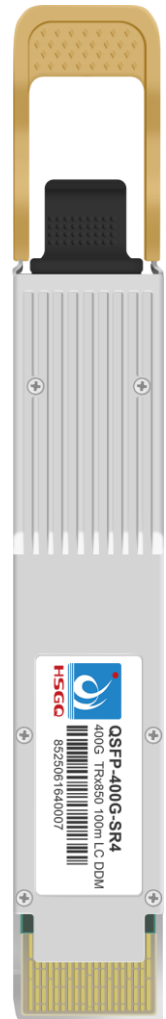


Product Features

- Compliant with IEEE 802.3db 400GBASE-SR4 specification
- Compliant with QSFP112 MSA and CMIS 5.0
- 4x53.125GBd PAM4 transmitter and PAM4 receiver
- 4 channels 850nm VCSEL array and PIN photo detector array
- Single +3.3V power supply
- Maximum power consumption: 7.5W
- Operation case temperature: 0~70°C
- 1*12 MPO/APC optical connector
- Maximum link length of 60m on OM3 MMF and 100m on OM4/OM5 MMF with FEC
- RoHS compliant

Applications

- 400G Ethernet
- Infiniband NDR400
- Datacenter & Enterprise Networking



Product specifications

(1) Absolute Maximum Ratings

Parameter	Unit	Min	Max	Notes
Storage Temperature	°C	-40	85	
Operating Relative Humidity	%	0	85	
Power Supply Voltage	V	-0.5	3.63	
Damaged Input Optical Power	dBm	5		

Note:

- 1、Exceeding any of these values may immediately damage the device.

(2) Recommended Operating Conditions

Parameter	Unit	Min	Typ	Max	Notes
Operating Case Temperature	°C	0		70	1
Power Supply Voltage	V	3.135	3.3	3.465	
Power Consumption	W			7.5	
Pre-FEC Bit Error Ratio			2.4E-4		2
Post-FEC Bit Error Ratio			1E-12		2
Bit Rate	Gbps		400		

Note:

- Case Temperature here is depending on module case around TOSA, please do remember it is NOT the environmental temperature
- FEC is provided by host system.

(3) Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Module Supply Current	Icc	-	-	2.5	A	-
Power Dissipation	PD	-	-	7.5	W	-
Transmitter						
Signaling data (each lane)	-	53.125± 100 ppm			GBd	PAM4
Input Differential Impedance	Zin	90	100	110	Ω	-
Differential termination mismatchal	-	-	-	10	%	-
Single-ended voltage tolerance range	-	-0.4	-	3.3	V	-
Receiver						
Signaling rate (each lane)		53.125 ± 100 ppm			GBd	PAM4
Output Differential Impedance	Zout	90	100	110	Ω	-
Differential termination mismatch	-	-	-	10	%	-
Error Bit Rate	BER	-	-	2.4E-4		1

Note: 1、PRBS31Q@53.125Gbd PAM4.

(4) Transmitter Optical Characteristics

All performance is defined over the recommended operating environment unless otherwise specified.

Parameter	Symbol	Min	Typ	Max	Unit	Notes
PAM4 Signaling rate, each lane	-	-	53.125	-	GBd	PAM4
Lane Wavelengths(range)	λ0	844	850	863	nm	-
Average launch power, each lane	Pa	-4.6	-	4	dBm	1
Outer Optical Modulation Amplitude, each lane	OMAouter	-2.6	-	-	dBm	-
Transmitter and dispersion penalty eye closure for PAM4 (TDECQ), each lane	TDECQ	-	-	4.4	dB	-
Average launch power of OFF transmitter, each lane	Poff	-	-	-30	dBm	-
Extinction ratio	ER	2.5	-	-	dB	-
Relative Intensity Noise	RIN	-	-	-132	dB/Hz	-
Optical return loss tolerance	-			12	dB	
Transmitter transition time	-	-	-	17	ps	
Encircled Flux	EF	>86% at 19 um; <30% at 4.5 um				

(5) Receiver Optical Characteristics

All performance is defined over the recommended operating environment unless otherwise specified

Parameter	Symbol	Min	Typ	Max	Unit	Notes
PAM4 Signaling rate, each lane	-	-	53.125	-	GBd	PAM4
Lane wavelengths	λ_0	842	850	948	nm	-
Damage threshold, each lane	-	5	-	-	dBm	
Average receive power, each lane	-	-6.4	-	4	dBm	1
Receive power (OMA _{outer})	-	-	-	3.5	dBm	-
Receiver reflectance				-12	dBm	
Receiver sensitivity (OMA _{outer})				-4.6	dBm	2
Stressed receiver sensitivity (OMA _{outer})	-	-	-	-2.0	dBm	

Note:

- 1、Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
- 2、For BER = 2.4E-4 Pre-FEC, use the compliance test signal of TP3 for measurement.

(5) Optical Interface

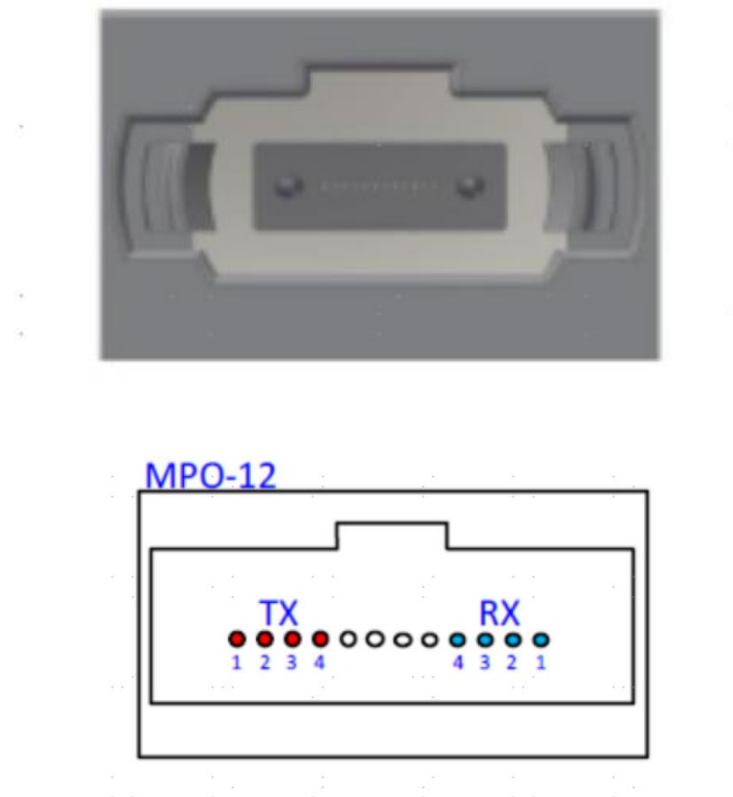


Figure 2: MPO-12 Single Row optical patch cord and module receptacle

(6) Pin Assignment and Description

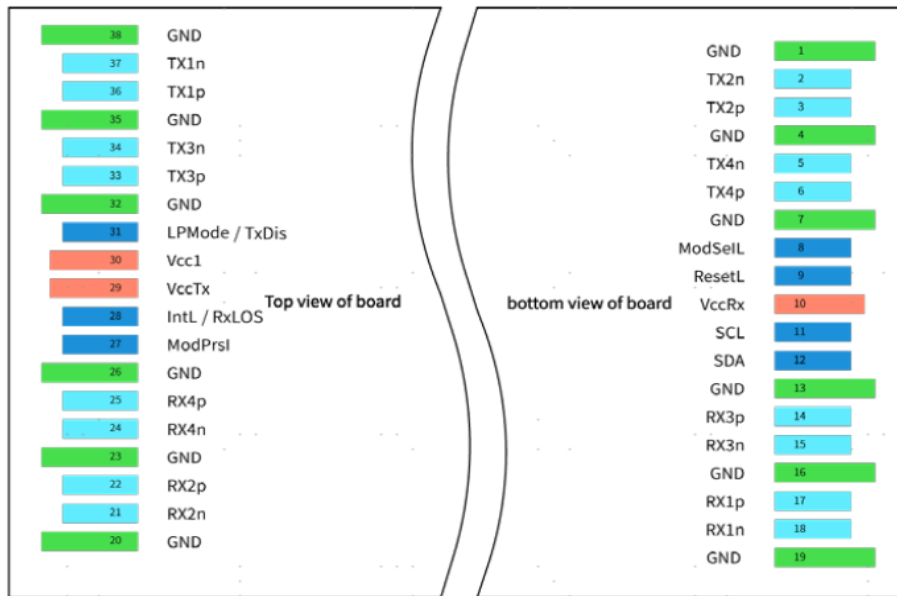


Figure 3: Module pad layout

PIN Definition			
PIN	Symbol	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	-
9	ResetL	Module Reset	-
10	Vcc Rx	+3.3V 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 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/RxLOS	Interrupt/optional RxLOS	-
29	Vcc Tx	+3.3V Power supply transmitter	-
30	Vcc1	+3.3V Power supply	-
31	LPMode/TxDis	Low Power Mode/optional TX Disable	-
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

Note:

- 1、Circuit ground is internally isolated from chassis ground.

(7) Mechanical Specifications

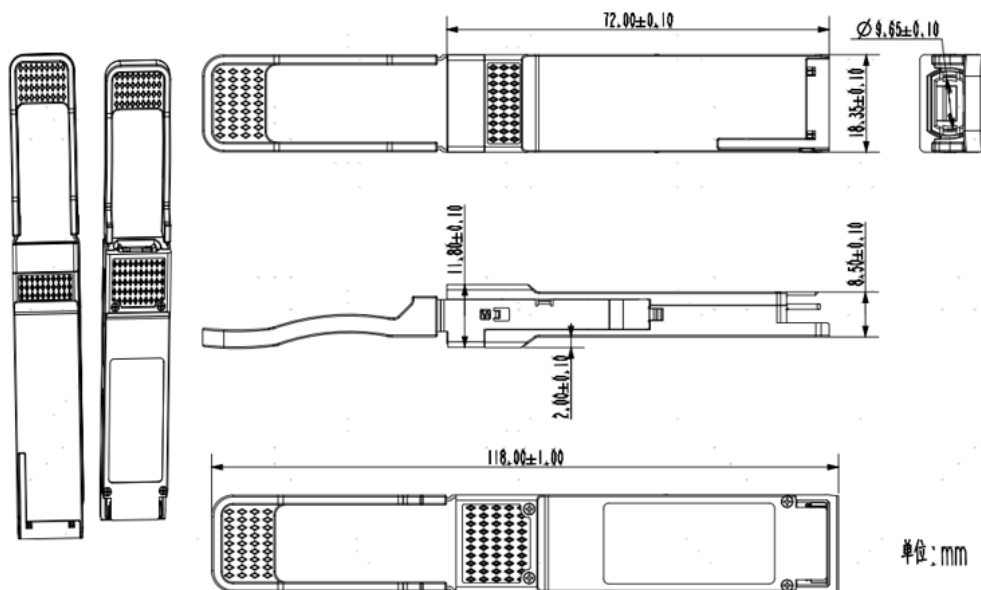


Figure 4: Mechanical Outline REF

(8) Digital Diagnostic Functions

Parameter	Unit	Error	Notes
Temperature Monitor	°C	±3	1LSB=1/256°C
Supply Voltage Monitor	V	±0.1	1LSB=100uV
Bias Current Monitor	mA	±10%	1LSB=2uA
TX Power Monitor	dB	±3	1LSB=0.1uW
RX Power Monitor	dB	±3	1LSB=0.1uW

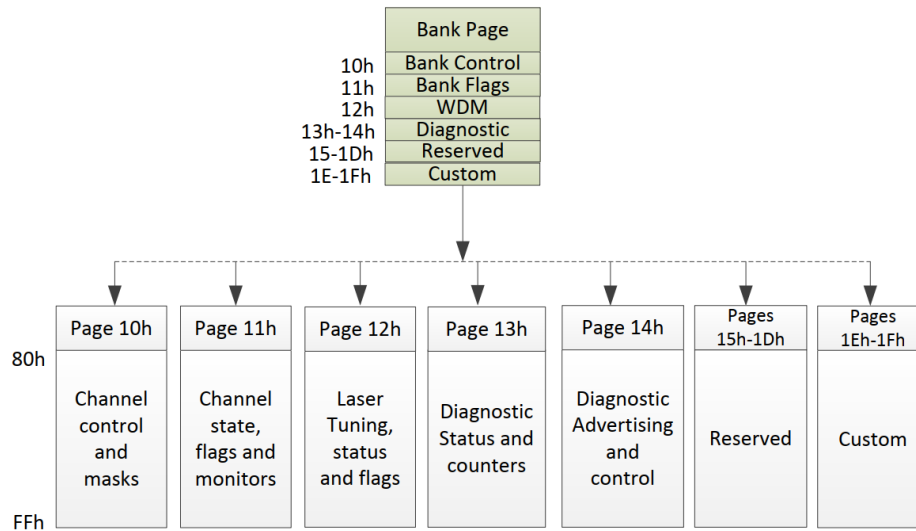


Figure 5. CMIS Bank Page Memory Map

(9) ESD

This transceiver is specified as ESD threshold 1kV for high speed data pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

(10) Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

Ordering Information

Model	Specification Description
QSFP-400G-SR4	100m, 850nm, 4*100G PAM4 electrical interface, 4*100G PAM4 at 1*12 MPO/APC optical interface, QSFP112, commercial temperature