

## Description

The SPS-33200 is small form factor pluggable module for bi-directional serial optical data communications such as SONET OC-3 / SDH STM-1 and Fast Ethernet. It is with the SFP 20-pin connector to allow hot plug capability. This module is designed for single mode fiber and operates at a nominal wavelength of 1550 nm. A guaranteed minimum optical link budget of 46 dB is offered which can correspond to a link distance of over 200 km (assuming worst case fiber loss of 0.2 dB/km). The transmitter section uses a 1550 nm multiple quantum well DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

### LASER SAFETY

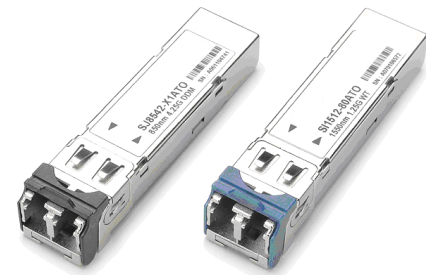
This single mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

## Features

- Single + 3.3 V power Supply.
- Small Form Factor Pluggable MSA Compliant.
- PECL Differential Inputs and Outputs.
- TTL Signal Detect Indicator.
- For Single Mode Applications
- LC Duplex Connector
- EEPROM with serial ID functionality.
- Class 1 Laser International Safety Standard IEC 825 Compliant
- Temperature Ranges: 0°C to +70°C
- RoHS Compliant

## Applications

- Fast Ethernet Links
- SONET/SDH Equipment Interconnect
- Bridges/Routers/intelligent hub and concentrators



## Performance Specifications

Absolute Maximum Ratings					
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V <sub>CC</sub>	-0.5	-	3.6	V
Storage Temperature	T <sub>S</sub>	-40	-	85	°C
Operating Temperature	T <sub>OP</sub>	0	-	70	°C
Lead Soldering Limits	T <sub>SOLD</sub>	-	-	260/10	°C/sec
General Specifications					
Parameter	Symbol	Min	Typ	Max	Units
Data Rate	B	-	155	-	Mbps
Supported Link Length on 9/125µm SMF	L	-	200	-	Km

## Order Information

P/No.	Bit Rate (Mbps)	Distance (km)	Wavelength (nm)	Single/Dual Fiber	Package	TX Power (dBm)	RX Sens. (dBm)
SPS-33200	125 / 155	200	1550 DFB	Dual	LC SFP	5 to 1	-45

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## Optical and Electrical Characteristics

Transmitter Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$	3.1	3.3	3.5	V
Supply Current	$I_{CC(Tx+Rx)}$	-	200	300	mA
Data Differential Input Voltage	$V_{in, pp}$	300	-	1600	mV
Disable Input Voltage	$V_{IL} - V_{CC}$	-1.81	-	-1.48	V
Enable Input Voltage	$V_{IH} - V_{CC}$	-1.16	-	-0.88	V
Transmitter Optical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Output Optical Power	$P_O$	1	-	+5	dBm
Center Wavelength	$\lambda_C$	1500	-	1580	nm
Spectral Width (RMS)	$\Delta\lambda$	-	-	1	nm
Optical Rise Time (10%-90%)	$t_r$	-	-	2	ns
Optical Fall Time (10%-90%)	$t_f$	-	-	2	ns
Extinction Ratio	ER	10	-	-	dB

Receiver Electrical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$	3.1	3.3	3.5	V
Supply Current	$I_{CC(Tx+Rx)}$	-	200	300	mA
Data Differential Output Voltage	$V_{out, pp}$	300	-	1000	mV
Data Output Rise Time (10%-90%)	$t_r$	-	-	2	ns
Data Output Fall Time (10%-90%)	$t_f$	-	-	2	ns
Receiver Optical Characteristics					
Parameter	Symbol	Min	Typ	Max	Unit
Maximum Receiver Power	$P_{in}$	-10	-	-	dBm
Receiver Sensitivity	$P_S$	-	-	-45	dBm
Optical Center Wavelength	$\lambda_C$	1200	-	1600	nm
Signal Detect-Asserted	$P_A$	-	-	-45	dBm avg.
Signal Detect-Deasserted	$P_D$	-55	-	-	dBm avg.
Signal Detect-Hysteresis	$P_A - P_D$	1.0	-	-	dB

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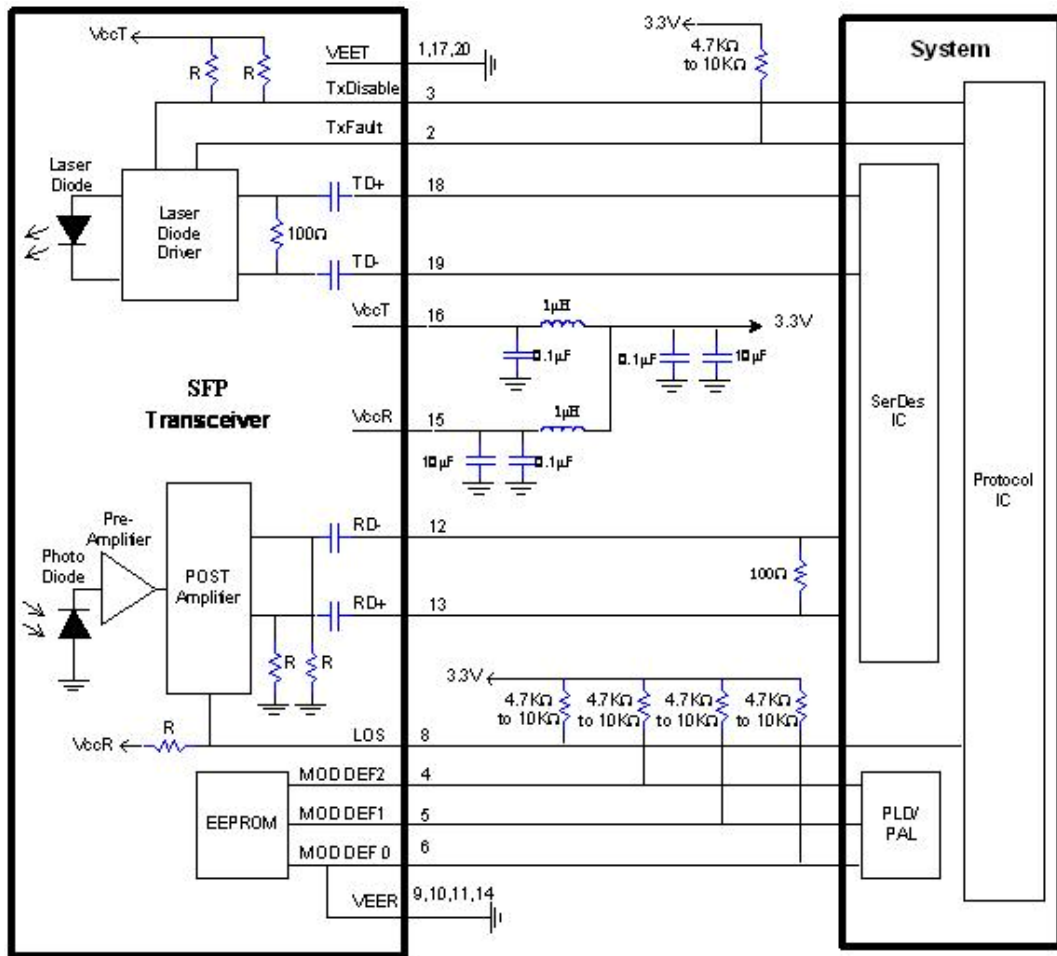
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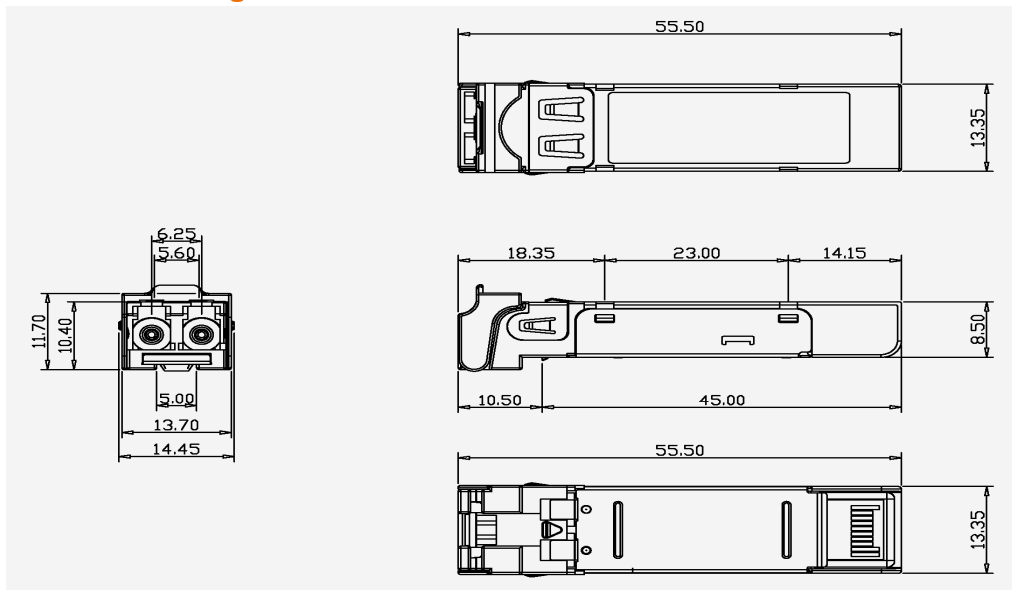
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### Recommended Circuit Schematic



### Package Outline Drawing



Dimension (unit: mm)

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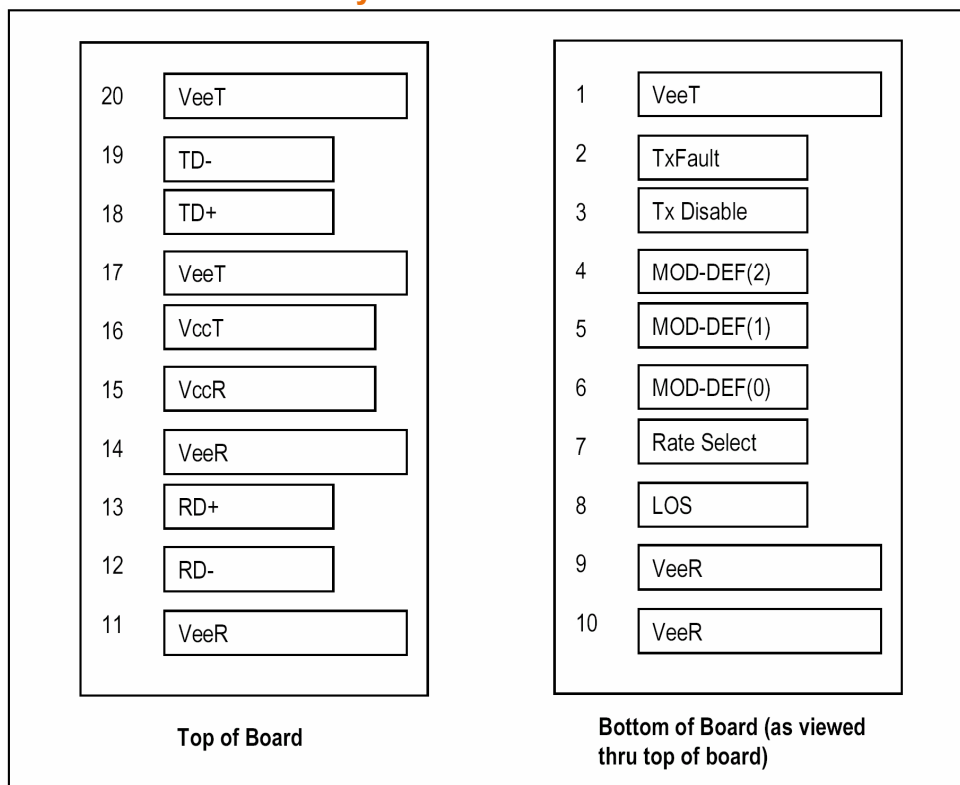
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## SFP Transceiver Electrical Pad Layout



## Pinout Table

Pin	Symbol	Name/Description	Ref.
1	V <sub>EET</sub>	Transmitter Ground	1
2	T <sub>FAULT</sub>	Transmitter Fault.	4
3	T <sub>DIS</sub>	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF (2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF (1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF (0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	
9	V <sub>EER</sub>	Receiver Ground	1
10	V <sub>EER</sub>	Receiver Ground	1
11	V <sub>EER</sub>	Receiver Ground	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V <sub>EER</sub>	Receiver Ground	1
15	V <sub>CCR</sub>	Receiver Power Supply	
16	V <sub>CCT</sub>	Transmitter Power Supply	
17	V <sub>EET</sub>	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted DATA in. 100 ohm termination between TD+ and TD-, AC Coupled thereafter.	
19	TD-	Transmitter Inverted DATA in. See TD+	
20	V <sub>EET</sub>	Transmitter Ground	1

### Notes:

- Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V. MOD\_DEF (0) pulls line low to indicate module is plugged in.
- TX-Fault is open collector output. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 2.0V and 5.5V.
- LOS is open collector output. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 2.0V and 5.5V.

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