

## OP-S32G85-01

### 28Gbps SFP28 Transceiver, Multi Mode, 100m Reach

#### Product Features

- Supports up to 28.05Gbps bit rates
- Hot-pluggable SFP+ footprint
- 850nm VCSEL laser and PIN photodiode
- 100m over M5F MMF (50/125 um OM4)
- 70m over M5E MMF (50/125um OM3)
- 20m on MMF (50/125um OM2)
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- Operating case temperature:  
Standard: 0 to +70°C



#### Applications

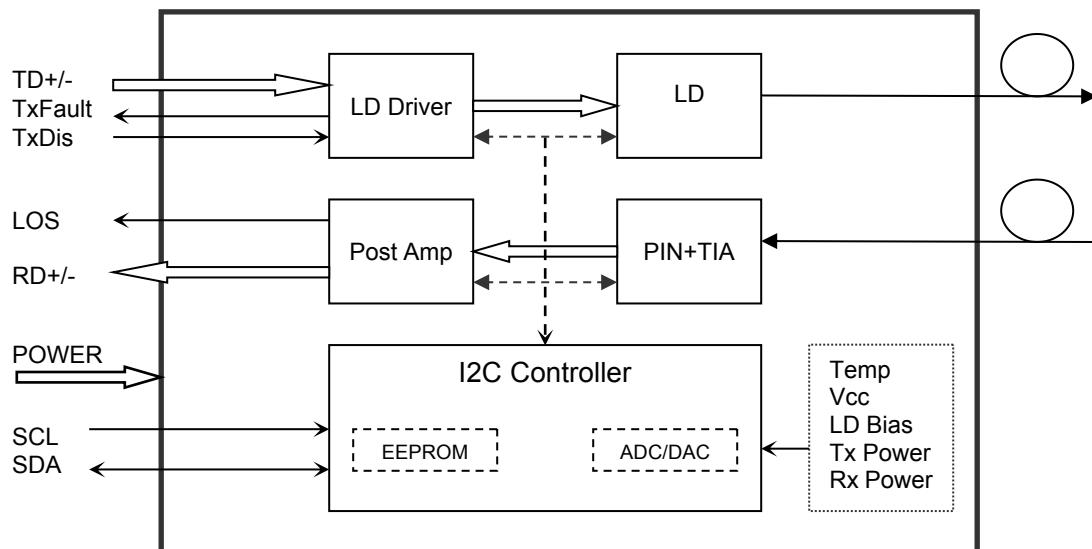
- Tri-Rate 8.5/14.025/28.05 Gb/s Fibre Channel

#### Description

The SFP28 transceivers are high performance, cost effective modules supporting data rate of 28.05Gbps over multimode fiber.

The transceiver consists of three sections: a VCSEL laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.



Transceiver functional diagram

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

## Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	Vcc	3.135	3.30	3.465	V
Power Supply Current	Icc			300	mA
Data Rate			28.05		Gbps

## Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	$\lambda_c$	840	850	860	nm	
Spectral Width (RMS)	$\Delta\lambda$			0.57	nm	
Side-Mode Suppression Ratio	SMSR	-	-	-	dB	
Average Output Power	$P_{out}$	-6.2		2	dBm	1
Extinction Ratio	ER	2.0			dB	
Data Input Swing Differential	$V_{IN}$	180		950	mV	2
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$	
TX Disable	Disable	2.0		Vcc	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		Vcc	V	
	Normal	0		0.8	V	
<b>Receiver</b>						
Centre Wavelength	$\lambda_c$	840	850	860	nm	
Receiver Sensitivity	SEN			-10.2	dBm	3
Receiver Overload		2			dBm	3
LOS De-Assert	LOS <sub>D</sub>			-13	dBm	
LOS Assert	LOS <sub>A</sub>	-30			dBm	
LOS Hysteresis		0.5		4	dB	
Data Output Swing Differential	$V_{out}$	500		900	mV	4
LOS	High	2.0		Vcc	V	
	Low			0.8	V	

### Notes:

1. The optical power is launched into MMF.
2. PECL input, internally AC-coupled and terminated.
3. For 32GFC with FEC, receiver sensitivity is defined at 1E-6 BER level, not 1E-12 BER level.
4. Internally AC-coupled.

## Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	$t_{on}$			2	ms
Tx Disable Assert Time	$t_{off}$			100	$\mu s$
Time To Initialize, including Reset of Tx Fault	$t_{init}$			300	ms
Tx Fault Assert Time	$t_{fault}$			100	$\mu s$
Tx Disable To Reset	$t_{reset}$	10			$\mu s$
LOS Assert Time	$t_{loss\_on}$			100	$\mu s$
LOS De-assert Time	$t_{loss\_off}$			100	$\mu s$
Serial ID Clock Rate	$f_{serial\_clock}$		100	400	KHz
MOD_DEF (0:2)-High	$V_H$	2		$V_{cc}$	V
MOD_DEF (0:2)-Low	$V_L$			0.8	V

## Diagnostics

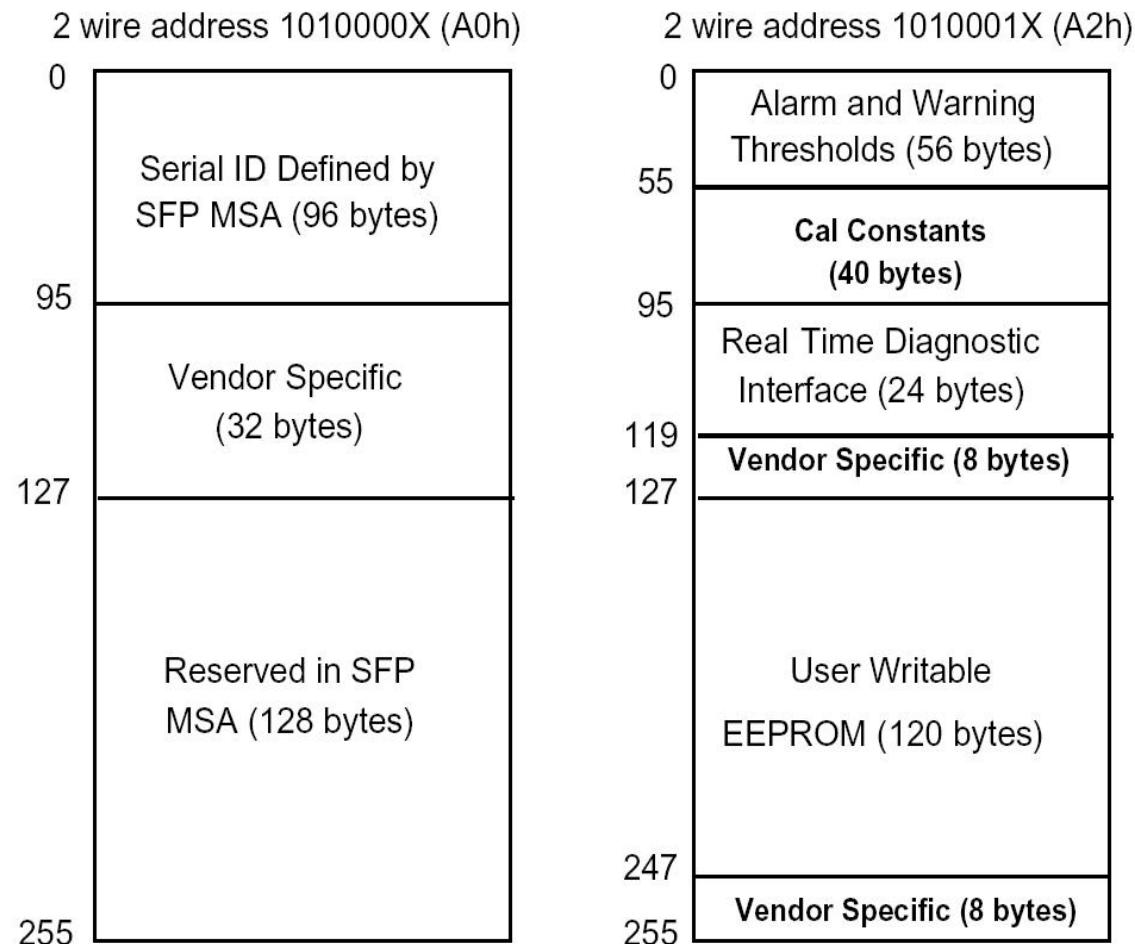
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 15	mA	±10%	Internal
TX Power	-6.2 to 2	dBm	±3dB	Internal
RX Power	-12 to 2	dBm	±3dB	Internal

## Digital Diagnostic Memory Map

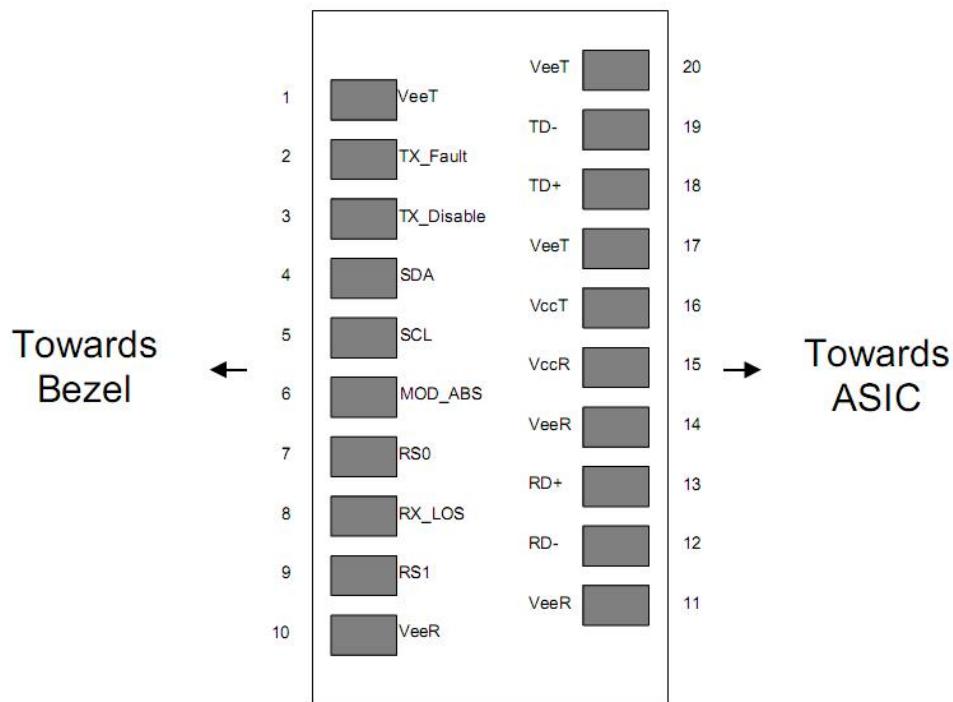
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



## Pin Descriptions



Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5

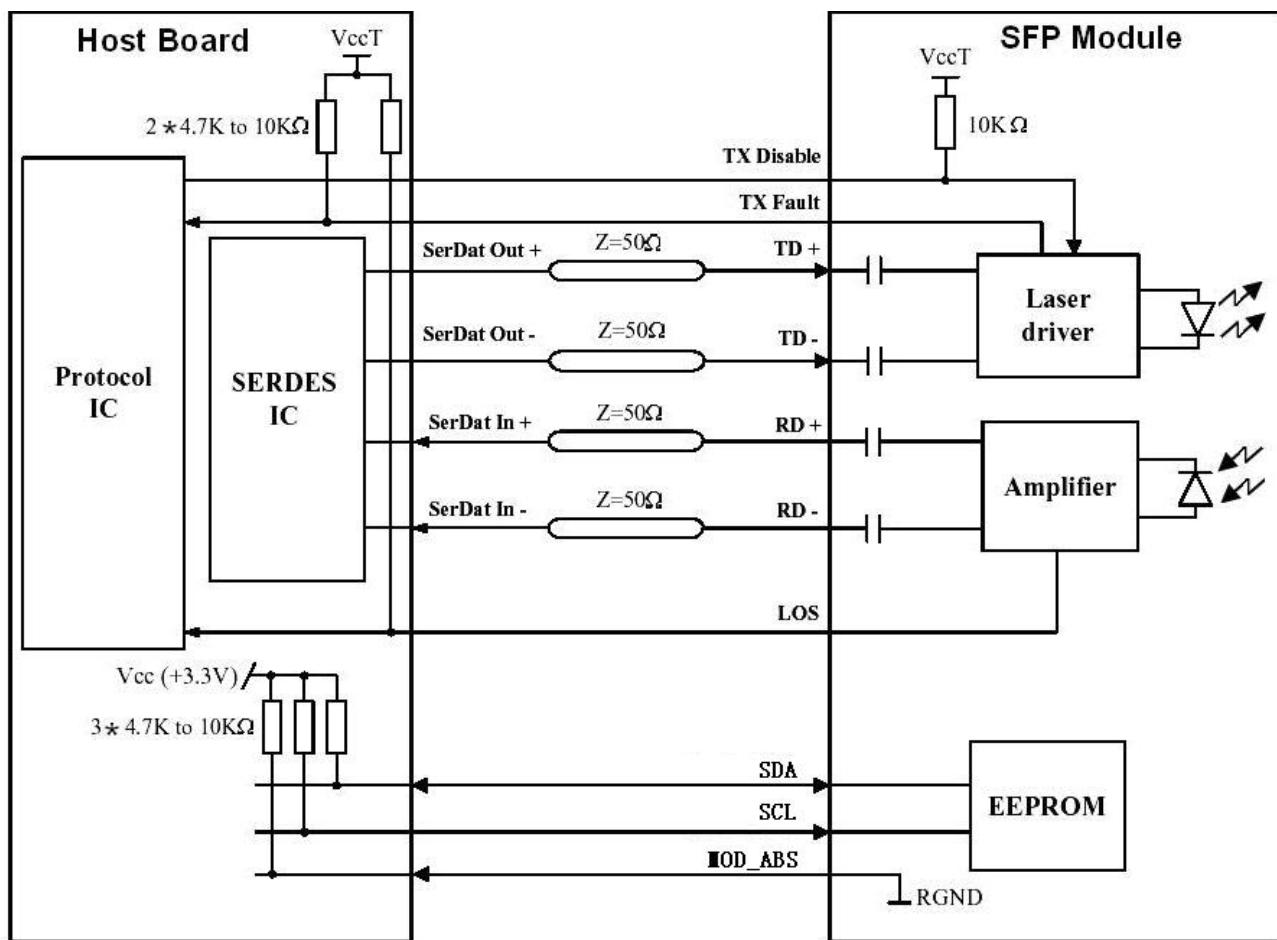
20	V <sub>EET</sub>	Transmitter Ground	1	
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Notes:

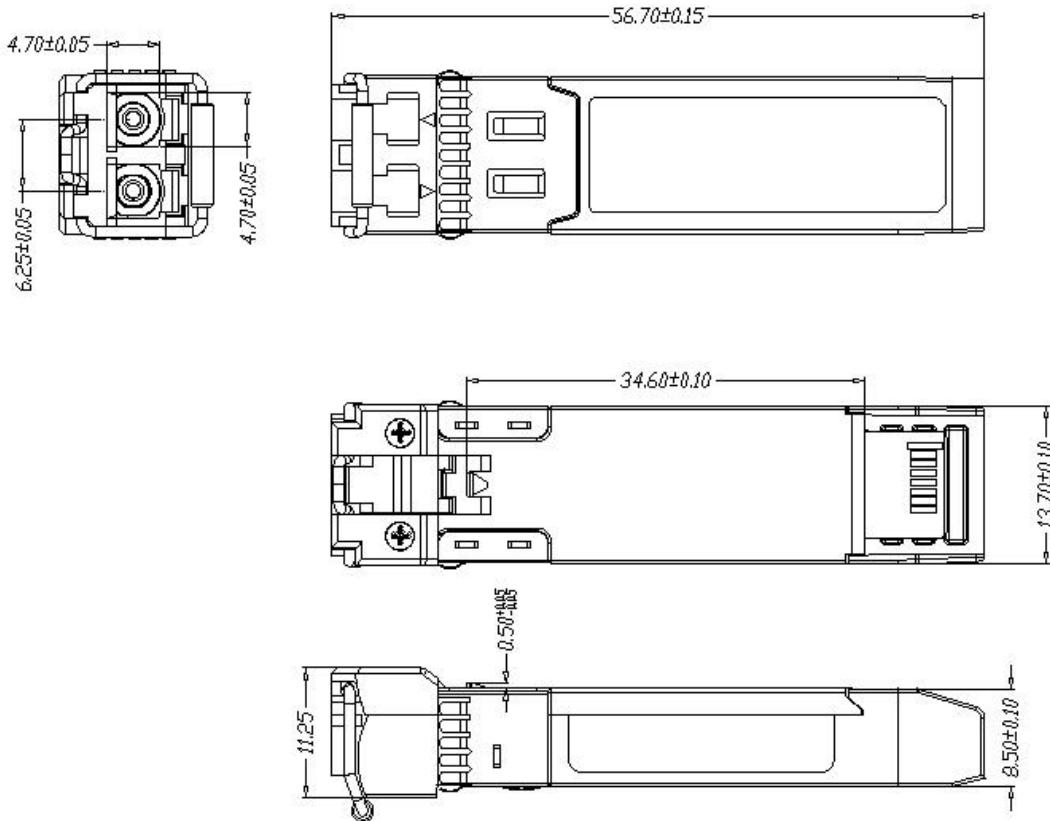
Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- 2) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- 3) LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
- 4) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 5) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

## Recommended Interface Circuit



## Mechanical Dimensions



## Ordering information

Part Number	Product Description
OP-S32G85-01	850nm, 28.05Gbps, LC, OM3-MMF 70m/OM4-MMF 100m, 0°C~+70°C

### Warnings

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD).

A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.