SP28-MWXXLR10X

SFP28 25Gb/s MWDM 10km Transceiver

PRODUCT FEATURES

- ●Up to 25.78Gbps Data Links
- ●Up to 10km transmission on SMF
- ●MWDM Laser and PIN-TIA receiver
- ●Build-in dual CDR , for lower EMI
- ●2-wire interface with integrated Digital Diagnostic monitoring
- ●Hot-pluggable SFP28 footprint
- ●Specifications compliant with SFF 8472
- ●Support Open-WDM OAM Application
- ●Compliant with SFF-8402 with LC connector
- ●Single 3.3V power supply
- ●Power dissipation < 2W
- ●Case operating temperature :

  Commercial:0°C to +70°C

  Industrial: -40°C to +85°C

APPLICATIONS

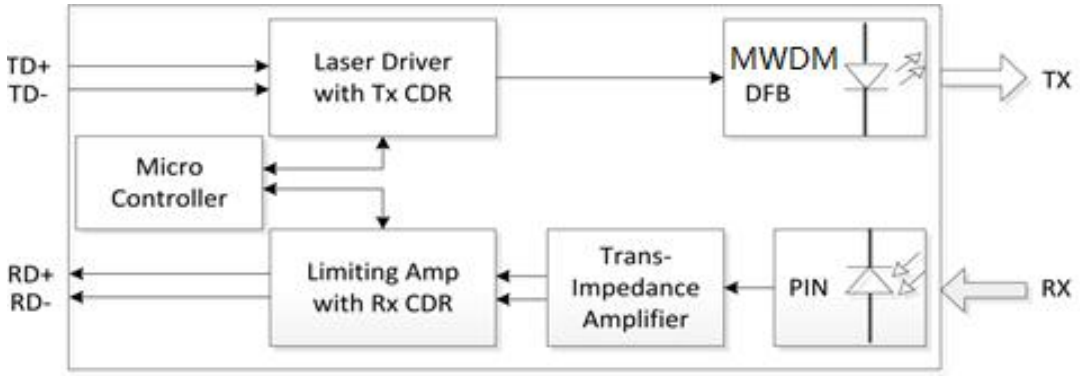
25GBASE-LR

eCPRI and CPRI 10

PRODUCT DESCRIPTION

SP28-MWXXLR10X is SFP28 module for duplex optical data communications support 25.78 Gb/s and 28.05 Gb/s data links. It is with the SFP+ 20-pin connector to allow hot plug capability. Digital diagnostic functions are available via an I2C. It has built-in dual clock and data recovery (CDR).

This module is designed for single-mode. The transmitter section uses a high performance MWDM DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector pre-amplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.



SFP28 Module

● Ordering information

Product part Number	Data Rate (Gbps)	Media	Wavelength (nm)	Transmission Distance(km)	Bail Latch Color	Temperature Range （Tcase）（℃）	
SP28-MW01LR10C	25.78	SM fiber	1267.5	10	Blue	0~70	Commercial
SP28-MW01LR10I	25.78	SM fiber	1267.5	10	Blue	-40~85	Industrial
SP28-MW02LR10I	25.78	SM fiber	1274.5	10	Red	-40~85	Industrial
SP28-MW03LR10C	25.78	SM fiber	1287.5	10	Blue	0~70	Commercial
SP28-MW03LR10I	25.78	SM fiber	1287.5	10	Blue	-40~85	Industrial
SP28-MW04LR10I	25.78	SM fiber	1294.5	10	Red	-40~85	Industrial
SP28-MW05LR10C	25.78	SM fiber	1307.5	10	Blue	0~70	Commercial
SP28-MW05LR10I	25.78	SM fiber	1307.5	10	Blue	-40~85	Industrial
SP28-MW06LR10I	25.78	SM fiber	1314.5	10	Red	-40~85	Industrial
SP28-MW07LR10C	25.78	SM fiber	1327.5	10	Blue	0~70	Commercial
SP28-MW07LR10I	25.78	SM fiber	1327.5	10	Blue	-40~85	Industrial
SP28-MW08LR10I	25.78	SM fiber	1334.5	10	Red	-40~85	Industrial
SP28-MW09LR10C	25.78	SM fiber	1347.5	10	Blue	0~70	Commercial
SP28-MW09LR10I	25.78	SM fiber	1347.5	10	Blue	-40~85	Industrial
SP28-MW10LR10I	25.78	SM fiber	1354.5	10	Red	-40~85	Industrial
SP28-MW11LR10C	25.78	SM fiber	1367.5	10	Blue	0~70	Commercial
SP28-MW11LR10I	25.78	SM fiber	1367.5	10	Blue	-40~85	Industrial
SP28-MW12LR10I	25.78	SM fiber	1374.5	10	Red	-40~85	Industrial

● Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T_s	-40	-	85	℃	
Relative Humidity	R_H	5	-	95	%	
Power Supply Voltage	V_{CC}	-0.3	-	4	V	
Signal Input Voltage	V_{SI}	Vcc-0.3	-	Vcc+0.3	V	
Rx Damage Threshold	PR_{dmg}	3			dBm	

● Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	℃	SP28-MWXXLR10C
		-40		85	℃	SP28-MWXXLR10I
Power Supply Voltage	V_{CC}	3.14	3.3	3.47	V	
Power Supply Current	I_{CC}	-		600	mA	
Data Rate	BR		25.78		Gbps	
Transmission Distance	TD			10	km	
Coupled fiber	Single mode fiber					9/125um SMF

● Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Launched Power	P_O	+2		+7.0	dBm	
Average Launched Power(Laser Off)	P_{off}	-	-	-30	dBm	
Center Wavelength Range	λ_C	-2.5	λ_C	+2.5	nm	
Spectrum Bandwidth(-20dB)	$\Delta\lambda$	-	-	1	nm	
Side-Mode Suppression Ratio	SMSR	30	-	-	dB	
Transmitter and Dispersion Penalty	TDP			1	dB	1267.5-1314.5nm
				3	dB	1327.5-1334.5nm
				4.5	dB	1247.5-1374.5nm
Extinction Ratio	ER	3.5		-	dB	Note (1)
Output Eye Mask	Compliant with IEEE 802.3cc					Note (2)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Receiver						
Input Optical Wavelength	λ_{IN}	1260	-	1620	nm	
Receiver Sensitivity (Average power)	P_{sen}	-	-	-13	dBm	Note (3)
Input Saturation Power (Overload)	P_{SAT}	2.0	-	-	dBm	Note (3)
Los Of Signal Assert	P_A	-30	-	-	dBm	
Los Of Signal De-assert	P_D	-	-	-16	dBm	
LOS -Hysteresis	P_{Hys}	0.5		5	dB	

Note:

Note (1): Measured with a PRBS 2^{31}-1 test pattern, @25.78Gb/s.

Note (2): Transmitter eye mask definition, Compliant with IEEE 802.3cc.

Note (3): Measured with Light source 1310nm, ER=3.5dB; BER =<$5x10^{-5}$ @PRBS=2^{31}-1 NRZ.

● Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Input Differential Impedance	Rin	90	100	110	Ω	
Differential Data Input	Vin	200		900	mVp-p	
Transmitter Fault Output-High	V_{FaultH}	2	-	Vcc+0.3	V	
Transmitter Fault Output-Low	V_{FaultL}	0	-	0.8	V	
Transmitter Disable Voltage- High	V_{DisH}	2	-	Vcc+0.3	V	
Transmitter Disable Voltage- low	V_{DisL}	0	-	0.8	V	
Receiver						
Output Differential Impedance	Rout	90	100	110	Ω	
Differential Data Output	Vout	350		900	mVp-p	
LOS Output Voltage-High	V_{LOSH}	2	-	Vcc+0.3	V	
LOS Output Voltage-Low	V_{LOSL}	0	-	0.8	V	

● Pin Description

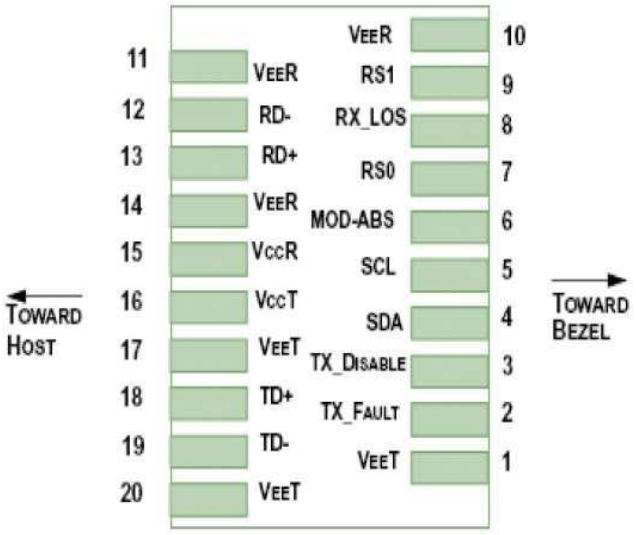


Diagram of Host Board Connector Block Pin Numbers and Name

Pin	Symbol	Name/Description	NOTE
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.	2
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0, internal pull down	5

Pin	Symbol	Name/Description	NOTE
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	Rate Select 1, internal pull down	5
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:

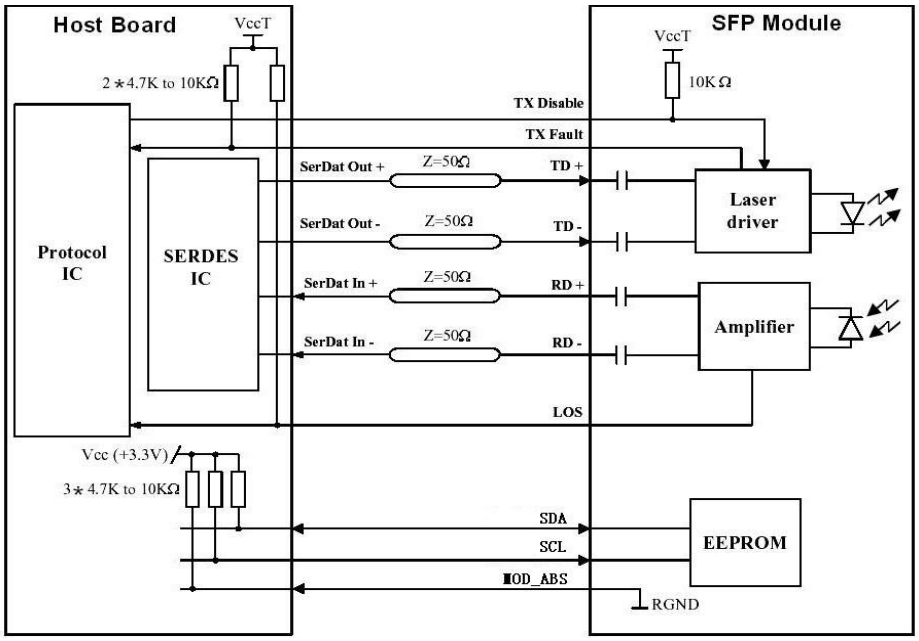
1. Circuit ground is internally isolated from chassis ground.
2. T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on T_{DIS}>2.0V or open, enabled on T_{DIS}<0.8V.
4. Should be pulled up with 4.7kΩ- 10kΩ host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5. Rate select can also be set through the 2-wire bus in accordance with SFF-8472. Rx Rate Select is set at Bit 3, Byte 110, Address A2h. Tx Rate Select is set at Bit 3, Byte 118, Address A2h.
6. LOS is open collector output. It should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

● Digital Diagnostic Monitor Accuracy

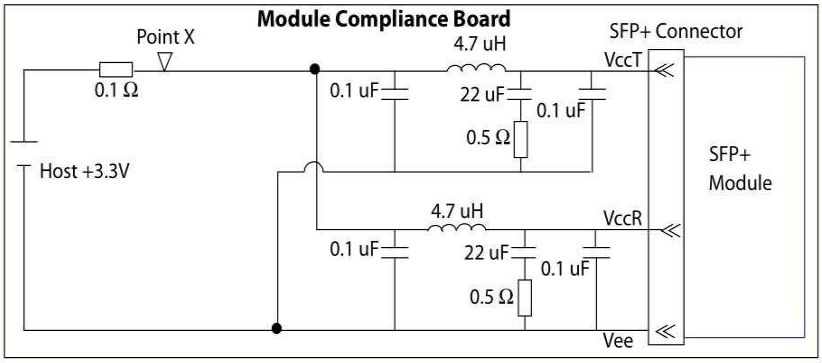
The following characteristics are defined over recommended operating conditions

Parameter	Accuracy	Unit
Internally measured transceiver temperature	+/-3	deg.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

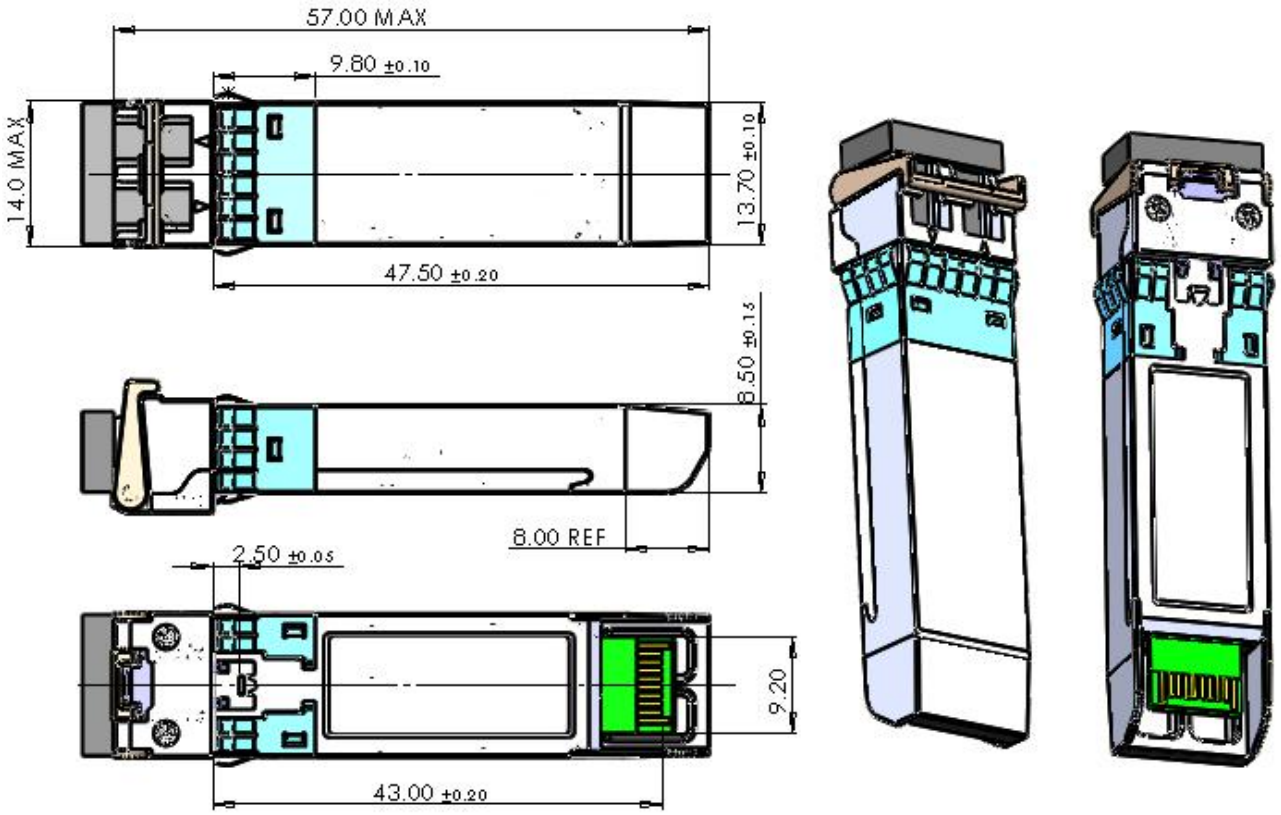
● Recommended Interface Circuit



● Recommended Filter for Voltage Supply



● Outline Dimensions



● Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge（ESD）	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950, UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

● Appendix A. Document Revision

Version No.	Date	Description
1.0	2020-8-20	Preliminary datasheet
1.1	2020-11-30	Updated Ordering information Updated Outline Dimensions