Technical Data Sheet

December 2001

SAMSUNG ELECTRONICS

FIBEROPTICS DIVISION

PD78S3A

10 Gbps PIN-TIA High Gain Receiver Module

Features

- Applicable to 10 Gbps operation
- Planar structure for high reliability
- Operation from 1200 nm to 1600 nm
- Typical sensitivity of –20 dBm
- High conversion gain
- High performance GaAs-preamplifier
- 14-pin butterfly package with SMA
- Package available with SC or FC fiber connector

Applications

- 10 Gbps short & long-haul systems
- SONET OC-192 / SDH STM-64 equipment
- DWDM equipment
- Datacom equipment

Product Code

Product Code	Connector	Sensitivity*	Overload*	Transimpedance
PD78S3A	SMA	-20 dBm	1 dBm	2000 Ω

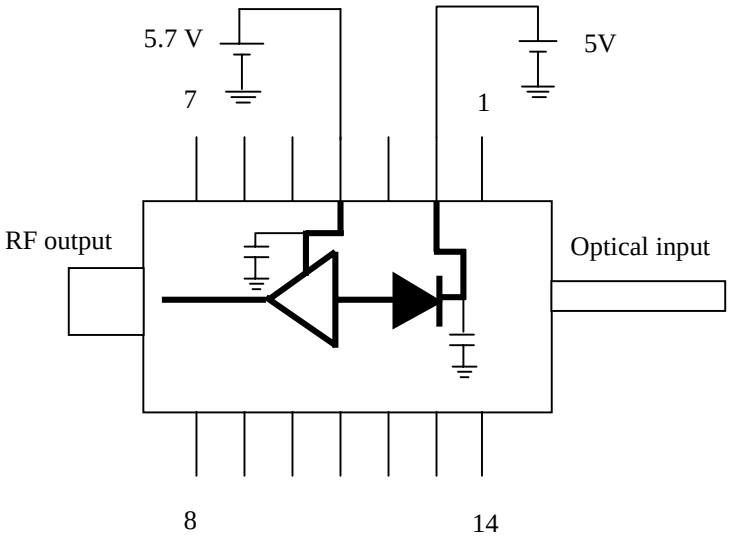
***** Typical Value is measured at $1X10^{-12}$ bit error rate for transmission of 9.95328 Gbits/s**.**

Description

The PD78S3 10 Gbps PIN detector 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 –20 dBm for 1.55 μm applications. The operating case temperature range for the receiver is 0^{o}C to 70^{o}C.

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°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}	λ = 1550 nm	0.70			A/W
PIN Dark Current	I_D				0.5	nA
Bandwidth	f_{3dB}		8			GHz
Sensitivity*	P_{LOW}	PRBS = 2^{23}-1 BER = 10^{-12}		-20	- 19	dBm
Overload*	P_{HIGH}	PRBS = 2^{23}-1 BER = 10^{-12}	0	1		dBm
Output Return Loss	S_{22}	0.13GHz ~ 8 GHz	9			dB
Optical Return Loss	RL	Not Including Connector	27			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	9	V
Total Supply Current			40	70	100	mA

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

Absolute Maximum Ratings

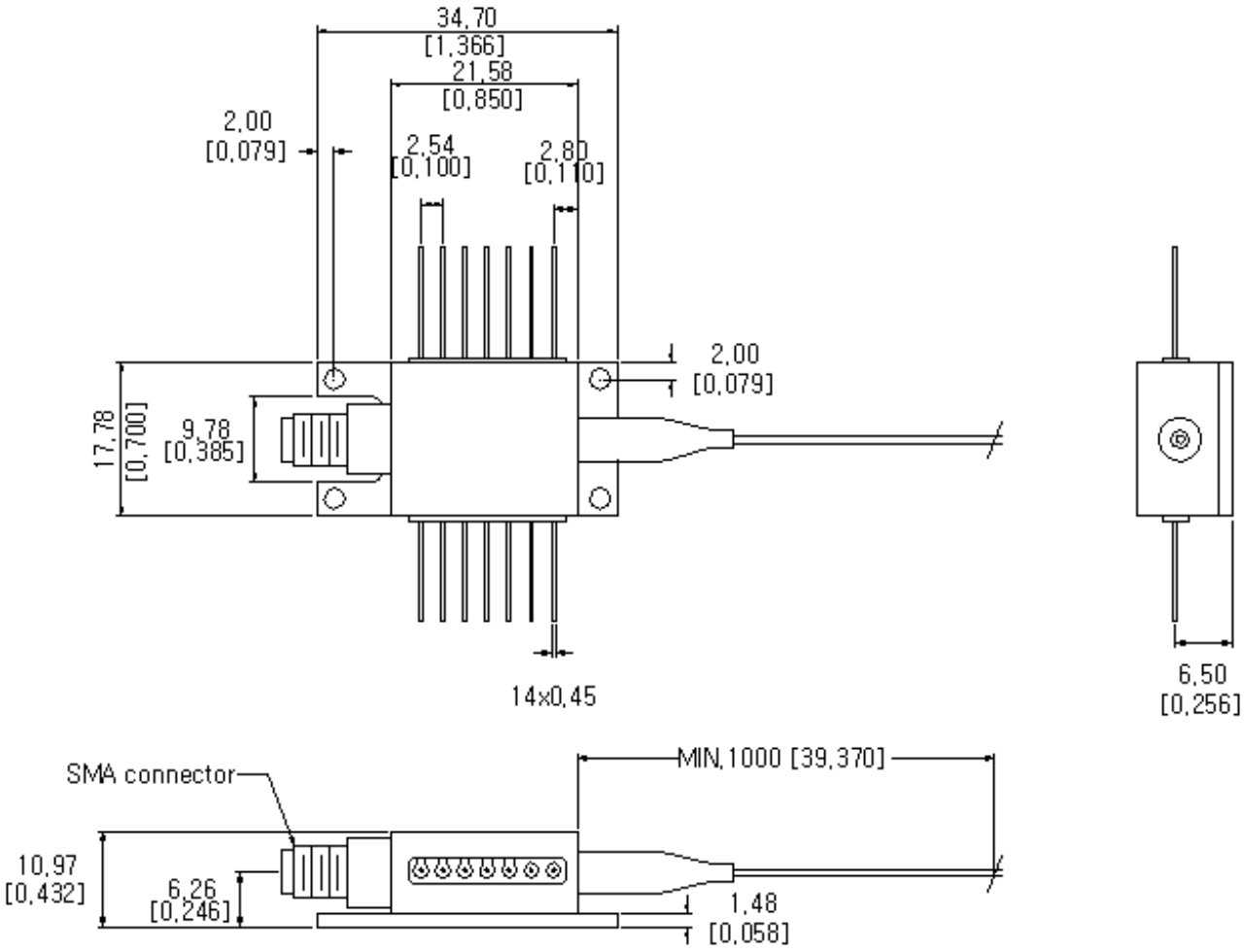
These are absolute maximum ratings only. Higher stress than these ratings may adversely affect device reliability or cause permanent damage to the device. Functional operation of the devices is not implied at these or any other conditions in excess of those given in the operational sections of the data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

Parameter	Symbol	Min	Max	Units
TIA Supply Voltage	V_{DD}	GND	8	V
PD Supply Voltage	V_{PD}	GND	15	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	V

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

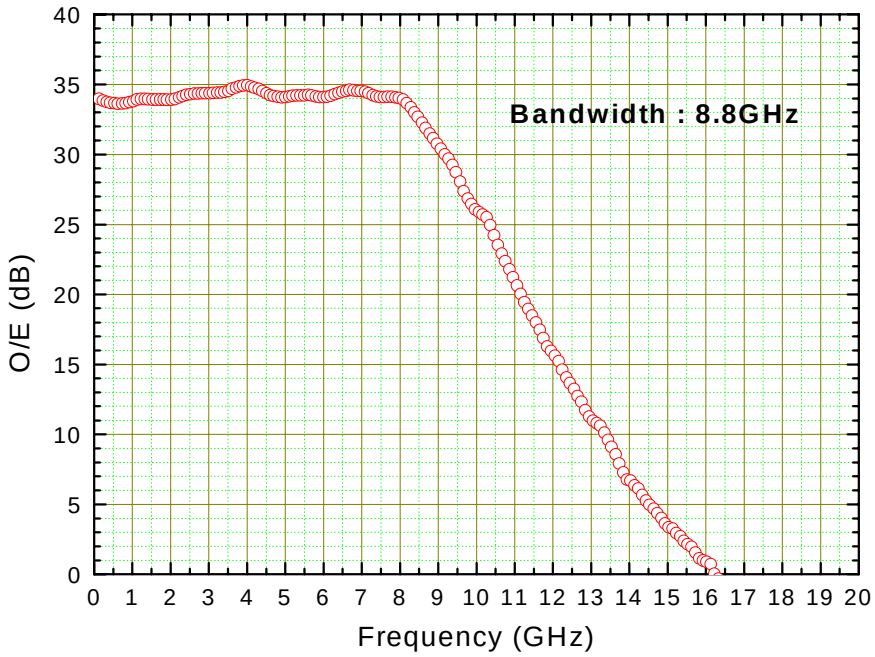
Outline Diagram

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



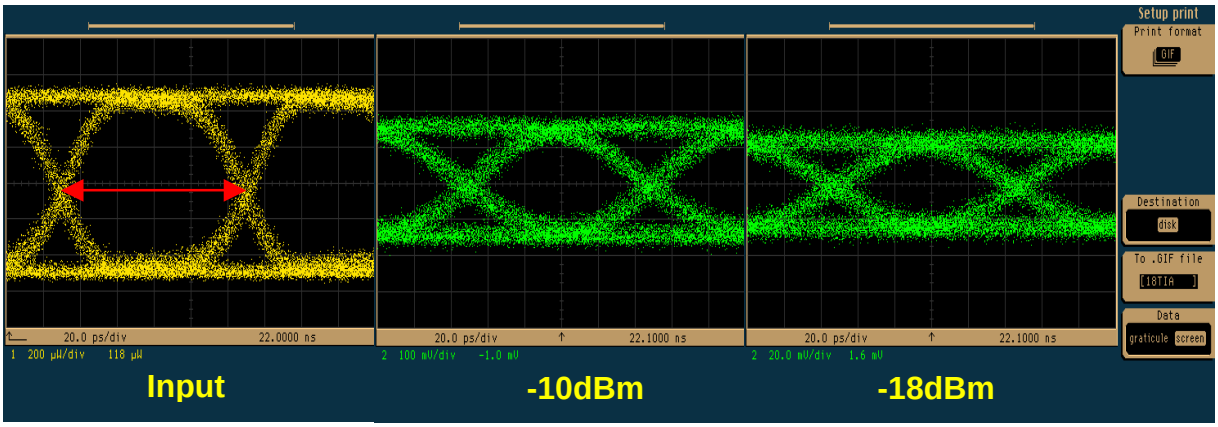
Performance Characteristics

1. Relative Frequency Response

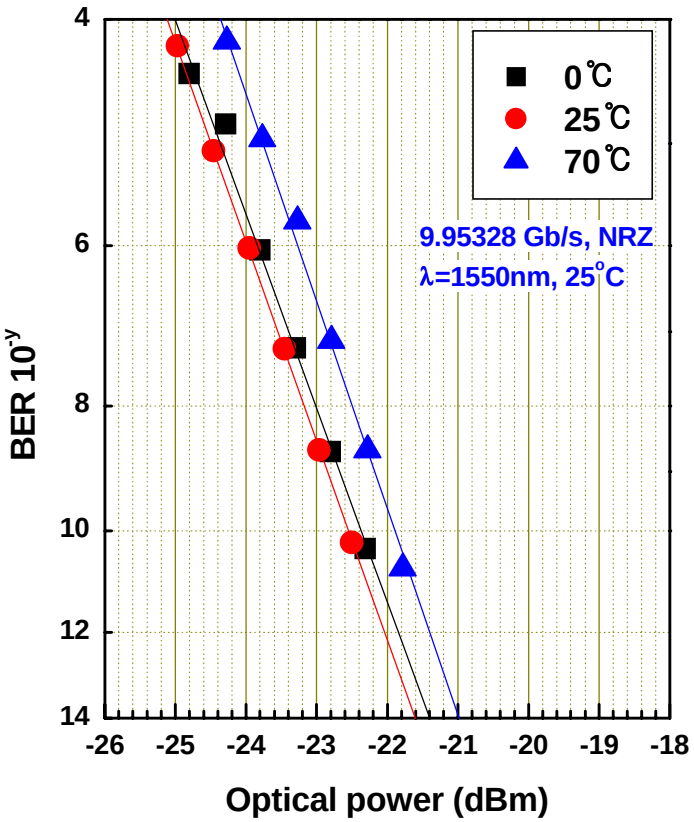


2. Input and Output Wave Form

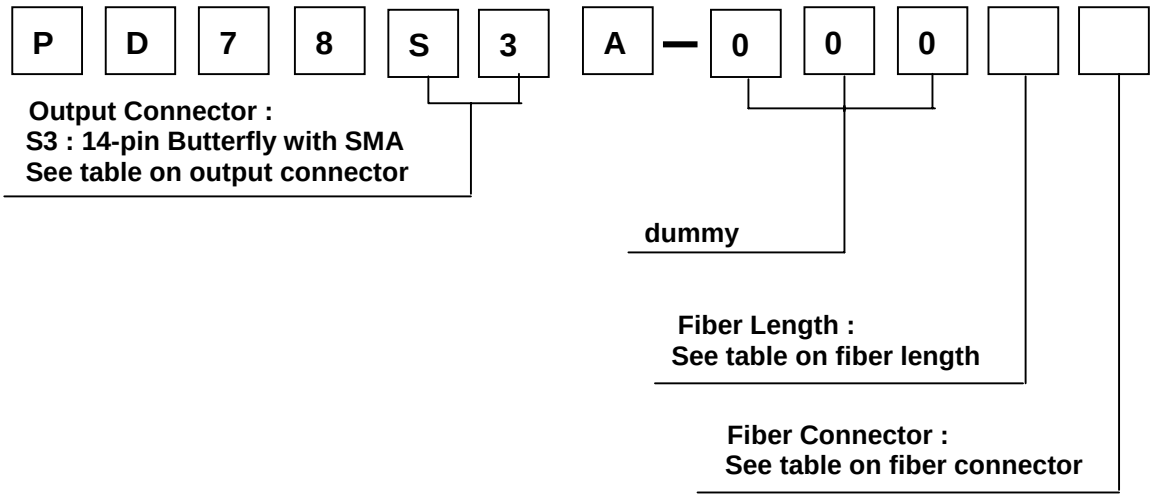
(9.95328 Gbits/s, NRZ, 2^{23}-1 PRBS , R_L=50Ω)



3. BER *vs* Received Power



Ordering Information



The standard product is 14-pin butterfly package with SMA(male or female) connector. Other types of connectors (GPO, K-connector) are also available upon request.

Output Connector

Code	Connector
S3	SMA
K3	K-connector
G3	GPO

Fiber Length

Code	Fiber Length
B	1.0m
C	1.5m

Fiber Connector

Code	Connector Type
1	FC/PC
4	SC/PC
6	No connector

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

Contact us

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