XP85PC1-02D(-xx)
SFP56 SR 850nm Transceiver

PRODUCT FEATURES

- Supports 10GE/25GE/50GE data rates
- Up to 100m transmission on multi-mode fiber
- 850nm VSCEL laser and PIN receiver
- 2-wire interface with integrated Digital Diagnostic Monitoring
- Hot-pluggable SFP56 footprint
- Compliant with SFP MSA with LC connector
- Single 3.3V power supply
- Power dissipation < 1.5W
- Case operating temperature range: 0°C to 70°C

STANDARDS

- SFF-8431 Low Speed Electrical Interface
- SFF-8472 Management Interface
- SFF-8432, SFF-8083, SFF-8081, SFF-8402 Mechanical Specifications
- Compliant to IEEE 802.3 cd
- RoHS Compliant

ORDERING INFORMATION

Product Part Number	Signaling Rate (GBd)	Media	Wavelength (nm)	Transmission Distance (m)	Case Temperature Range
XP85PC1-02D	26.56 PAM4 25.78 NRZ 10.3125 NRZ	Multi-mode fiber	850	100	0ºC to 70 ºC
XP85PC1-02D-1S	26.56 PAM4	Multi-mode	850	100	0ºC to 70 ºC

		fiber			
XP85PC1-02D-1D	26.56 PAM4 25.78 NRZ	Multi-mode fiber	850	100	0ºC to 70 ºC

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	ºC	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	Vcc	-0.3	-	4	V	

II. Recommended Operating Conditions

Parameter	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	0	25	70	ºC	
Power Supply Voltage	3.13	3.3	3.47	V	
Power Supply Current		420	475	mA	
50G Signaling Rate		26.5625		GBd	
25G Signaling Rate		25.78125		GBd	
10G Signaling Rate		10.3125		GBd	
50G Transmission Distance			70 (OM3) 100 (OM4/OM5)	m	
25G Transmission Distance			20 (OM2) 70 (OM3) 100 (OM4)	m	
10G Transmission Distance			35 (OM2) 100 (OM3) 125 (OM4)	m	
50G Bit Error Rate			2.4E-4		1
25G Bit Error Rate			5E-5		2
10G Bit Error Rate			1E-12		2
Coupled fiber	Multi-mode fiber				50/125um MMF

Notes:

1. *PRBS31Q for 50G*
2. *PRBS31 for 25G/10G*

III. Optical Characteristics

50G Optical Parameters

Parameter	Min	Typ	Max	Unit	Note
Transmitter (module output)					
Center wavelength	840	850	860	nm	
RMS spectral width			0.6	nm	1
Average launched power	-6.5		4	dBm	
OMA_{outer}	-4.5		3	dBm	2
Launched power in OMA_{outer} minus TDECQ	-5.9			dBm	
TDECQ			4.5	dB	
Average launch power of OFF transmitter			-30	dBm	
OMA_{outer} extinction ratio	3			dB	
Encircled flux	≥86% at 19um, ≤30% at 4.5um				
Receiver (module input)					
Damage Threshold	5			dBm	3
Average received power	-7.9		4	dBm	4
Receiver power (OMA_{outer})			3	dBm	
Receiver reflectance			-12	dB	
Receiver sensitivity, OMA_{outer}			-7	dBm	
Stressed receiver sensitivity, OMA_{outer}			-3	dBm	
LOS De-Assert			-11	dBm	
LOS Assert	-30		-11	dBm	

Notes:

1. *RMS spectral width is the standard deviation of the spectrum.*
2. *Even if the TDECQ < 1.9 dB, the OMA (min) must exceed this value.*
3. *The receiver should be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this received power.*
4. *Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.*

25G Optical Parameters (only applicable to XP85PC1-02D and XP85PC1-02D-1D)

Parameter	Min	Typ	Max	Unit	Note
Transmitter (module output)					
Center wavelength	840	850	860	nm	
RMS spectral width			0.6	nm	
Average launched power	-8.4		2.4	dBm	
Optical modulation amplitude	-6.4		3	dBm	
Average launch power of OFF transmitter			-30	dBm	
Extinction ratio	2			dB	
Encircled flux	≥86% at 19um, ≤30% at 4.5um				
Receiver (module input)					
Average received power	-10.3		2.4	dBm	
Receive power (OMA)			3	dBm	
Receiver reflectance			-12	dB	
Stressed receiver sensitivity, OMA			-5.2	dBm	
LOS De-Assert			-11	dBm	
LOS Assert	-30		-11	dBm	

10G Optical Parameters (only applicable to XP85PC1-02D)

Parameter	Min	Typ	Max	Unit	Note
Transmitter (module output)					
Center wavelength	840	850	860	nm	
RMS spectral width			0.45	nm	
Average launched power	-7.3		1.5	dBm	1
Optical modulation amplitude	-4.3			dBm	
Average launch power of OFF transmitter			-30	dBm	
Extinction ratio	2			dB	
RIN_{12} OMA			-128	dB/Hz	
Encircled flux	≥86% at 19um, ≤30% at 4.5um				
Receiver (module input)					
Average received power	-9.9		1.5	dBm	
Unstressed receiver sensitivity, OMA			-11.1	dBm	
Return loss of receiver	12			dB	
Stressed receiver sensitivity, OMA			-7.5	dBm	
LOS De-Assert			-11	dBm	
LOS Assert	-30		-11	dBm	

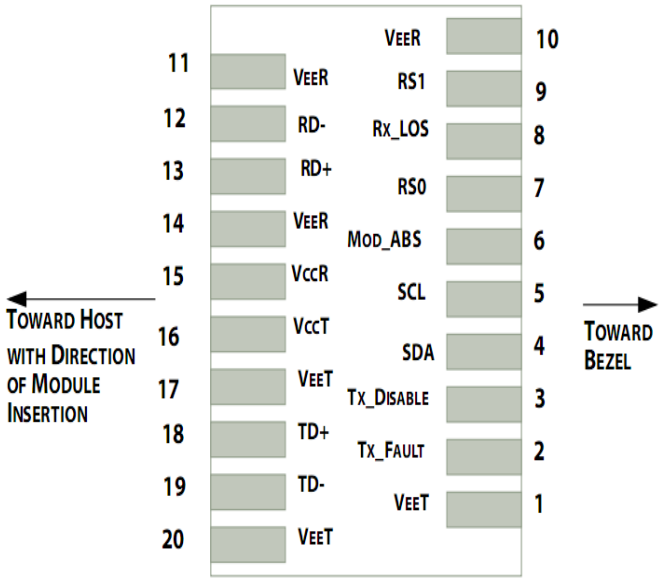
Notes:

1. *Max average launched power shall be the lesser of the value listed here or the Class 1 laser safety limits (CDRH and EN 60825)*

IV. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note
Power supply voltage	Vcc	3.13	3.3	3.47	V	
Power supply current	Icc		420	475	mA	
Low Speed Signals						
Tx_Fault, Rx_LOS Output voltage	V_{OL}	-0.3		0.40	V	At 0.7 mA
Tx_Disable, RS0, RS1 Input voltage	V_{IL}	-0.3		0.8	V	
	V_{IH}	2.0		Vcc+0.3	V	

V. Pin Descriptions



Pin out of Connector Block on Host Board

Pin	Symbol	Name/Description	NOTE
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	Tx_Fault	Transmitter Fault	
3	Tx_Disable	Transmitter Disable – Logic 1 disables laser output	
4	SDA	2-wire Serial Interface Data Line	
5	SCL	2-wire Serial Interface Clock Line	
6	MOD_ABS	Module Absent. Grounded within the module.	2
7	RS0	Rate Select 0 – Rx signaling rate	3
8	Rx_LOS	Loss of Signal indication – Logic 1 indicates loss of signal	
9	RS1	Rate Select 1 – Tx signaling rate	3
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out (AC Coupled)	
13	RD+	Receiver Non-inverted DATA out (AC Coupled)	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1

15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in (AC Coupled)	
19	TD-	Transmitter Inverted DATA in (AC Coupled)	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:

2. *Circuit ground is internally isolated from chassis ground.*
3. *MOD_ABS is pulled low in the module to indicate that the module is plugged in.*
4. *The signal is internally pulled down per SFF-8431 Rev 4.1.*

VI. Management Interface and Digital Diagnostic Functions

Rate Select

The XP85PC1-02D is a tri-rate transceiver, and the signaling rates for the transmitter and receiver can each be configured by either the rate select (RS) hard pin signals or the soft register bits according to the following table:

Ethernet Rate	Signaling Rate	Modulation	RS0 Logic OR of Pin 7 and Bit 110.3 (A2h)	RS1 Logic OR of Pin 9 and Bit 118.3 (A2h)	Software Bit 119.2 (A2h)
50G	26.5625GBd	PAM4	X	X	1
25G	25.78125GBd	NRZ	0	1	0
			1	0	0
			1	1	0
10G	10.3125GBd	NRZ	0	0	0

When the 50G Mode bit is set, the RS pins and bits are ignored.

The XP85PC1-02D-1D is a dual-rate transceiver, and the signaling rates for the transmitter and receiver can each be configured by either the rate select (RS) hard pin signals or the soft register bits according to the following table:

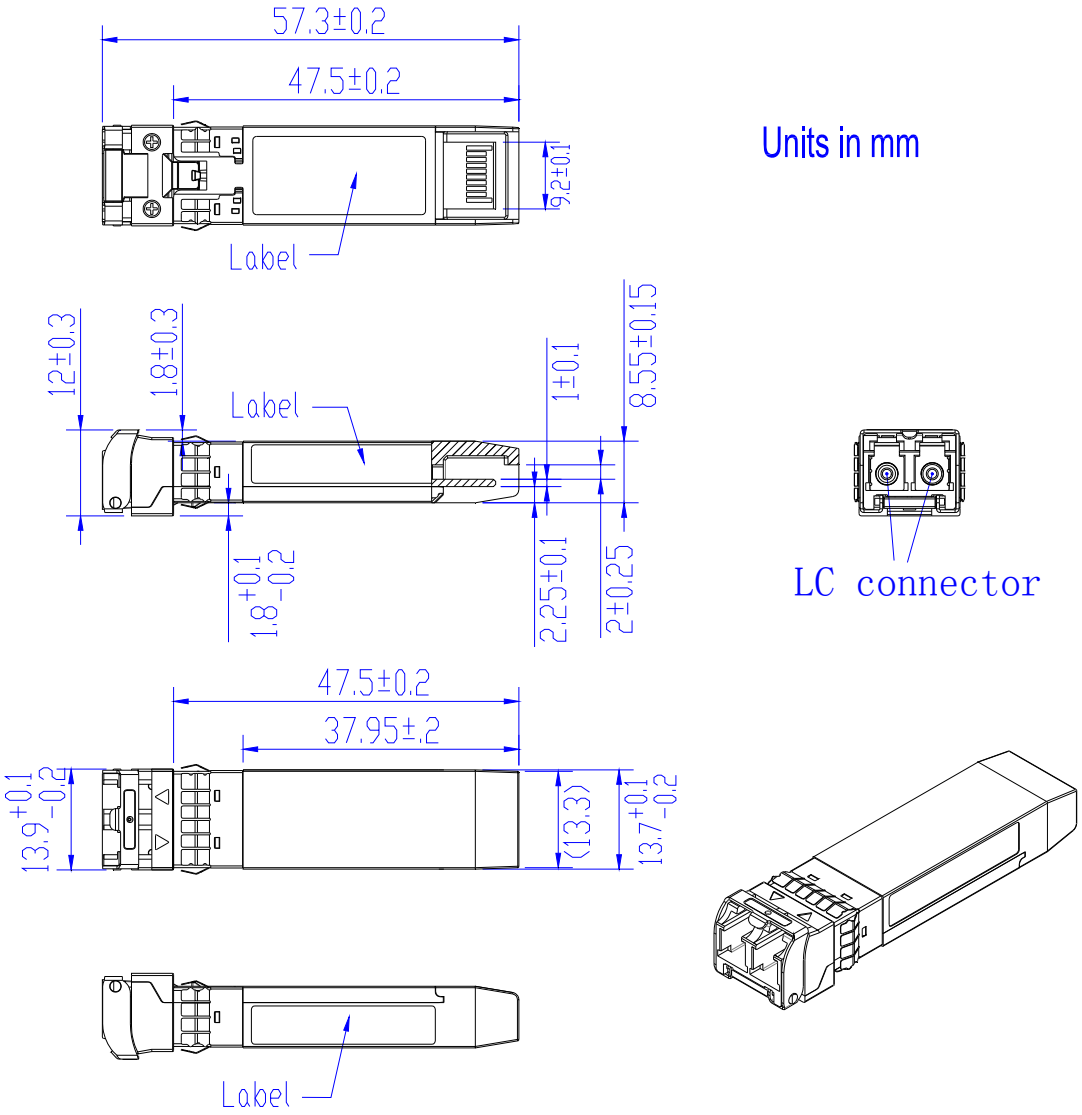
Ethernet Rate	Signaling Rate	Modulation	RS0 Logic OR of Pin 7 and Bit 110.3 (A2h)	RS1 Logic OR of Pin 9 and Bit 118.3 (A2h)
50G	26.5625GBd	PAM4	1	1
25G	25.78125GBd	NRZ	1	0
			0	1
			0	0

Monitor Data

The following monitors are supported using the “internal calibration” method described in SFF-8472 Rev 12.3:

- Temperature
- Supply Voltage
- Tx Bias Current
- Rx Optical Power
- Tx optical power

VII. Outline Dimensions



Appendix A. Document Revision

Version No.	Date	Description
0.1	August 29, 2022	Preliminary datasheet