QSFP28 SR2 BiDi Multi mode Optical Transceiver

Description

The BlueOptics© BO28L856S1D QSFP28 transceiver is a high performance, cost effective module supporting a data rate up to 100Gbps with 100 Meter link length on multi mode fiber.

BlueOptics© transceivers are 100% compliant with Multi-Source Agreement (MSA).

All BlueOptics© transceivers can be equipped with digital diagnostic function compliant to MSA SFF-8472.

Using digital diagnostic, BlueOptics© SFP transceivers provide the following real time information:

- Supply voltage
- Laser bias current
- Laser average output power
- Laser received input power
- Temperature

Applications

- ✓ 100G Ethernet
- ✓ Switch to Switch Interface
- ✓ Router/Server Interface
- ✓ Other optical links

Features

- ✓ Aggregate bandwidth of > 100Gbps
- ✓ Dual wavelength VCSEL bi-directional optical interface, PAM4 2 × 50-Gb/s 850 nm/900 nm
- ✓ Capable of over 70m transmission on OM3 Multimode Fiber (MMF)and 100m on OM4 MMF
- ✓ Utilizes a standard LC duplex fiber cable allowing reuse of existing cable infrastructure
- ✓ Single +3.3V power supply operating
- ✓ Compliant to the 100GbE XLPPI electrical specification per IEEE 802.3bm
- ✓ Compliant to QSFP28 SFF-8636 Specification
- ✓ QSFP28 MSA compliant
- ✓ RoHS Compliant Part
- ✓ Case operating temperature
  - Commercial: 0°C to +70°C
  - Industrial: -40°C to +85°C

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended.

Laser Safety: Even small radiation emitted by laser devices can be dangerous to human eyes and lead to permanent eye injuries. Be sure to avoid eye contact with direct or indirect radiation.

Warranty

Every BlueOptics© transceiver comes with a 5 year replacement warranty and lifetime support.
For a warranty inquiry, please contact your CBO sales representative.
This warranty covers the first user of the equipment only.

Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by CBO before they become applicable to any particular order or contract. In accordance with the CBO policy of continuous improvement specifications may change without notice.

The publication of information in this data sheet does not imply freedom from patent or other protective rights of CBO or others.

Further details are available from any CBO sales representative.

Installation

Before installation attach an ESD-preventive wrist to ensure not to damage the transceiver or hardware.

BlueOptics© BO28L856S1D can be installed in any Small Form Factor Pluggable (QSFP28) port. You can install the BO28L856S1D regardless if the system is powered on or off, because it is hot-swappable.

Insert the transceiver into the SFP port and remove the dust cap.

You can now connect your cable.

Order Information

Part No.	Temp.	DDM
BO28L856S1D	0°C to +70°C	✓
BO28L856S1DIN	-40°C to +80°C	✓

Regulatory Compliance

Feature	Standard	Co.
Electrostatic Discharge (ESD)	- IEC/EN 61000-4- 2	✓
Electromagnetic Interference (EMI)	- FCC Part 15 Class B EN 55022 - Class B (CISPR 22A)	✓
Laser Eye Safety	- FDA 21CFR 1040.10, 1040.11 - IEC/EN 60825-1, 2	Class 1 ✓
Component Recognition	- IEC/EN 60950, UL	✓
RoHS	- 2002/95/EC	✓
EMC	- EN61000-3	✓

It is a Four-Channel,Pluggable, LC Duplex, Fiber-Optic QSFP28 Transceiver for 100 Gigabit Ethernet Applications. This transceiver is a high performance module for short-range duplex data communication and interconnect applications. It integrates four electrical data lanes in each direction into transmission over a single LC duplex fiber optic cable. Each electrical lane operates at 25.78125 Gbps and conforms to the 100GE XLPPI interface.

The transceiver internally multiplexes an XLPPI 4x25G interface into two 50Gb/s electrical channels, transmitting and receiving each optically over one simplex LC fiber using bi-directional optics. This results in an aggregate bandwidth of 100Gbps into a duplex LC cable. This allows reuse of the installed LC duplex cabling infrastructure for 100GbE application. Link distances up to 70 m using OM3 and 100m using OM4 optical fiber are supported. These modules are de- signed to operate over multimode fiber systems using a nominal wavelength of 850nm on one end and 900nm on the other end. The electrical interface uses a 38 contact QSFP28 type edge connector. The optical interface uses a conventional LC duplex connector.

1. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	T_S	-40		+85	°C
Supply Voltage	$V_{CC}T$, R	-0.5		4	V
Relative Humidity	RH	0		85	%

2. Recommended Operating Environment

Parameter	Symbol	Min.	Typical	Max.	Unit
Case operating Temperature	T_C	0		+70	°C
Supply Voltage	$V_{CCT, R}$	+3.13	3.3	+3.47	V
Supply Current	I_{CC}			1000	mA
Power Dissipation	PD			3.5	W

3. Electrical Characteristics(TOP = 0 to 70 °C, VCC = 3.13 to 3.47 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Data Rate per Channel			25.78125		Gbps	
Power Consumption		-	2.5	3.5	W	
Supply Current	Icc		0.75	1.0	A	
Control I/O Voltage-High	VIH	2.0		Vcc	V	
Control I/O Voltage-Low	VIL	0		0.7	V	
Inter-Channel Skew	TSK			150	Ps	
RESETL Duration			10		Us	
RESETL De-assert time				100	ms	
Power On Time				100	ms	
Transmitter						
Single Ended Output Voltage Tolerance		0.3		4	V	1
Common mode Voltage Tolerance		15			mV	
Transmit Input Diff Voltage	VI	120		1200	mV	
Transmit Input Diff Impedance	ZIN	80	100	120		
Data Dependent Input Jitter	DDJ			0.1	UI	
Data Input Total Jitter	TJ			0.28	UI	
Receiver						
Single Ended Output Voltage Tolerance		0.3		4	V	
Rx Output Diff Voltage	Vo		600	800	mV	
Rx Output Rise and Fall Voltage	Tr/Tf	12			ps	1
Total Jitter	TJ			0.7	UI	
Deterministic Jitter	DJ			0.42	UI	

Notes:

1. 20～80%.

4. Optical Specification(TOP = 0 to 70 °C, VCC = 3.0 to 3.6 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Optical Wavelength CH1	λ	832	850	868	nm	
Optical Wavelength CH2	λ	882	900	918	nm	
RMS Spectral Width	Pm		0.5	0.65	nm	
Average Optical Power per Channel	Pavg	-6	-1	+4.0	dBm	
Laser Off Power Per Channel	Poff			-30	dBm	
Optical Extinction Ratio	ER	3.0			dB	
Relative Intensity Noise	Rin			-128	dB/HZ	1
Optical Return Loss Tolerance				12	dB	
Receiver						
Optical Center Wavelength CH1	λ	882	900	918	nm	
Optical Center Wavelength CH2	λ	832	850	868	nm	
Receiver Sensitivity per Channel	R			-8	dBm	
Maximum Input Power	P_{MAX}	+0.5			dBm	
Receiver Reflectance	Rrx			-15	dB	
LOS De-Assert	LOS_D			-10	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Notes:
1. 12dB Reflection.

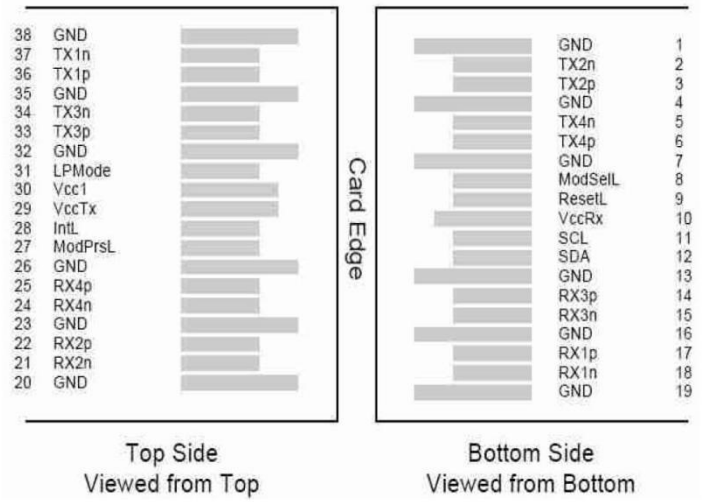
5. Timing for Soft Control and Status Functions

Parameter	Symbol	Max	Unit	Conditions
Initialization Time	t_init	2000	ms	Time from power on1, hot plug or rising edge of Reset until the module is fully functional2
Reset Init Assert Time	t_reset_init	2	μs	A Reset is generated by a low level longer than the minimum reset pulse time present on the ResetL pin.
Serial Bus Hardware Ready Time	t_serial	2000	ms	Time from power on1 until module responds to data transmission over the 2-wire serial bus
Monitor Data Ready Time	t_data	2000	ms	Time from power on1 to data not ready, bit 0 of Byte 2, deasserted and IntL asserted
Reset Assert Time	t_reset	2000	ms	Time from rising edge on the ResetL pin until the module is fully functional2
LPMode Assert Time	ton_LPMode	100	μs	Time from assertion of LPMode (Vin:LPMode =Vih) until module power consumption enters lower Power Level
IntL Assert Time	ton_IntL	200	ms	Time from occurrence of condition triggering IntL until Vout:IntL = Vol
IntL Deassert Time	toff_IntL	500	μs	toff_IntL 500 μs Time from clear on read3 operation of associated flag until Vout:IntL = Voh. This includes deassert times for Rx LOS, Tx Fault and other flag bits.
Rx LOS Assert Time	ton_los	100	ms	Time from Rx LOS state to Rx LOS bit set and IntL asserted
Flag Assert Time	ton_flag	200	ms	Time from occurrence of condition triggering flag to associated flag bit set and IntL asserted
Mask Assert Time	ton_mask	100	ms	Time from mask bit set4 until associated IntL assertion is inhibited
Mask De-assert Time	toff_mask	100	ms	Time from mask bit cleared4 until associated IntlL operation resumes
ModSelL Assert Time	ton_ModSelL	100	μs	Time from assertion of ModSelL until module responds to data transmission over the 2-wire serial bus

ModSelL Deassert Time	toff_ModSelL	100	μs	Time from deassertion of ModSelL until the module does not respond to data transmission over the 2-wire serial bus
Power_over-ride or Power-set Assert Time	ton_Pdown	100	ms	Time from P_Down bit set 4 until module power consumption enters lower Power Level
Power_over-ride or Power-set De-assert Time	toff_Pdown	300	ms	Time from P_Down bit cleared4 until the module is fully functional3

Notes：
1. Power on is defined as the instant when supply voltages reach and remain at or above the minimum specified value.
2. Fully functional is defined as IntL asserted due to data not ready bit, bit 0 byte 2 de-asserted.
3. Measured from falling clock edge after stop bit of read transaction.
4. Measured from falling clock edge after stop bit of write transaction.

6. PIN Assignment



7. Pin Definitions

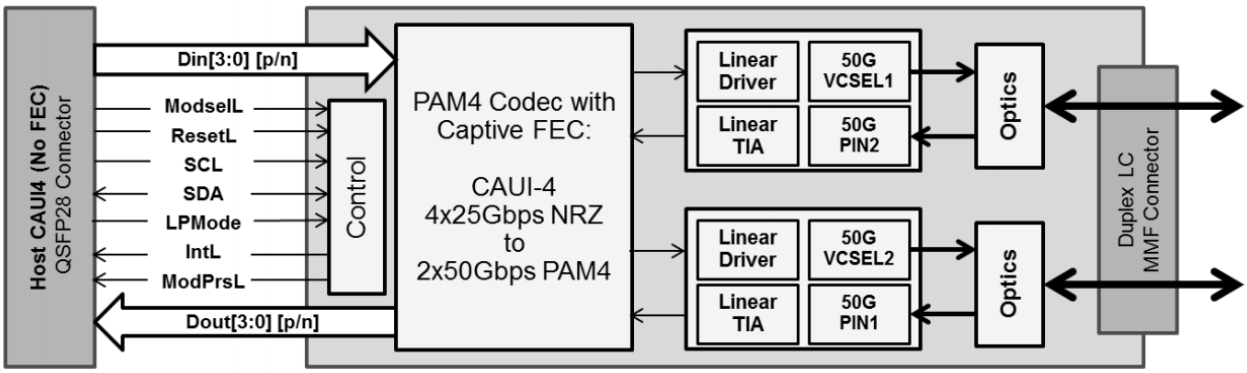
Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Output	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Output	
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	
9	LVTTL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	1
14	CML-O	Rx3p	Receiver Inverted Data Output	
15	CML-O	Rx3n	Receiver Non-Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Inverted Data Output	
18	CML-O	Rx1n	Receiver Non-Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	

25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3V Power Supply Transmitter	2
30		Vcc1	+3.3V Power Supply	2
31	LVTTL-I	LPMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Inverted Data Output	
34	CML-I	Tx3n	Transmitter Non-Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Inverted Data Output	
37	CML-I	Tx1n	Transmitter Non-Inverted Data Output	
38		GND	Ground	1

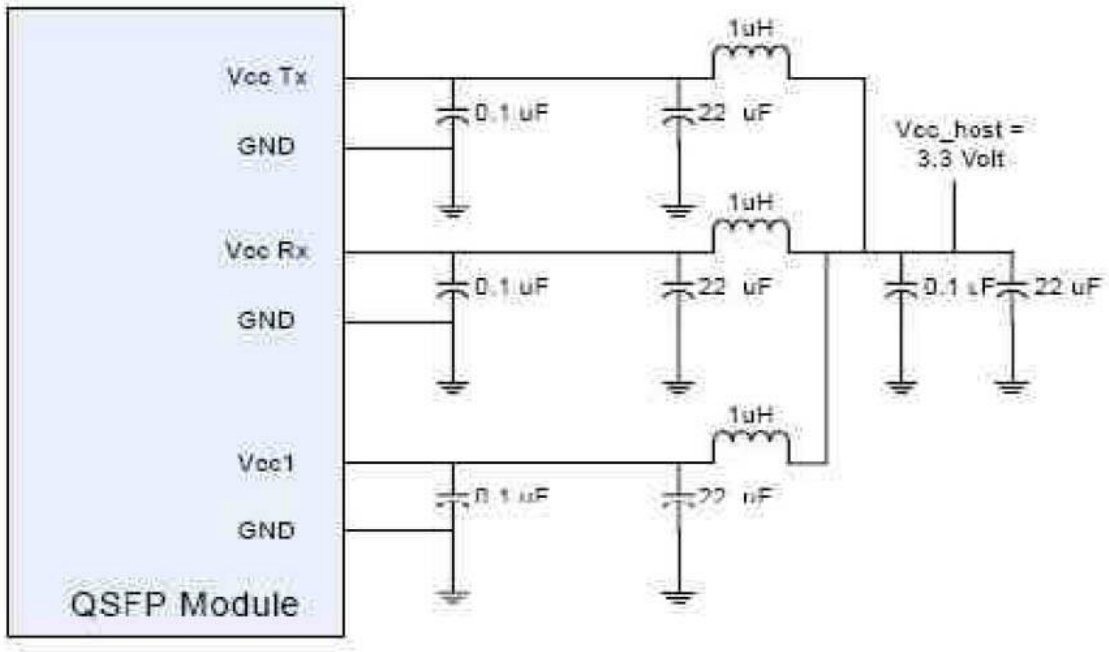
Notes:

1. GND is the symbol for single and supply(power) common for QSFP modules, All are common within the QSFP module and all module voltages are referenced to this potential otherwise noted. Connect these directly to the host board signal common ground plane. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. VccRx, Vcc1 and VccTx may be internally connected within the QSFP transceiver module in any combination. The connector pins are each rated for maximum current of 500mA.

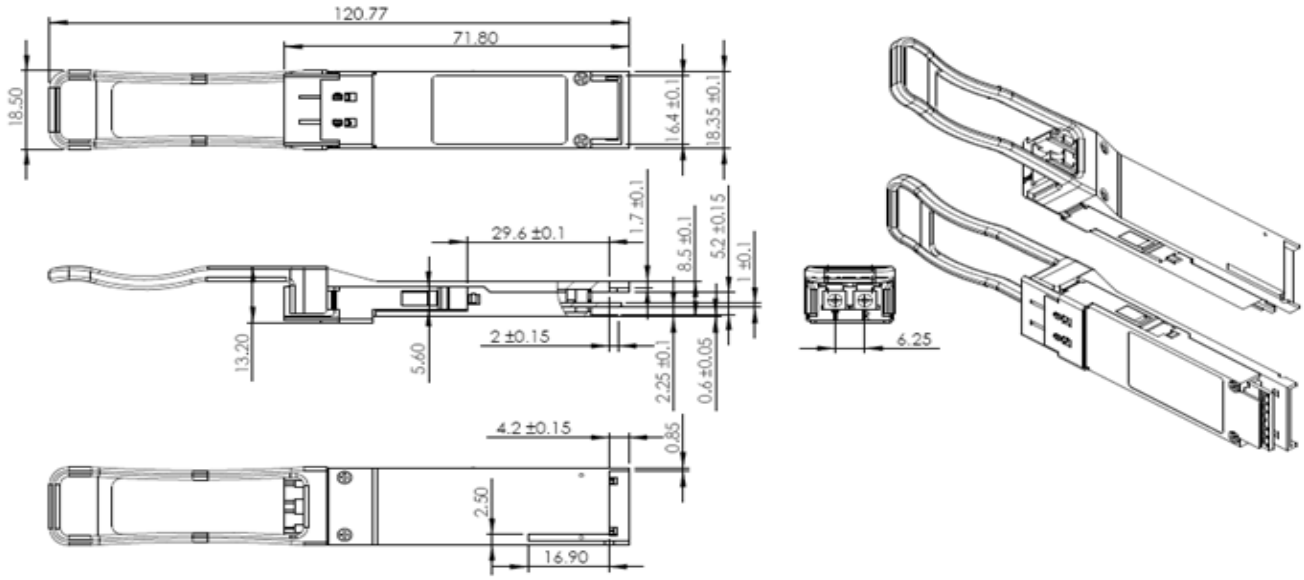
8. Transceiver Block Diagram



9. Recommended PCB Layout



10. Mechanical Diagram



11. Revision History

Revision	Initiated	Review	Approved	History	Relase Date
V 1.0	Michael	Olaf	Christian	Released	02 / 2022

12. Further Information

For further information, please contact info@cbo-it.de or www.cbo-it.de