

EB894X-01D

40Gbps 850nm & 900nm 100M QSFP Bi-direction Optical Transceiver

PRODUCT FEATURES

- **Compliant to the 40GbE XLPI electrical specification per IEEE 802.3ba-2010**
- **Compliant to QSFP+ SFF-8436 Specification**
- **Aggregate bandwidth of >40Gbps**
- **Operates at 10.3125 Gbps per electrical channel with 64b/66b encoded data**
- **QSFP MSA compliant**
- **Capable of over 100m transmission on OM3 Multimode Fiber (MMF) and 150m on OM4 MMF**
- **Single +3.3V power supply operating**
- **Built-in digital diagnostic functions**
- **Temperature range 0°C to 70°C**
- **RoHS Compliant Part**
- **Utilizes a standard LC duplex fiber cable allowing reuse of existing cable infrastructure**

APPLICATIONS

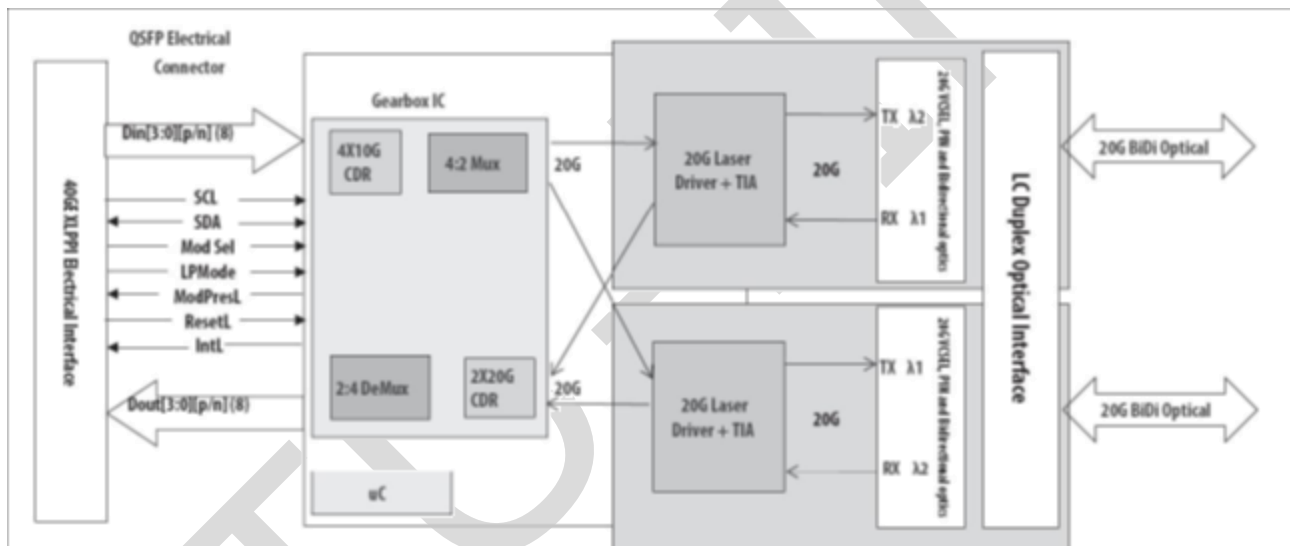
- **40 Gigabit Ethernet interconnects**
- **Datacom/Telecom switch & router connections**
- **Data aggregation and backplane applications**
- **Proprietary protocol and density applications**

DESCRIPTIONS

It is a Four-Channel, Pluggable, LC Duplex, Fiber-Optic QSFP+ Transceiver for 40 Gigabit Ethernet Applications. This transceiver is a high performance module for short-range duplex data communication and interconnection 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 10.3125 Gbps and conforms to the 40GE XLPI interface.

The transceiver internally multiplexes an XLPI 4x10G interface into two 20Gb/s electrical channels, transmitting and receiving each optically over one simplex LC fiber using bidirectional optics. This results in an aggregate bandwidth of 40Gbps into a duplex LC cable. This allows reuse of the installed LC duplex cabling infrastructure for 40GbE application. Link distances up to 100 m using OM3 and 150m using OM4 optical fiber are supported. These modules are designed 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 QSFP+ type edge connector. The optical interface uses a conventional LC duplex connector.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
EB894X-01D	41.25Gbps	Vcsel	MMF	100m	LC	0~70°C	Yes

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	°C	
Relative Humidity	RH	0	-	85	%	
Power Supply Voltage	VCC	-0.5	-	4	V	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	°C	Without air flow
Power Supply Voltage	VCC	3.13	3.3	3.46	V	
Power Supply Current	ICC	-		1000	mA	
Power Dissipation	PD			3.5	W	

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Data Rate per Channel			10.3125	11.2	Gbps	
Supply Current	Icc		750	1000	mA	
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						
Input differential impedance	Rin	80	100	120	Ω	1
Differential data input swing	Vin,pp	120		1200	mV	
Single ended input voltage tolerance	VinT	0.3		4.0	V	
Receiver						
Differential data output swing	Vout,pp	600		800	mV	2
Single-ended output voltage		0.3		4.0	V	

Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Into 100 ohms differential termination.

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Transmitter						
Center Wavelength CH1	λ	832	850	868	nm	
Center Wavelength CH2	λ	882	900	918	nm	

RMS Spectral Width	Pm		0.5	0.65	nm	
Average Launch Power per channel	Pavg	-4	-2.5	+5.0	dBm	
Laser off Power per channel				-30	dBm	
Optical Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty each lane	TDP			3.5	dB	
Relative Intensity Noise	Rin			-128	dB/Hz	
Optical Return Loss Tolerance	ORL			12	dB	
Receiver						
Receiver Wavelength CH1	λ	882	900	918	nm	
Receiver Wavelength CH2	λ	832	850	868	nm	
Rx Sensitivity per channel	RSENS			-11	dBm	1
Maximum Input Power	Pmax	+0.5			dBm	
Receiver Reflectance	Rrx			-12	dB	
LOS De-Assert	LOSD			-14	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5			dBm	

Notes:

Measured with a PRBS 231-1 test pattern, @10.325Gb/s, BER<10⁻¹².

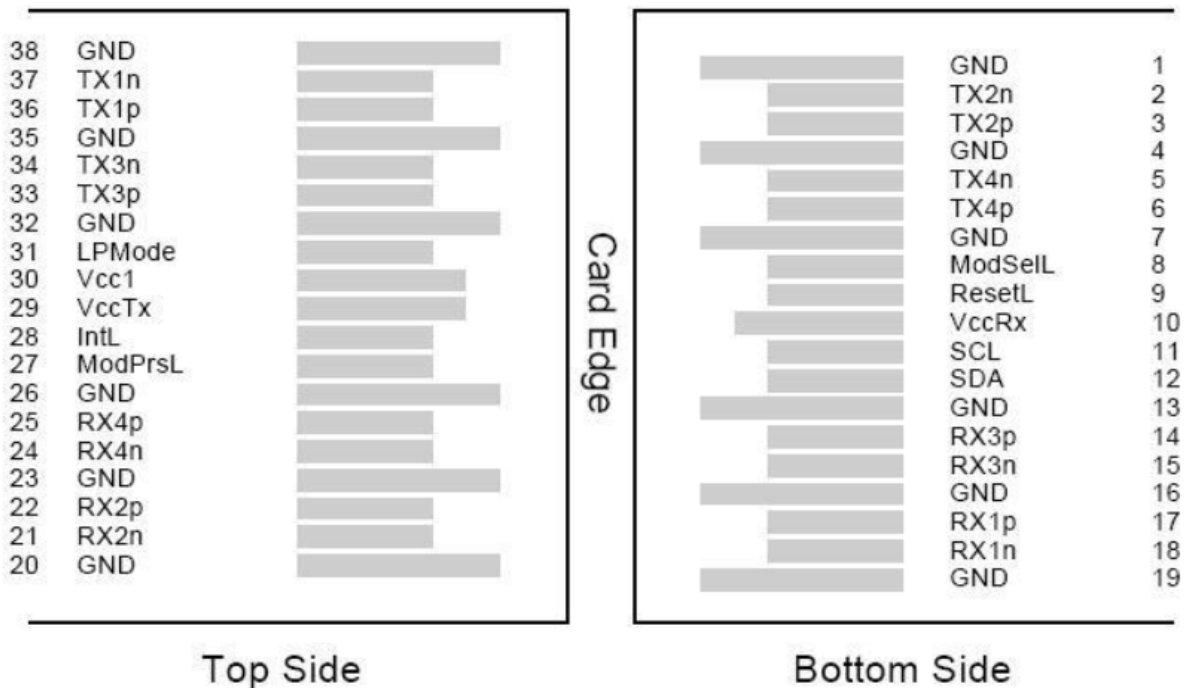
Digital Diagnostics

The following characteristics are defined over recommended operating conditions.

Parameter	Accuracy	Unit
Internally measured transceiver temperature	+/-3	°C
Internally measured transceiver supply voltage	+/-3	%
Measured Tx bias current	+/-10	%
Measured Tx output power	+/-3	dB
Measured Rx received average optical power	+/-3	dB

Pin Diagram

QSFP+ Transceiver Pad Layout, host PCB QSFP+ Pinout, and PIN Descriptions are as follows:



PinDefinitions

Pin	Symbol	Name/Description	NOTE
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver Ground)	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	3.3V Power Supply Receiver	2
11	SCL	2-Wire serial Interface Clock	
12	SDA	2-Wire serial Interface Data	
13	GND	Transmitter Ground (Common with Receiver Ground)	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	

23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4n	Receiver Inverted Data Output	1
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Transmitter Ground (Common with Receiver Ground)	1
27	ModPrsl	Module Present	
28	IntL	Interrupt	
29	VccTx	3.3V power supply transmitter	2
30	Vcc1	3.3V power supply	2
31	LPMODE	Low Power Mode, not connect	
32	GND	Transmitter Ground (Common with Receiver Ground)	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Transmitter Ground (Common with Receiver Ground)	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Output	
38	GND	Transmitter Ground (Common with Receiver Ground)	1

Notes:

- 1) GND is the symbol for signal and supply (power) common for QSFP+ modules. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
- 2) VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP+ transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

Recommended Interface Circuit

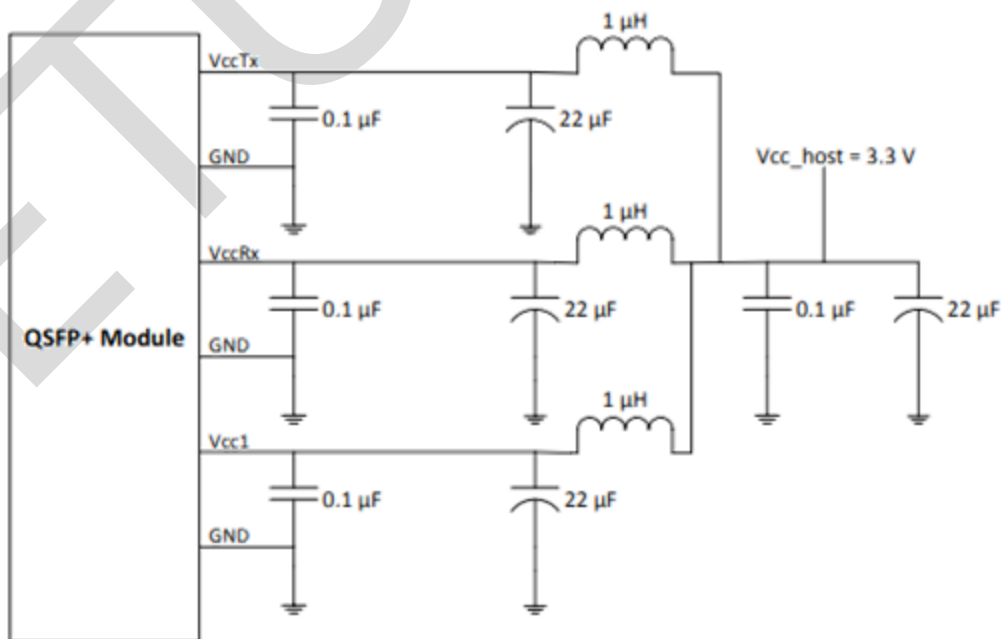
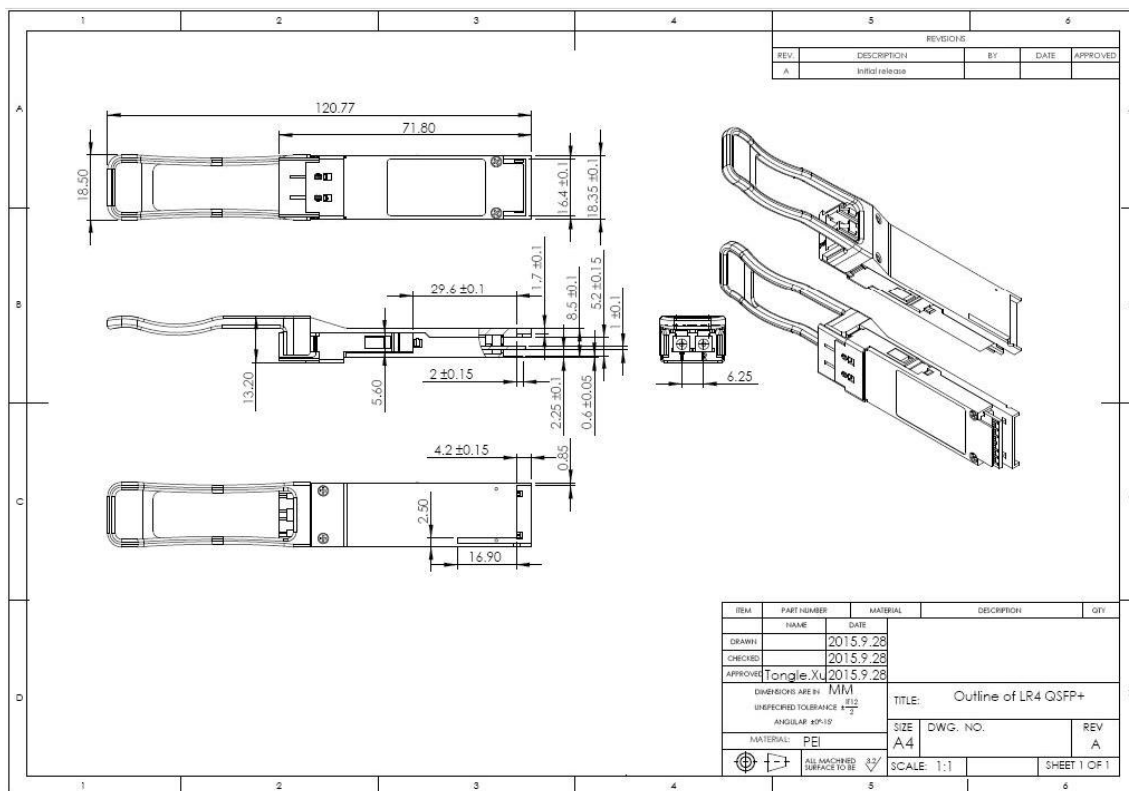


FIGURE 5-4 RECOMMENDED HOST BOARD POWER SUPPLY FILTERING

Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	February 18, 2019	Preliminary datasheet
2.0	July 15, 2024	Format change

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