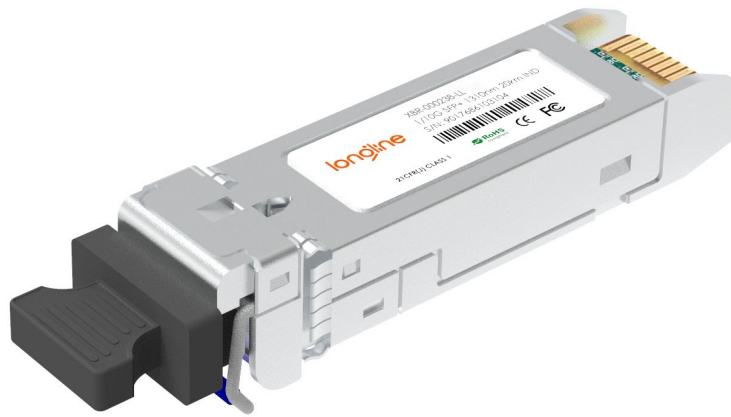


# 32GBASE-LR SFP28 1310nm 10km DOM Transceiver

XBR-000238-LL



## Application

- 16GFC/32GFC Fibre channel

## Features

- Supports up to 28.05Gbps bit rates
- Hot-Pluggable SFP28 footprints
- 1310nm DFB laser and PIN photodiode, Up to 10km for SMF transmission
- 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

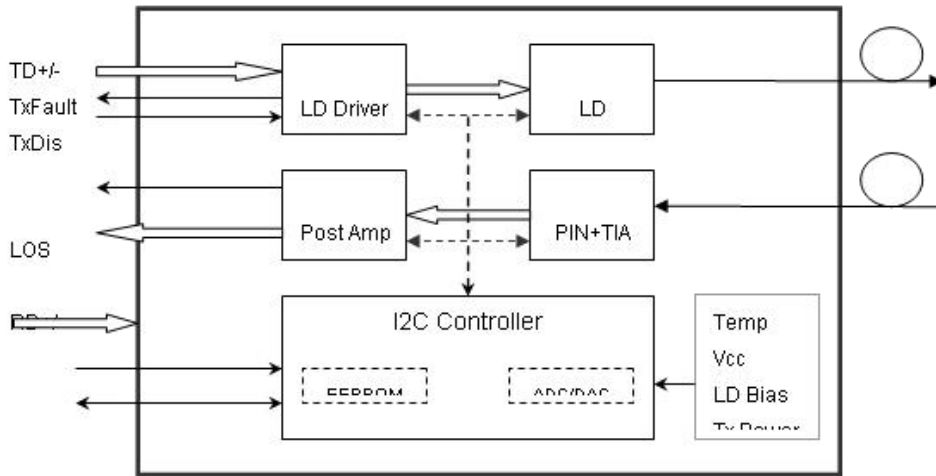
## Description

The SFP28 transceivers are high performance, cost effective modules supporting data rate of 28.05Gbps and 10km transmission distance with SMF.

The transceiver consists of three sections: a DFB 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.

## Block Diagram



**Transceiver function diagram**

## I. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	° C
Operating Humidity	-	5	85	%

## II. 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			400	mA
Data Rate			28.05		Gbps

### III. Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Note
<b>Transmitter</b>						
Centre Wavelength	$\lambda_c$	1270	1310	1350	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	$P_{out}$	-7		2	dBm	1
Extinction Ration	ER	4			dB	
Data Input Swing Differential	$V_{IN}$	180		850	mV	2
Input Differential Impedance	$Z_{IN}$	90	100	110	$\Omega$	
TX Disable	Disable		2.0		V <sub>cc</sub>	V
	Enable		0		0.8	V
TX Fault	Fault		2.0		V <sub>cc</sub>	V
	Normal		0		0.8	V
<b>Receiver</b>						

<b>Centre Wavelength</b>	$\lambda_c$	1260		1600	nm	
<b>Receiver Sensitivity</b>				-11.6	dBm	3
<b>Receiver Overload</b>				2	dBm	3
<b>LOS De-Assert</b>	LOS <sub>D</sub>			-15	dBm	
<b>LOS Assert</b>	LOS <sub>A</sub>	-30			dBm	
<b>LOS Hysteresis</b>		0.5			dB	
<b>Differential Data Output Swing</b>	V <sub>out</sub>	300		900	mV	4
<b>LOS</b>	High	2.0		V <sub>cc</sub>	V	
	Low	0		0.8	V	

**Notes:**

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2<sup>31</sup>-1 test pattern @25.08Gps, BER ≤ 1 × 10<sup>-6</sup>.
4. Internally AC-coupled.

## IV. Timing Requirement

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t <sub>on</sub>			2	ms
Tx Disable Assert Time	t <sub>off</sub>			100	μs
Time To Initialize, including Reset of Tx Fault	t <sub>init</sub>			300	ms
Tx Fault Assert Time	t <sub>fault</sub>			100	μs
Tx Disable to Reset	t <sub>reset</sub>	10			μs
LOS Assert Time	t <sub>loss_on</sub>			100	μs
LOS De-assert Time	t <sub>loss_off</sub>			100	μs
Serial ID Clock Rate	f <sub>serial_clock</sub>		100	400	KHz
MOD_DEF (0:2)-High	V <sub>H</sub>	2		V <sub>cc</sub>	V
MOD_DEF (0:2)-Low	V <sub>L</sub>			0.8	V

## V. Diagnostic

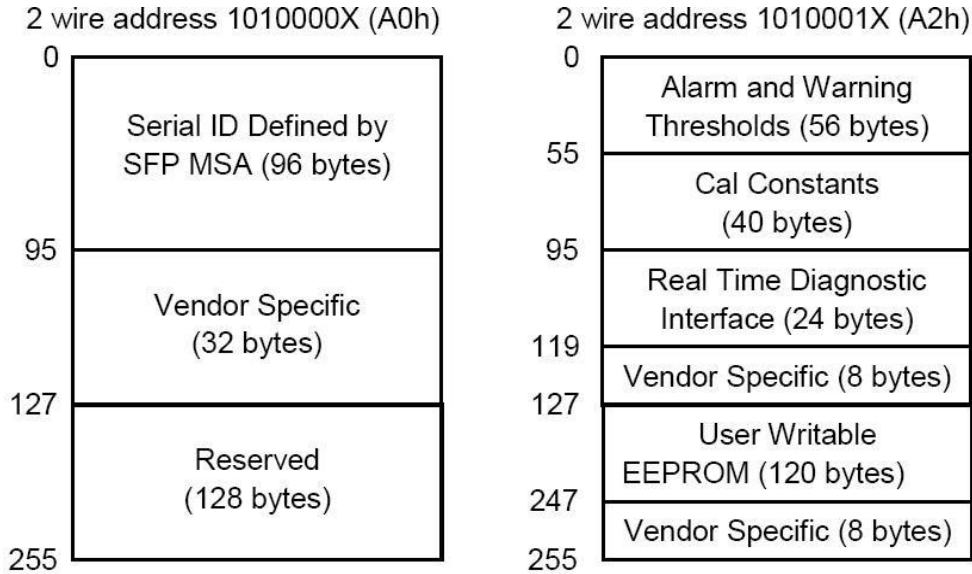
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	° C	±3° C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 100	mA	±10%	Internal
TX Power	-7 to 2	dBm	±3dB	Internal
RX Power	-14 to 2	3.5	±3dB	Internal

### Digital Diagnostic Memory Map

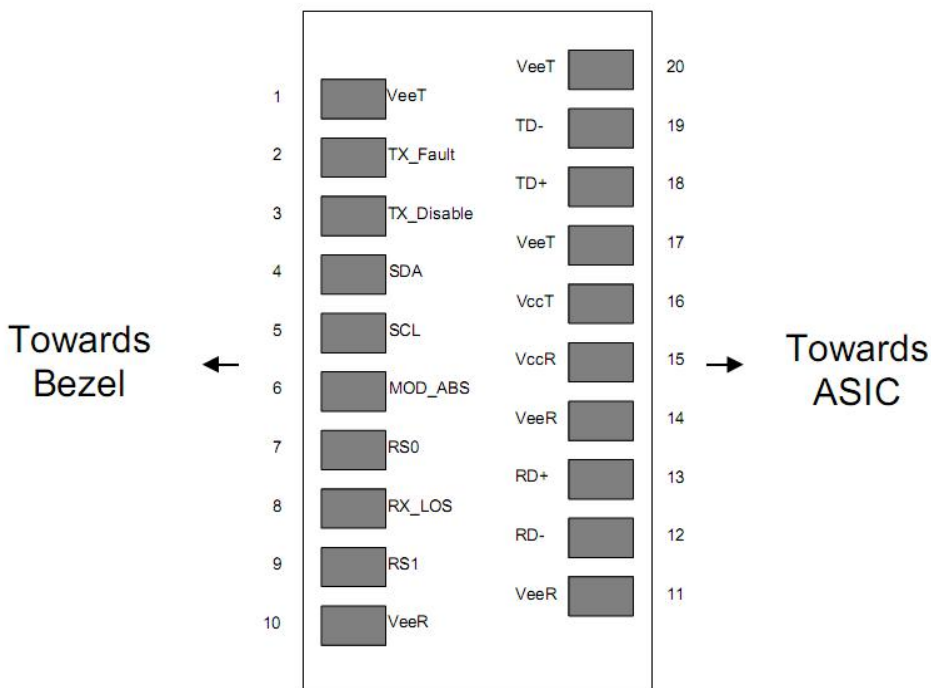
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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..



### V. Pin Descriptions



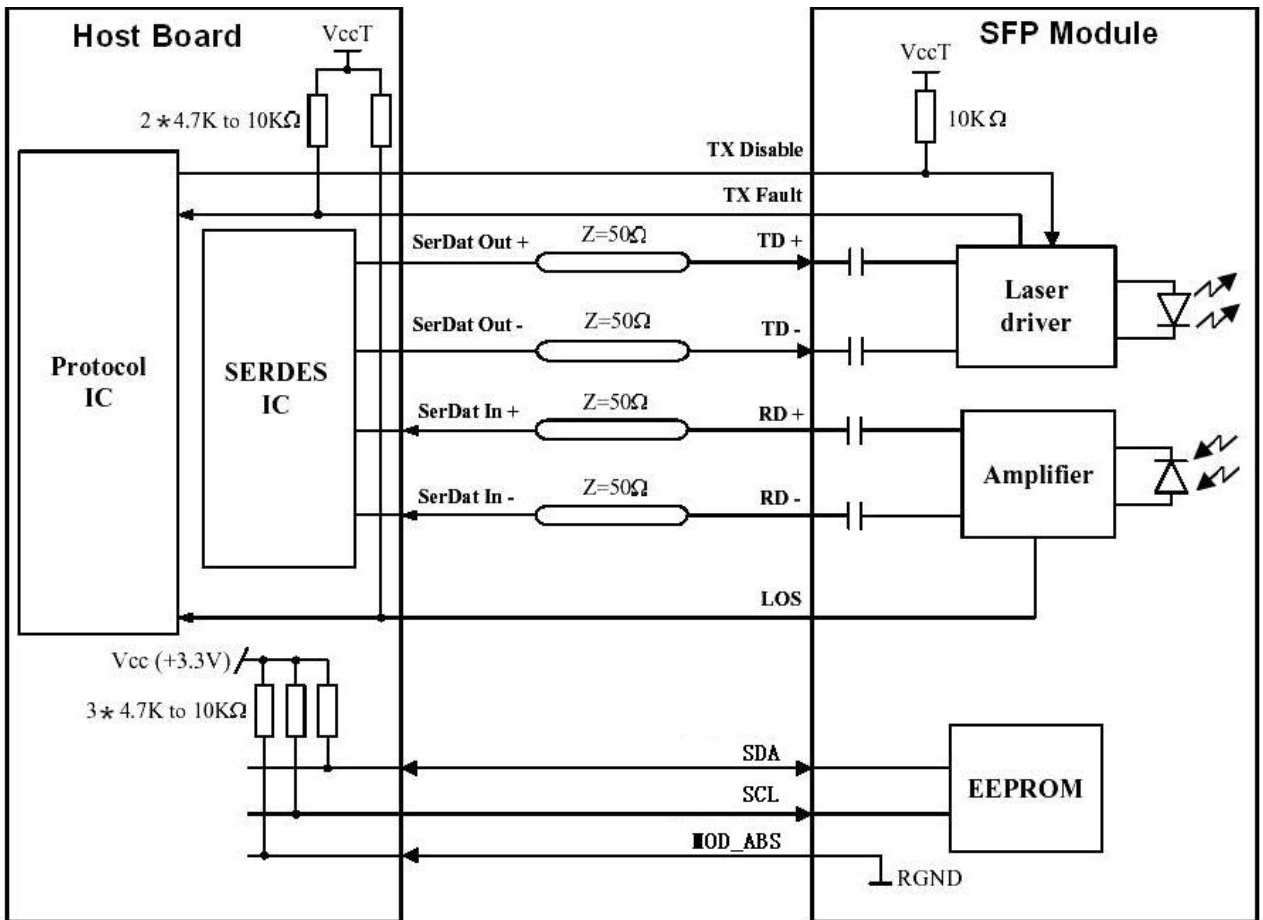
PIN	Signal Name	Description	Plug Seq	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	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	

**Notes:**

1. Plug Seq.: Pin engagement sequence during hot plugging.
2. 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 V<sub>cc</sub>+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.

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.

## VI. Recommended Interface Circuit





## VII. Mechanical Dimensions

