

400G QSFP112 FR4 2km Transceiver QSFP112 Series

- QSFP112 MSA Rev2.1
- 100G Lambda MSA
- IEEE 802.3ck
- CMIS Rev5.2
- RoHS
- compliance GR-468-CORE
- 400G Ethernet
- Data Center Applications



Ascent's Q112-400G-FR4-02 is a high-performance, hot-pluggable 400G QSFP112 optical transceiver designed for high-speed data center interconnects and 400G Ethernet applications over single-mode fiber.

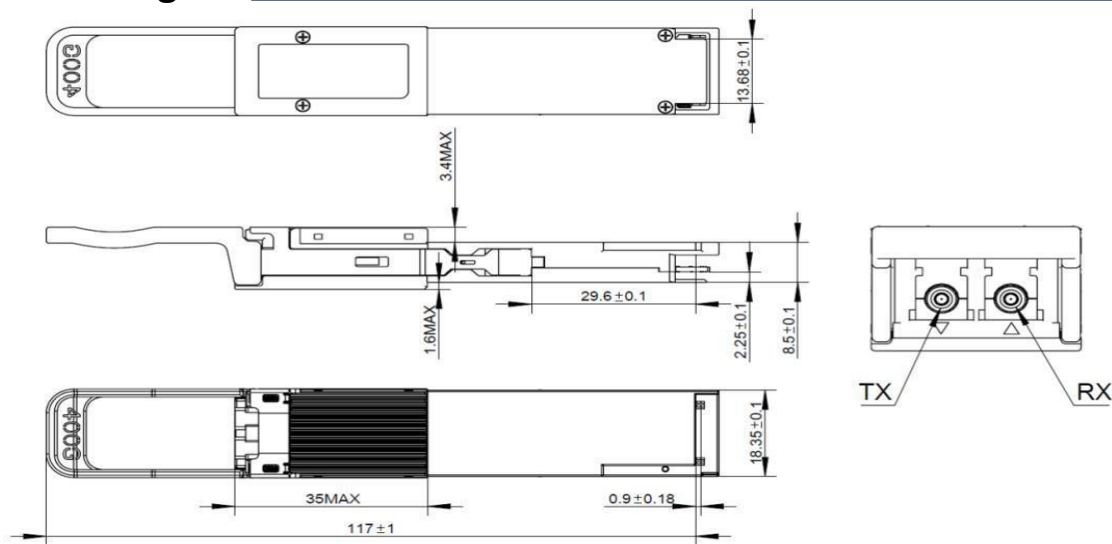
The module features four 106.25 Gb/s PAM4 optical lanes operating at CWDM wavelengths of 1271, 1291, 1311, and 1331 nm. An integrated optical multiplexer/demultiplexer enables transmission over duplex single-mode fiber with a reach of up to 2 km through a duplex LC interface.

Designed for high-density networking environments, the transceiver supports a 4 × 106.25 Gb/s electrical interface, CMIS 5.2 management, and digital diagnostic monitoring. Its compact QSFP112 form factor and maximum power consumption of 9 W make it suitable for high-bandwidth switching and routing applications.

Key Features

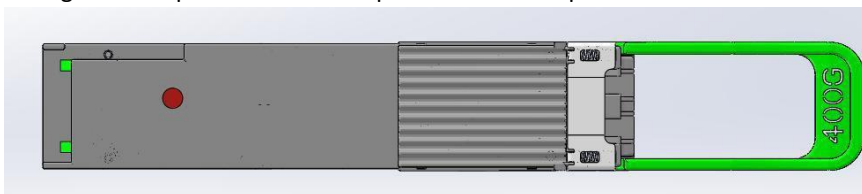
- QSFP112 MSA compliant
- 4x106.25Gb/s PAM4 electrical interface
- Maximum power consumption 9W@ Tcase = 70°C
- Duplex LC connector
- CWDM4 MUX/DEMUX design
- Up to 2km transmission on single mode fiber
- Operating case temperature: 0~70°C
- Single 3.3V power supply
- RoHS-6 compliant

Outline Diagram



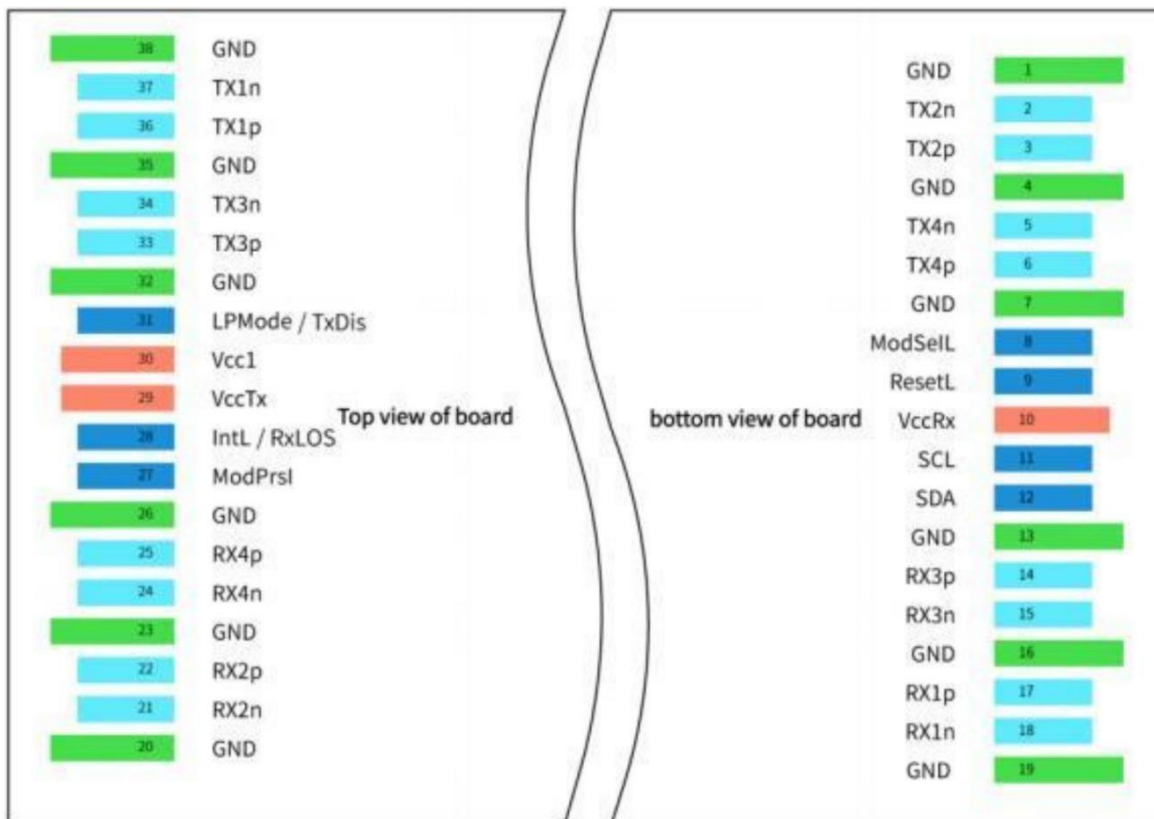
Notes:

- [1] Flatness: 0.05mm for the heat dissipation area and 0.075mm for the rest.
- [2] Roughness: 0.8μm for the heat dissipation area and 1.6μm for the rest.



Temperature measuring point

Pin Assignment



Pin	Name	Logic	Description	Plug Sequence	Note
1	GND		Ground	1	Note1
2	Tx2n	CML-I	Transmitter Inverted Data Input	3	
3	Tx2p	CML-I	Transmitter Non-Inverted Data Input	3	
4	GND		Ground	1	Note1
5	Tx4n	CML-I	Transmitter Inverted Data Input	3	
6	Tx4p	CML-I	Transmitter Non-Inverted Data Input	3	
7	GND		Ground	1	Note1
8	ModSelL	LVTTTL-I	Module Select	3	
9	ResetL	LVTTTL-I	Module Reset	3	
10	Vcc Rx		+3.3V Power Supply Receiver	2	Note2
11	SCL	LVC MOS- I/O	2-wire serial interface clock	3	
12	SDA	LVC MOS- I/O	2-wire serial interface data	3	
13	GND		Ground	1	Note1
14	Rx3p	CML-O	Receiver Non-Inverted Data Output	3	
15	Rx3n	CML-O	Receiver Inverted Data Output	3	
16	GND		Ground	1	Note1
17	Rx1p	CML-O	Receiver Non-Inverted Data Output	3	
18	Rx1n	CML-O	Receiver Inverted Data Output	3	
19	GND		Ground	1	Note1
20	GND		Ground	1	Note1
21	Rx2n	CML-O	Receiver Inverted Data Output	3	

22	Rx2p	CML-O	Receiver Non-Inverted Data Output	3	
23	GND		Ground	1	Note1
24	Rx4n	CML-O	Receiver Inverted Data Output	3	
25	Rx4p	CML-O	Receiver Non-Inverted Data Output	3	
26	GND		Ground	1	Note1
27	ModPrsL	LVTTL-O	Module Present	3	
28	IntL/Rx Los	LVTTL-O	Interrupt/ Optional Rx Los	3	
29	VccTx		+3.3V Power supply transmitter	2	Note2
30	Vcc1		+3.3V Power supply	2	Note2
31	LPMMode/Tx Dis	LVTTL-I	Low Power Mode/Optional Tx Dis	3	
32	GND		Ground	1	Note1
33	Tx3p	CML-I	Transmitter Non-Inverted Data Input	3	
34	Tx3n	CML-I	Transmitter Inverted Data Input	3	
35	GND		Ground	1	Note1
36	Tx1p	CML-I	Transmitter Non-Inverted Data Input	3	
37	Tx1n	CML-I	Transmitter Inverted Data Input	3	
38	GND		Ground	1	Note1

Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP112 module. All are common within the QSFP112 module and all voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane
2. Vcc Rx, c1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements, defined for the host side of the Host Edge Card Connector, are listed in Table 4. Vcc Rx, and Vcc Tx may be internally connected within the QSFP112 module in any combination. The connector pins are each rated for a maximum current of 1.5A (max. current of 2.0 A is required for high module power of 15-20W)

Absolute Maximum Ratings

Table1-Absolute Maximum Ratings

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Storage Temperature	TSTG	-40		85	°C	
Operating Relative Humidity	RH	5		85	%	Note1
Supply Voltage	VCC	-0.5	3.3	3.6	V	
Damage Threshold, each lane	PIN	4.5			dBm	

Note:

[1] Non-condensing.

Recommended Operating Conditions

Table2-Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Case temperature	Tcase	0		70	°C	
Supply Voltage	VCC	3.135	3.3	3.465	V	
Supply Current	ICC			2871	mA	Tcase =70°C
Module Power Dissipation	P			9	W	Tcase =70°C

Optical, Electrical Characteristic

Tested under recommended operating conditions, unless otherwise noted

Table3-Transmitter Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min	Typical	Max	Units	Notes
Optical Data Rate, each Lane		53.125±100ppm			GBd	
Modulation Format		PAM4				
Line wavelengths	λ_1	1264.5	1271	1277.5	nm	
	λ_2	1284.5	1291	1297.5	nm	
	λ_3	1304.5	1311	1317.5	nm	
	λ_4	1324.5	1331	1337.5	nm	
Total Average Launch Power				9.3	dBm	
Average Launch Power, each lane	PAVG	-3.3		3.5	dBm	
Optical Modulation Amplitude (OMA), each lane	OMA	-0.3		3.7	dBm	
Extinction Ratio	ER	3.5			dB	
Side-Mode Suppression Ratio	SMSR	30			dB	
Launch power in OMA minus TDECQ, each lane, for ER≥4.5dB		-1.7			dBm	
Launch power in OMA minus TDECQ, each lane, for ER <4.5dB		-1.6			dBm	
Transmitter and Dispersion Eye Closure for PAM4, each Lane	TDECQ			3.4	dB	

Difference in Launch Power between any Two Lanes (OMAouter)				4	dB	
Optical Return Loss Tolerance				17.1	dB	
Transmitter Reflectance				-26	dB	
Average Launch Power of OFF Transmitter, each Lane				-20	dBm	
Electrical Data Rate, each lane		53.125±100ppm			GBd	
Differential pk-pk input Voltage tolerance	Vpp	800			mV	
DC Common Mode Voltage	Vcm	-350		2850	mV	Note1
Differential Termination Resistance Mismatch		-10		10	%	
Effective return loss				8.5	dB	
Differential to Common Mode Input Return Loss		IEEE 802.3ck Equation (120G-2)			dB	
Module Stressed Input Test		IEEE 802.3ck 120G.3.4.2				Note2

Notes:

[1] DC common mode voltage generated by the host.

[2] Specification includes effects of ground offset voltage. BER specified in IEEE 802.3ck 120G.1.1.

Table4-Receiver Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min	Typical	Max	Units	Notes
Optical Data Rate, each Lane		53.125±100ppm			GBd	
Modulation Format		PAM4				
Optical Input Power, each lane				3.5	dBm	
Line wavelengths	λ_1	1264.5	1271	1277.5	nm	
	λ_2	1284.5	1291	1297.5	nm	
		1304.5	1311	1317.5	nm	
		1324.5	1331	1337.5	nm	
		-7.3		3.5	dB	
				max(-4.6,	dB	
				-26	dB	
Electrical Data Rate, each lane		53.125±100ppm			GBd	
Differential Termination Resistance Mismatch		-10		10	%	
Differential output Voltage pk-pk	Vpp			845	mV	
DC Common Mode Voltage	Vcm	-350		2850	mV	Note 1
Effective return loss	ERL	8.5			dB	
Transition time		8.5			ps	
Common mode to differential return loss		IEEE 802.3ck Equation (120G-1)			dB	

Note:

[1] DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

Digital Diagnostic Functions and Control and Status I/O Timing Characteristics

Table5- Digital Diagnostic Functions

Parameter	Symbol	Min	Typical	Max	Units	Notes
Temperature monitor absolute error	DMI_Temp	-3		3	°C	Note1
Supply voltage monitor absolute error	DMI_Vcc	-5%		5%	V	Note2
Bias current monitor absolute error	DMI_Ibias	-10%		10%	mA	
Laser power monitor absolute error	DMI_Tx	-3		3	dB	
RX power monitor absolute error	DMI_Rx	-3		3	dB	

Notes:

[1] Temperature here is depending on module case around Max power dissipation. Temperature monitor is done

over operating temperature.

[2] Supply voltage monitor is done over operating voltage.

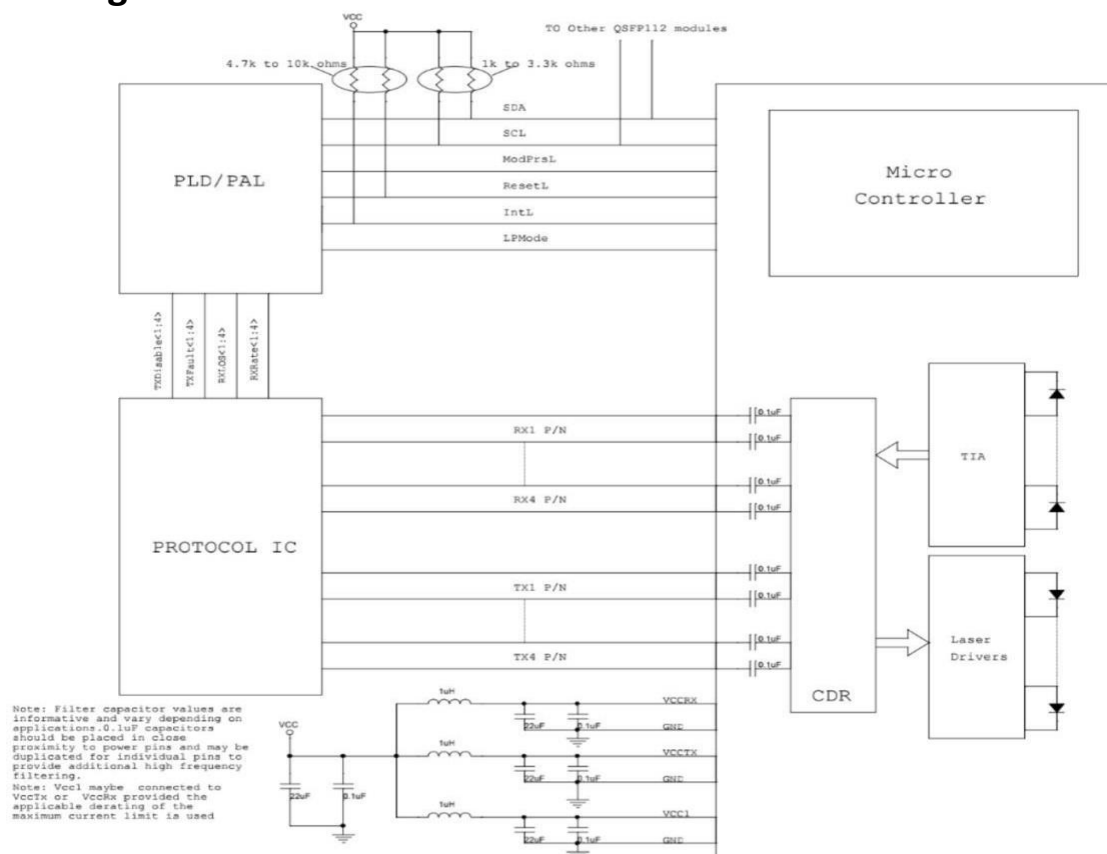
Table7- Surge Current Requirements

Parameter	Symbol	Min	Typical	Max	Units	Notes
VCC			3.3		V	
Vcc set point accuracy		-5		5	%	
Power Supply Noise including ripple				50	mV	
Module Maximum Current Inrush with LPMode Pin asserted				0.55	A	
Module Maximum Current Inrush with LPMode Pin deasserted				1.3	A	
Module Current Ramp Rate				100	mA/us	
High Power Mode Power Class 8 module						
Power Consumption	P_8			9	W	
Instantaneous peak current	Icc_ip_8	-	-	3600	mA	
Sustained peak current	Icc_sp_8	-	-	2970	mA	
Steady state current	Icc_8			2871	mA	Note1

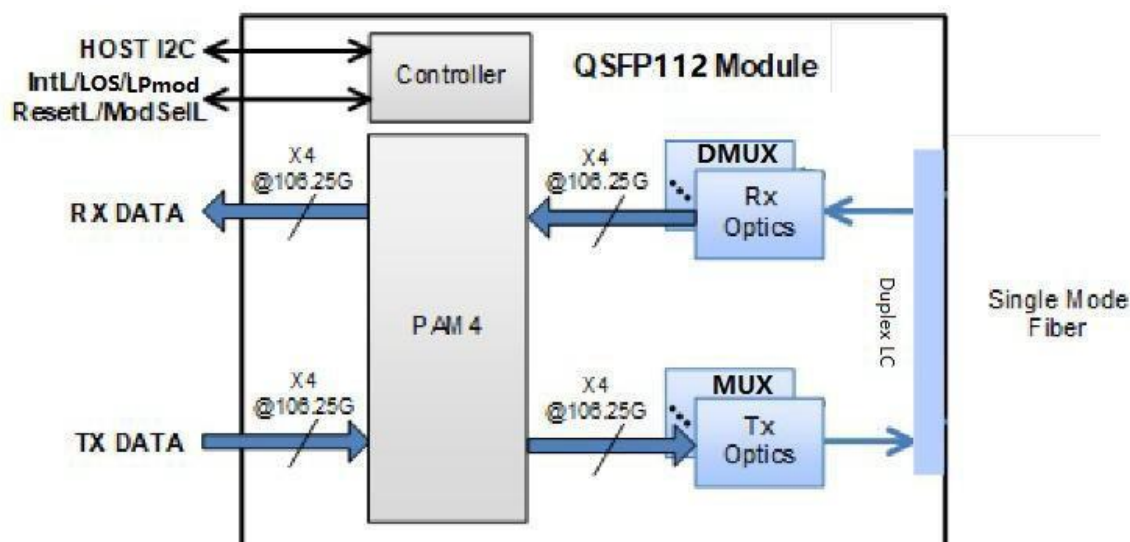
Notes:

[1] The module must stay within its declared power class.

Management Interface



Block Diagram of Transceiver



<Transmitter Section>: The Q112-400G-FR4-02 converts 4-channel 106.25Gb/s electrical data to 4-channel CWDM4 106.25Gb/s optical signals for 425Gb/s optical transmission.

<Receiver Section>: Similarly, it optically converts 4-channel CWDM4 106.25Gb/s optical signals to 4-channel electrical data output on the receiver side.

Ordering Information

Product Name

Q112-400G-FR4-02

Product Description

QSFP112 400GBASE-FR4 PAM4 1310nm SMF 2km DOM Optical Transceiver
Module, LC

Contact Information



Ascent Communication Technology Ltd

AUSTRALIA

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

CHINA

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

EUROPE

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

HONG KONG SAR

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

USA

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

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

Specifications and product availability are subject to change without notice.

Copyright © 2025 Ascent Communication Technology Limited. All rights reserved.

Ver. ACT_Q112-400G-FR4-02_Datasheet_V1b_Oct_2025