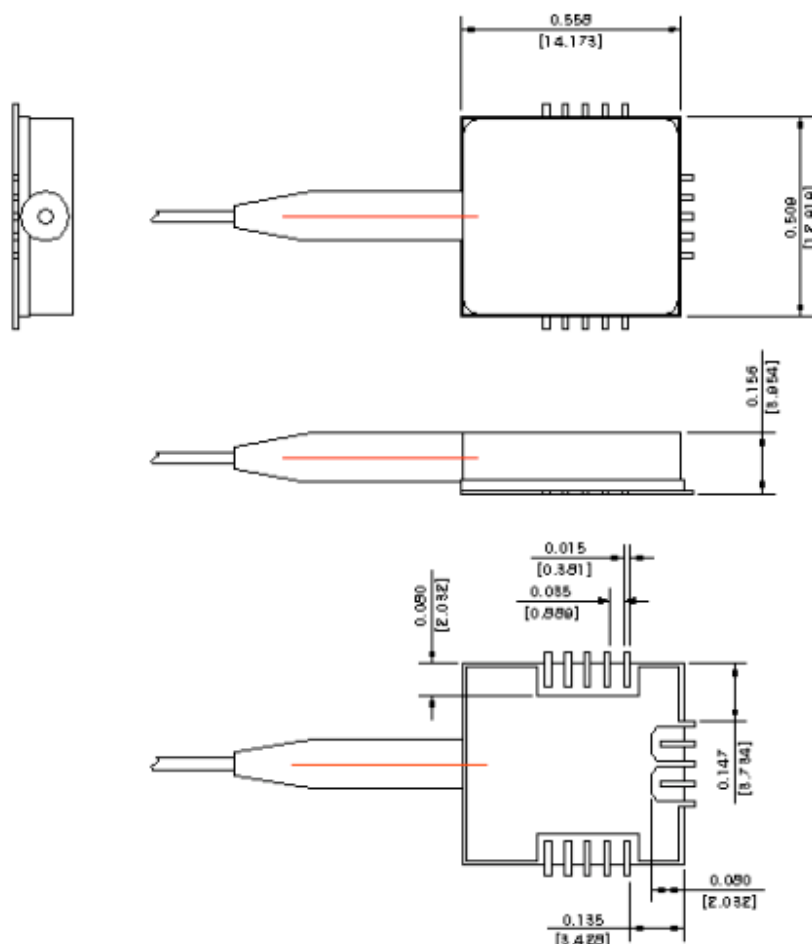
These are absolute maximum ratings only. Higher stress than these ratings may adversely affect device reliability or cause permanent damage to the device. Functional operation of the devices is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Units
TIA Supply Voltage	V_{TIA}	GND	8	V
PD Supply Voltage	V_{PD}	GND	12	V
Optical Input Power	P_{IN}		3	dBm
Operating Case Temperature	T_C	-5	85	°C
Storage Temperature	T_{STG}	- 40	85	°C
ESD-susceptibility, dc-pins ⁽¹⁾	-	-	500	V

⁽¹⁾ Based on HBM. In general, precautions should be taken to avoid damage to the device.

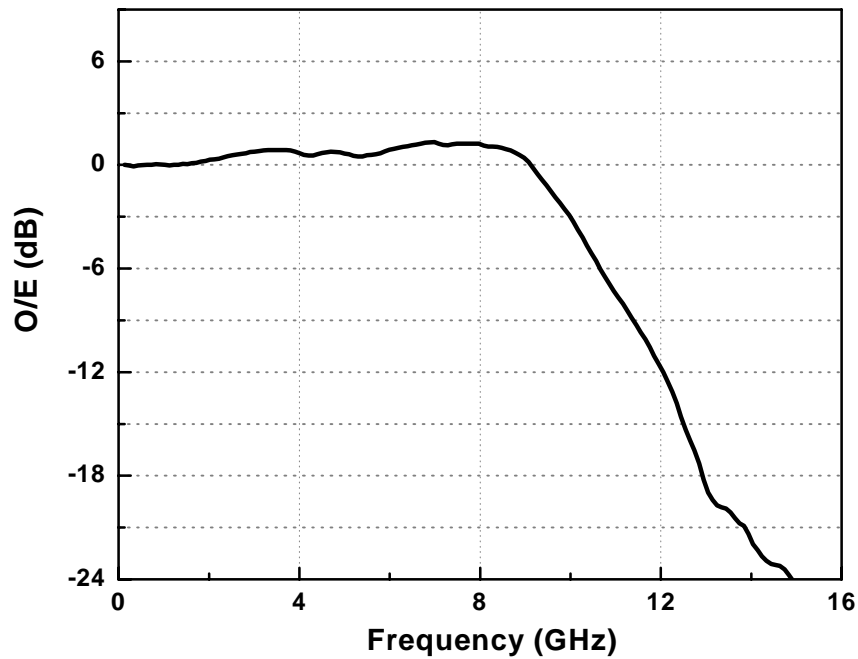
Outline Diagram

Dimensions are in millimeters [inches]. Tolerances are $\pm 0.127\text{mm}$ [± 0.005].

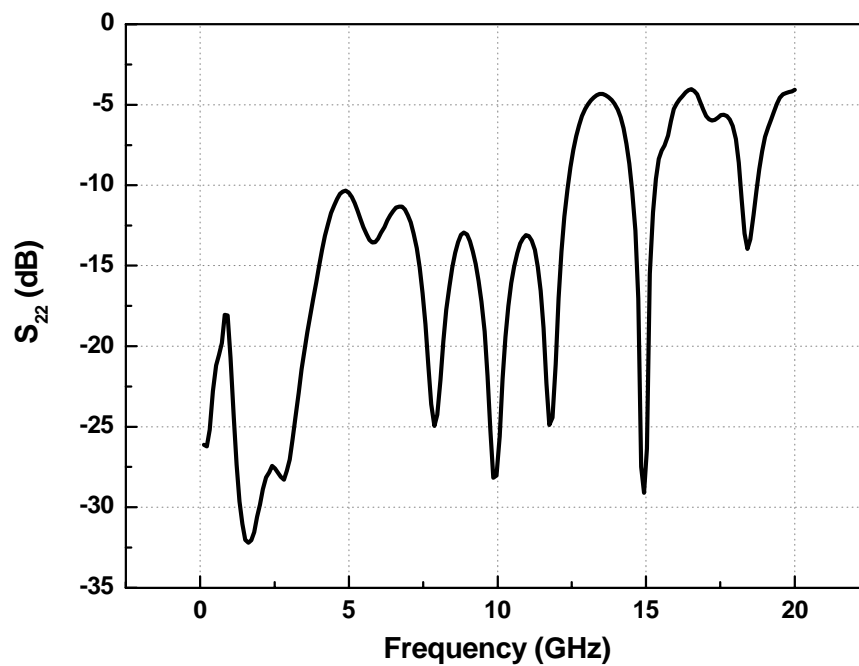


Performance Characteristics

1. Relative Frequency Response

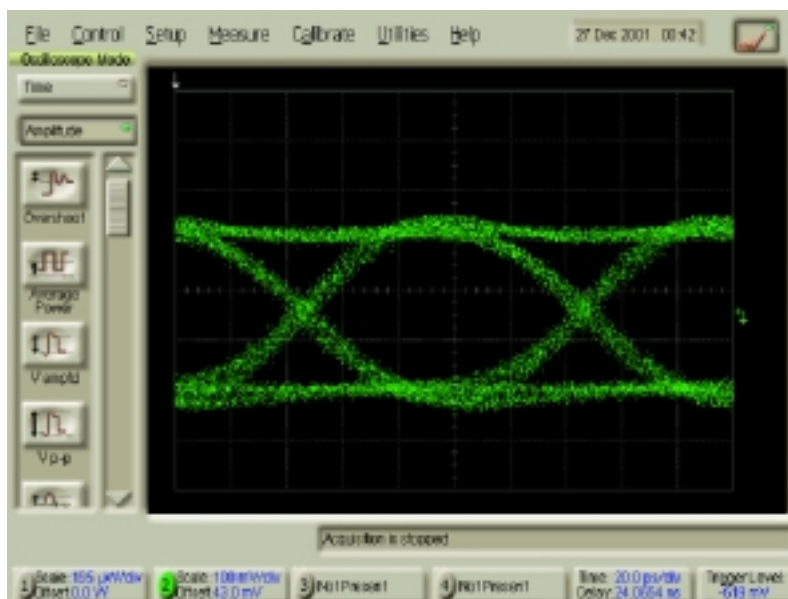


2. Output Return Loss (S_{22})

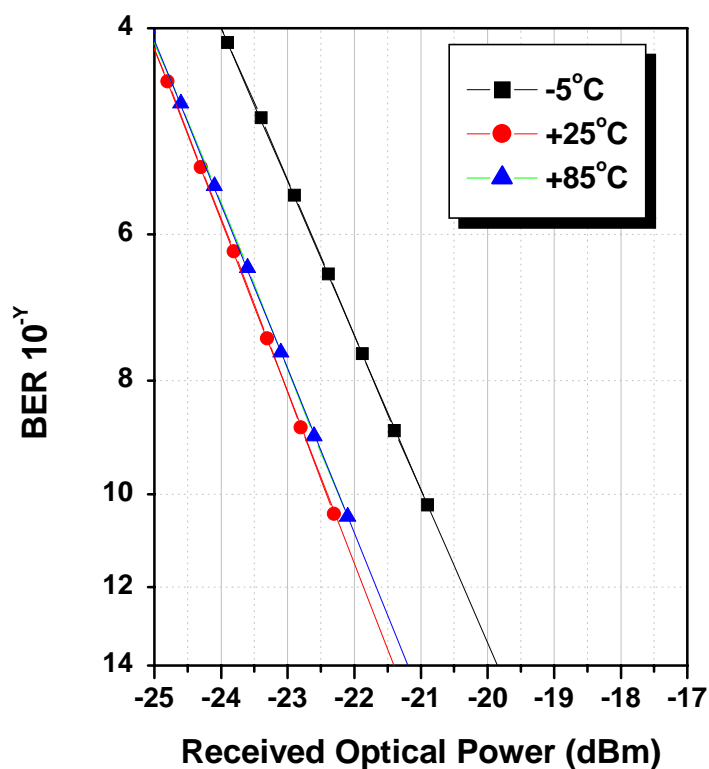


3. Eye Diagram

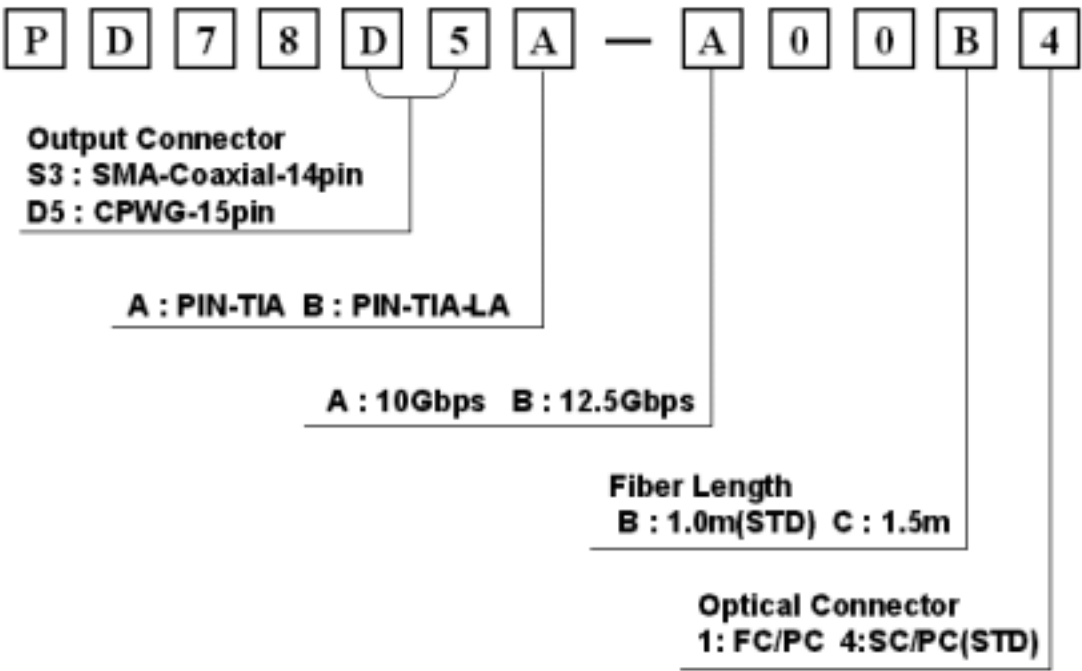
($T=25^{\circ}\text{C}$, 9.95328 Gbps, NRZ, PRBS $2^{31}-1$, $R_L=50\Omega$, $P_{IN}=-10\text{dBm}$, 20 ps/div)



4. BER vs. Received Optical Power



Ordering Information



Handling Precaution

Power Sequence

Following the turn-on sequence is required to avoid possible damage to the module from power supply switching transients.

1. All ground connections
 2. Most negative supply
 3. Most positive supply
 4. All remaining connections
- Reverse the order for the proper turn-off sequence

Electrostatic Discharge

Caution: The device is susceptible to damage as a result of electrostatic discharge

Widely accepted human-body model (resistance=1.5K Ω , Capacitance=100pF) for susceptibility testing and protection-design is employed as a circuit parameter.

Parameter	Value	Unit
Human-body model	> 400	V

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