ASCENT
Communication Technology

40 Gb/s QSFP+ PSM 1310nm 10km MPO Optical Transceiver

QSFP Series

- **Four-channel full-duplex transceiver modules**
- **Transmission data rate up to 11.2 Gbit/s per channel**
- **Up to 10 km transmission distance with SMF**
- **DFB laser array inside**
- **Low power consumption**
- **RoHS 6 compliant**
- **Hot-pluggable QSFP form factor**
- **Single MPO connector receptacle**
- **Built-in digital diagnostic**

Ascent's QSFP-AQ-MP-31-10 is a four-channel, hot-pluggable, parallel, fiber-optic QSFP+ transceiver for InfiniBand QDR/DDR/SDR, 10G/8G/4G/2G fiber channel and SAS applications. It is compliant with the QSFP+ MSA, IEEE 802.3ae 10GBASE-LR/LW, and OTN data rates OTU2, OTU1e, and OTU2e per the ITU and designed for use in high density 10 Gigabit Ethernet links over single mode fiber.
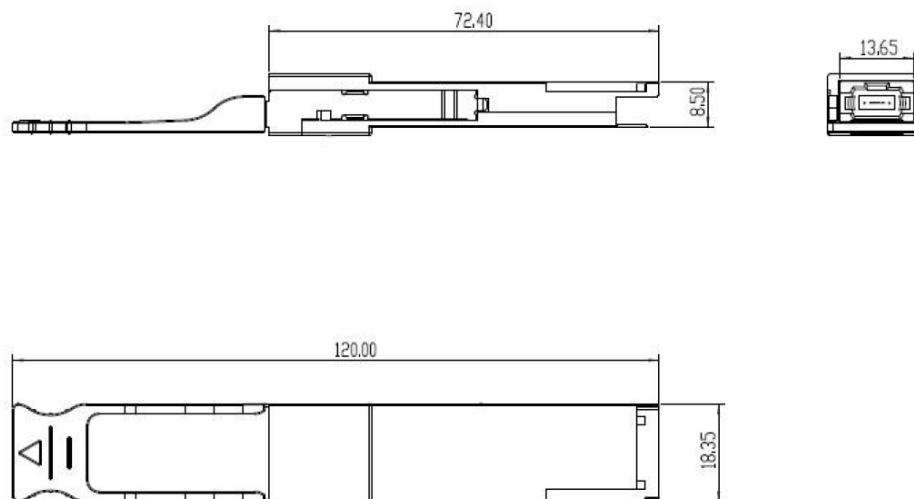
The QSFP full-duplex optical module offers 4 independent transmit and receive channels, each capable of 10.3 Gbps operation for an aggregate data rate of 40 Gbps over 10 km using single-mode fiber. These modules are designed to operate over single-mode fiber systems using a 1310 nm DFB laser array.

An optical fiber ribbon cable with an MPO/MTPTM connector can be plugged into the QSFP module receptacle. QSFP+ PSM LR4 is one kind of parallel transceiver which provides increased port density and total system cost savings.

Key Features

- Four-channel full-duplex transceiver modules

- Transmission data rate up to 11.2 Gbit/s per channel

- Up to 10 km transmission distance with single-mode fiber

- DFB laser array inside

- <2.5 W power consumption

- Operating case temperature: 0°C to +70°C

- 3.3 V power supply voltage

- RoHS 6 compliant

- Hot-pluggable QSFP form factor

- Single MPO connector receptacle

- Built-in digital diagnostic function

Outline Dimensions

Pin Assignment

Top side	**Bottom side**

Pin	Symbol	Name/Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	1
9	ResetL	Module Reset	
10	Vcc Rx	+3.3 V Power supply receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver	Non-Inverted
22	Rx2p	Receiver Non-Inverted Data Output	

23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3 V Power supply transmitter	
30	Vcc1	+3.3 V Power Supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Notes:

1. Circuit ground is internally isolated from chassis ground.

Other Pin Descriptions:

ModSelL Pin

The ModSelL is an input pin. When held low by the host, the module responds to 2-wire serial communication commands. The ModSelL allows the use of multiple QSFP modules on a single 2-wire interface bus. When the ModSelL is "High", the module will not respond to any 2-wire interface communication from the host. ModSelL has an internal pull-up in the module.

ResetL Pin

Reset. LPMode_Reset has an internal pull-up in the module. A low level on the ResetL pin for longer than the minimum pulse length (t_Reset_init) initiates a complete module reset, returning all user module settings to their default state. Module Reset Assert Time (t_init) starts on the rising edge after the low level on the ResetL pin is released. During the execution of a reset (t_init) the host shall disregard all status bits until the module indicates a completion of the reset interrupt. The module indicates this by posting an IntL signal with the Data_Not_Ready bit negated. Note that on power up (including hot insertion) the module will post this completion of reset interrupt without requiring a reset.

LPMode Pin

Ascent PSM IR4 operate in the low power mode (<1.5 W power consumption) This pin active high will decrease power consumption to less than 1W.

ModPrsL Pin

ModPrsL is pulled up to Vcc on the host board and grounded in the module. The ModPrsL is asserted "Low" when the module is inserted and deasserted "High" when the module is physically absent from the host connector.

IntL Pin

IntL is an output pin. When "Low", it indicates a possible module operational fault or a status critical to the host system. The host identifies the source of the interrupt by using the 2-wire serial interface. The IntL pin is an open collector output and must be pulled up to Vcc on the host board.

Power Supply Filtering
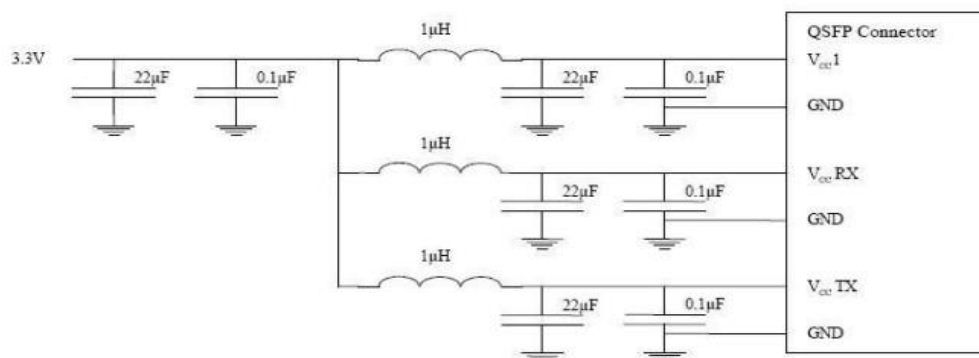
Optical Interface Lanes and Assignment

The optical interface port is a male MPO connector. The four fiber positions on the left as shown in below, with the key up, are used for the optical transmit signals (channels 1 through 4). The fiber positions on the right are used for the optical receive signals (channels 4 through 1). The central four fibers are physically present.
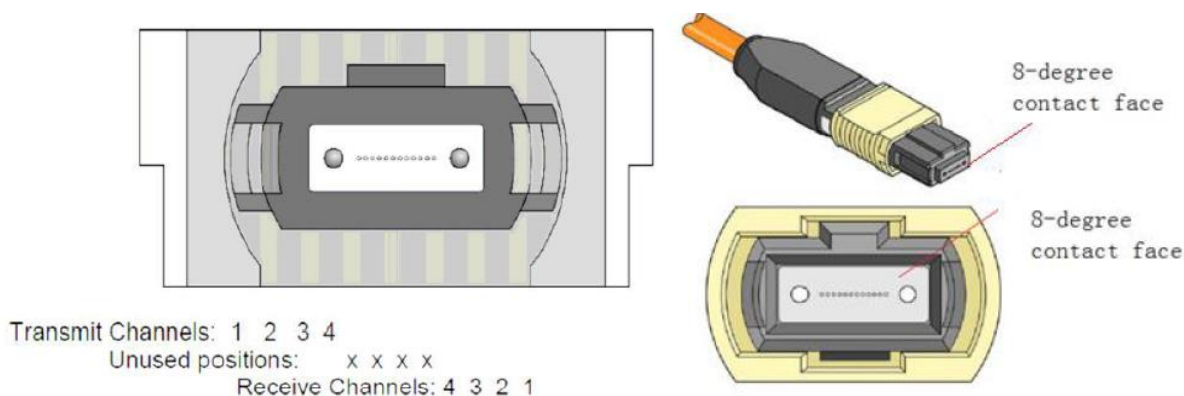
Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	V_{CC}	-0.3		3.6	V	
Storage Temperature	T_S	-40		85	°C	
Relative Humidity	RH	0		85	%	
Damage Threshold, per Lane	DT	3.4			dBm	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver.

General Operating Characteristics

Parameter	Symbol	Min	Typ.	Max	Units	Notes
Bit Rate per Lane	B_R			10.313	Gb/s	1
Bit Error Ratio	B_{ER}			10-12		2
Distance on SMF	D_1			10	km	3

Notes:

1. Compliant with 40G Ethernet. Compatible with 1/10 Gigabit Ethernet and 1/2/4/8/10G Fiber Channel.

2. Tested with a PRBS 2^{31}-1 test pattern.

3. Per 40GBASE-LR4, IEEE 802.3ba.

Optical Characteristics ($T_{OP(C)}$ = 0 °C to +70 °C, V_{CC} = 3.13 V to 3.47 V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Operating Wavelength	λ_C	1270	1310	1350	nm	
Average Output Power	P_{AVE}	-5.2		+1	dBm	
Difference in Launch Power between any Two Lanes (OMA)	D_L			5	dB	
Extinction Ratio	E_R	3.5			dB	
Peak Power, each Lane	P_P			4	dBm	
Dispersion Penalty, each Lane	T_{DP}			3.5	dB	
Average Launch Power of OFF Transmitter, each Lane	P_{OFF}			-30	dB	
Eye Mask Coordinates: X1, X2, X3, Y1, Y2, Y3	Specification values 0.23, 0.34, 0.43, 0.27, 0.35, 0.4					1
Receiver						
Operating Wavelength	λ_C	1270		1350	nm	
Stressed Receiver Sensitivity in OMA	P_{SEN1}			-12.5	dBm	2
Average Receive Power, each Lane	P_{AVE}	-11		+2.4	dBm	
Receiver Reflectance	Rrx			-12	dB	
LOS Assert	Pa	-30			dBm	
LOS De-Assert	Pd			-15	dBm	
LOS Hysteresis	Pd-Pa	0.5			dB	

Notes:

1. Hit ratio = 5 x 10^{-5}

2. Measured with conformance test signal at TP3 for BER = 10-12 Receiver Characteristics

Ordering Information

Product Name	Product Description
QSFP-AQ-MP-31-10	QSFP+ Plug-in, 4x10Gbps, PLR4, 10km, 1310nm on single mode fiber, MPO-12

Contact Information

Ascent Communication Technology Ltd

AUSTRALIA
140 William Street, Melbourne
Victoria 3000, AUSTRALIA
Phone: +61-3-8691 2902

HONG KONG SAR
Unit 9, 12th Floor, Wing Tuck Commercial Centre
177 Wing Lok Street, Sheung Wan, HONG KONG
Phone: +852-2851 4722

CHINA
Unit 1933, 600 Luban Road
200023, Shanghai CHINA
Phone: +86-21-60232616

USA
2710 Thomes Ave
Cheyenne, WY 82001, USA
Phone: +1-203 816 5188

EUROPE
Pfarrer-Bensheimer-Strasse 7a
55129 Mainz, GERMANY
Phone: +49 (0) 6136 926 3246

VIETNAM
15 /F TTC Building, Duy Tan Street
Cau Giay Dist., Hanoi, VIETNAM
Phone: +84 243 795 5917

WEB: www.ascentcomtec.com

EMAIL: sales@ascentcomtec.com