Technical Data Sheet

February 2002

SAMSUNG ELECTRONICS

FIBEROPTICS DIVISION

PD78S3A

10 Gbps PIN-TIA High Sensitivity Receiver

Features

- 14-pin Butterfly Package
- High Sensitivity of –21 dBm
- High Overload of + 1 dBm
- Wide Dynamic Range of 22dBm
- Low Capacitance and High Speed InGaAs-PIN Diode
- Fully Operation from 1.2 μm to 1.6μm Wavelength Range
- High Transimpedance Gain of 2000 Ω
- Bellcore GR468-CORE Controlled Environment Compliance

Applications

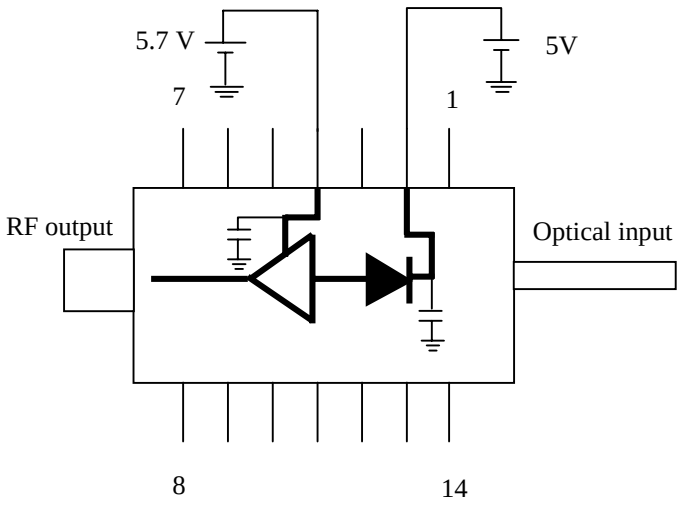
- 10 Gbps Short, Intermediate, and Long-reach Systems
- SONET OC-192 / SDH STM-64 System
- DWDM System
- Datacom System
- Up to 10.7Gbps FEC System

Description

The PD78S3 10 Gbps PIN Receiver modules are designed for SONET OC-192 and SDH STM-64 applications. The InGaAs-PIN photodiode has a planar structure, contributing to its high reliability. In addition, the simple one-step wet etching process produces high quality micro-lens for high optical coupling efficiency. The PIN photodiode is coupled to a high performance GaAs transimpedance amplifier. The typical room temperature sensitivity measured at 1×10^{-12} bit error rate for transmission of 10 Gbps is –21 dBm for 1.55 μm applications.

Pin Information

PD78S3A	
Pin	**Definition**
1	**GND**
2	**+ 5V (V_{PD})**
3	**GND**
4	**+ 5.7V(V_{DD})**
5	**GND**
6	**NC**
7~12	**GND**
13-14	**NC**



Circuit Diagram

Module Performance Characteristics

Condition : 25℃case temperature, 9.95328 Gbps, NRZ

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Optical Wavelength	λ		1.2		1.6	μm
PIN Responsivity	R_{PIN}	λ = 1550 nm	0.70			A/W
PIN Dark Current	I_D				0.5	nA
Bandwidth	f_{3dB}		8	9		GHz
Sensitivity*	P_{LOW}	PRBS = 2^{31}-1 BER = 10^{-12}		**-21**	**- 19**	dBm
Overload*	P_{HIGH}	PRBS = 2^{31}-1 BER = 10^{-12}	**0**	**1**		dBm
Output Return Loss	S_{22}	0.13GHz ~ 7 GHz	10			dB
Optical Return Loss	RL	Not Including Connector	27	35		dB
Transimpedance	T_Z	130 MHz		2000		Ω
Power Consumption	P_{CON}			0.5		W
Supply Voltage (TIA)	V_{DD}		5.4	5.7	6.0	V
Supply Voltage (PIN)	V_{PIN}		3.3	5	7	V
Total Supply Current			40	70	100	mA

* Test transmitter : External modulator, BW>10GHz, λ =1550±30nm; extinction ratio > 10dB

** -5.2 and + 5.0 V of TIA are also available.

Absolute Maximum Ratings

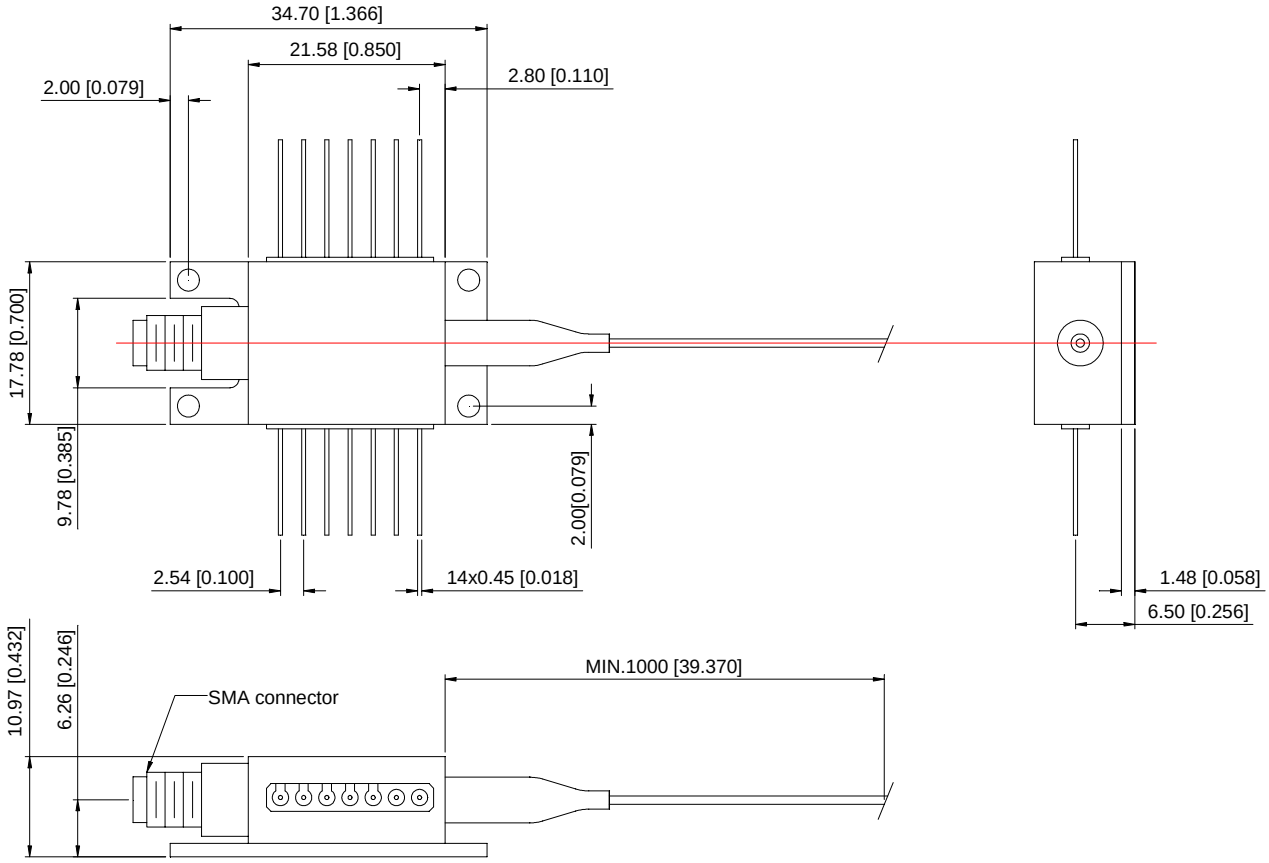
These are absolute maximum ratings only. Higher stress than these ratings may adversely affect device reliability or cause permanent damage to the device. Functional operation of the devices is not implied at these or any other conditions in excess of those given in the operational sections of the data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

Parameter	Symbol	Min	Max	Units
TIA Supply Voltage	V_{DD}	-0.5	8	V
PD Supply Voltage	V_{PD}	0.5	10	V
Optical Input Power	P_{IN}		3.0	dBm
Operating Case Temperature	T_C	0	70	°C
Storage Temperature	T_{STG}	- 40	85	°C
ESD-susceptibility, dc-pins*	-	-500	500	V

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

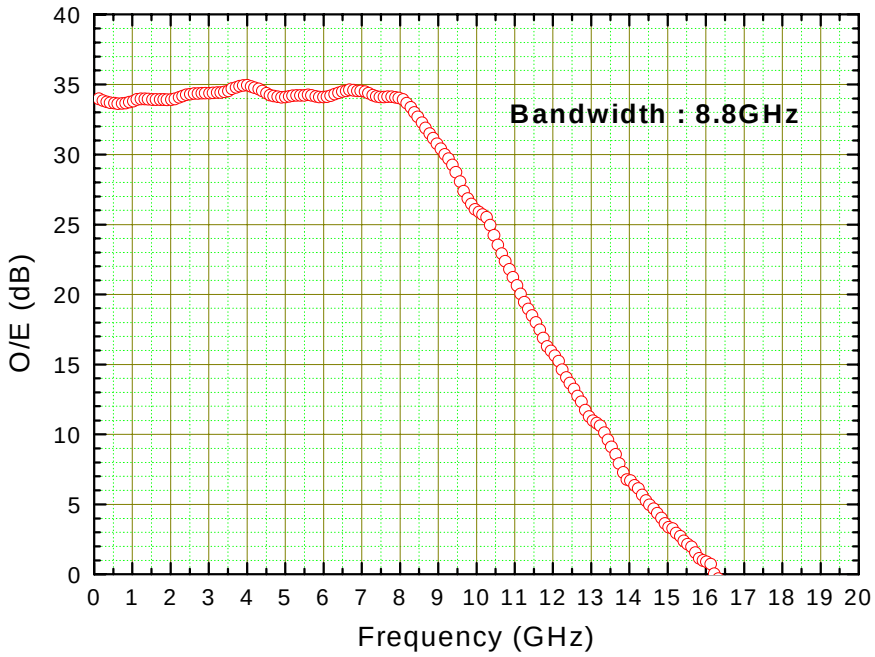
Outline Diagram

Dimensions are in millimeters [inches]. Tolerances are ±0.127mm [±0.005].



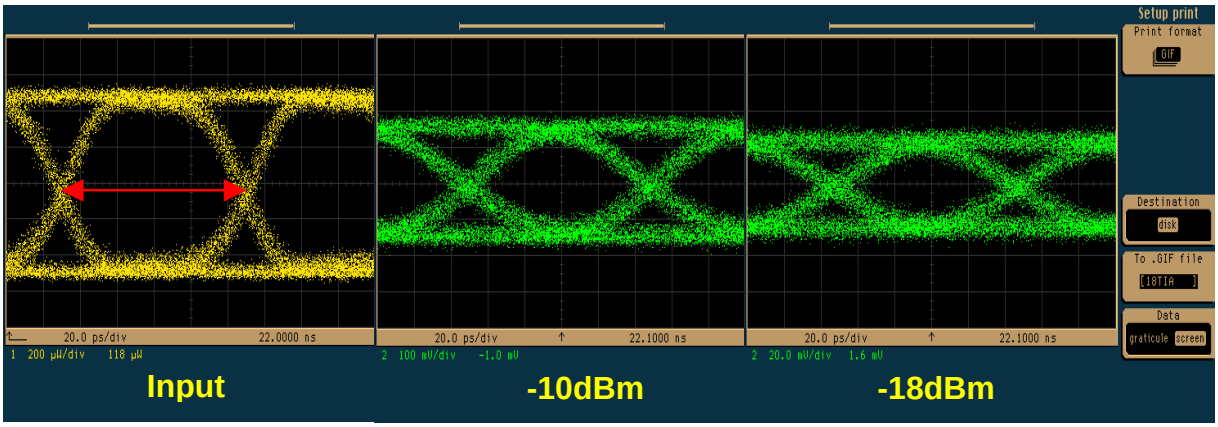
Performance Characteristics

1. Relative Frequency Response

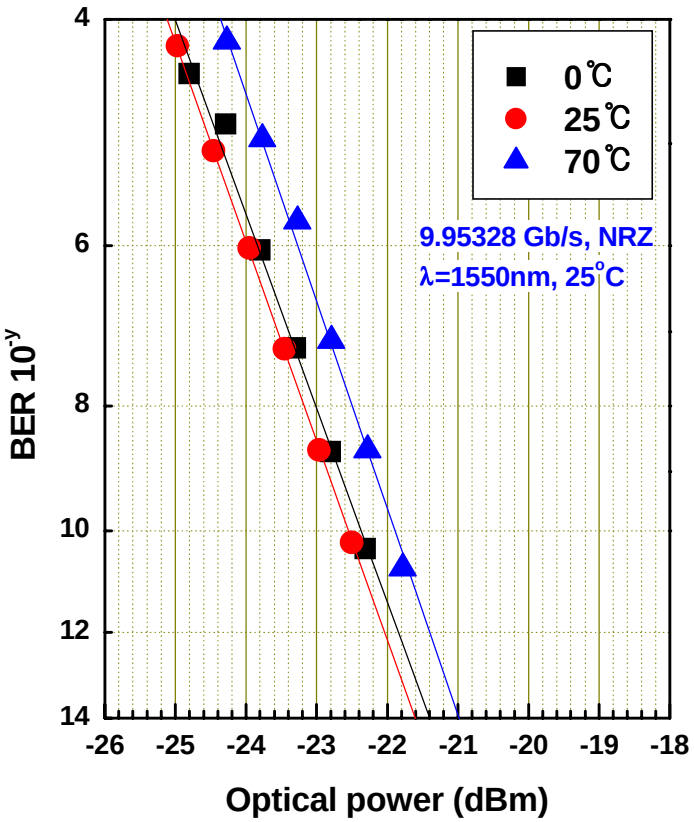


2. Input and Output Wave Form

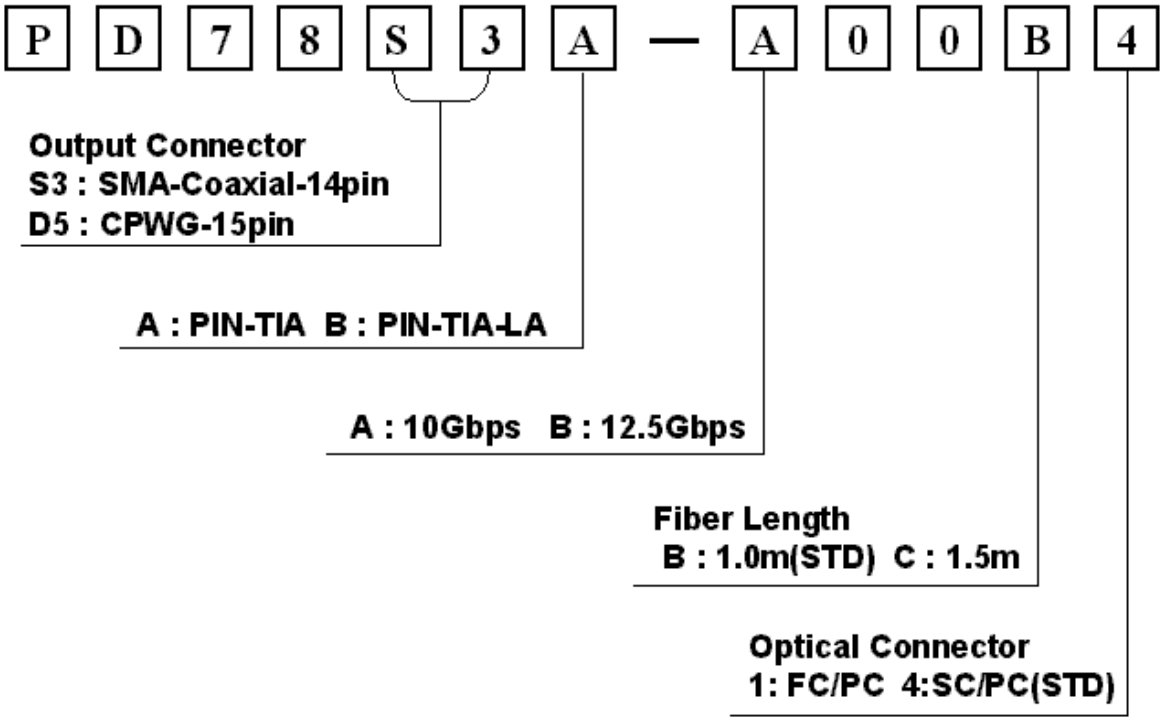
(9.95328 Gbits/s, NRZ, 2^{23}-1 PRBS , R_L=50Ω)



3. BER *vs.* Received 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=1.5KΩ, 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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