SP10-CWxxLR10x

SFP+ 10Gb/s CWDM 10km Transceiver

PRODUCT FEATURES

- Supports up to 10.7Gbps bit rates
- Hot-pluggable SFP+ footprint
- Up to 10km for SMF
- CWDM DFB laser and PIN photodiode,
- Compliant with SFP+ MSA and SFF-8472
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- RoHS compliant
- Operating case temperature:
  Standard: -5 to +70°C
  Industrial: -40 to +85°C

APPLICATIONS

- 10Gbps CWDM Optical systems
- 10GBASE-LR at 10.3125Gbps
- 10GBASE-LW at 9.953Gbps
- LTE systems

PRODUCT DESCRIPTION

The SP10-CWxxLR10x SFP+ transceivers are high performance, cost effective modules supporting data rate of 10Gbps and 10km transmission distance with SMF. The transceiver consists of three sections: a uncooled DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

Ordering information

Part Number	Data Rate (Gbps)	Media	Wavelength (nm)	Transmission Distance(km)	Temperature Range T_{case} / ℃	
SP10-CWxxLR10C	10.3	SMF	1270~1390	10	0~70	Commercial
SP10-CWxxLR10I	10.3	SMF	1270~1390	10	-40~85	Industrial

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	Vcc	-0.5		4	V
Storage Temperature Range	Ts	-40		85	℃
Relative Humidity - Storage	RH_S	0		95	%
Relative Humidity - Operating	RH_O	0		85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Case Operating Temperature Range	Tc	0	-	70	℃
		-40	-	85	
Power Supply Voltage	V_{cc}	3.14	3.3	3.46	V
Supply Current	I_{cc}	-	-	300	mA
Data Rate	BR	-	10.3125	-	Gbps

Electrical Characteristics

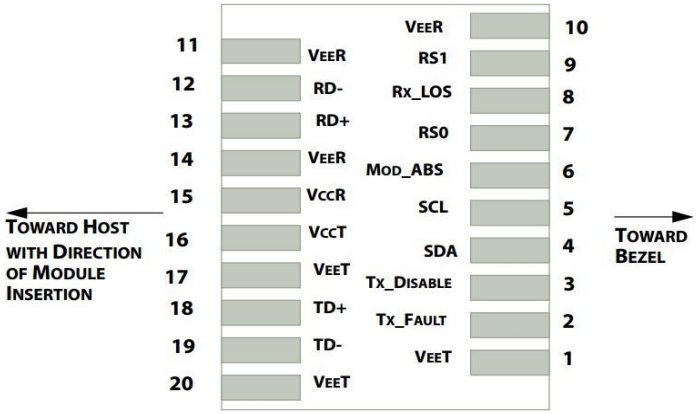
Transmitter Electrical Characteristics					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Differential Input Voltage Swing	V_{IN}	180	-	700	mV
Tx Differential Input Impendence	Z_{IN}	-	100	-	Ω
Transmitter Disable Voltage	V_{DIS}	2.0	-	V_{CC}+0.3	V
Transmitter Enable Voltage	V_{EN}	V_{EE}	-	V_{EE}+0.8	V
T_{FAULT} Logic High	V_{TFH}	2.4	-	V_{CC}	V
T_{FAULT} Logic Low	V_{TFL}	V_{EE}	-	V_{EE}+0.4	V
Receiver Electrical Characteristics					
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**
Differential output Voltage Swing	V_{OUT}	300	-	850	mV
Rx Differential Output Impendence	Z_{OUT}	-	100	-	Ω
LOS Assert Voltage	V_{LOSA}	2.4	-	V_{CC}	V
LOS De-assert Voltage	V_{LOSD}	V_{EE}	-	V_{EE}+0.4	V

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Transmitter Characteristics						
Laser Type			DFB			
Data Rate	-	-	10.3125	-	Gb/s	
Center Wavelength Range	λ	λ-6.5	λ	λ+6.5	nm	1
Spectral Width@-20dB	Δλ	-	-	1	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Launch Optical Power	Pout	-4	-	+3	dBm	2
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter and Dispersion Penalty	TDP	-	-	3.2	dB	
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	
Eye Diagram	Compliant with IEEE802.3ae requirements when filtered					
Receiver Characteristics						
Receiver Type			PIN			
Data Rate	-	-	10.3125	-	Gb/s	
Operating Central Wavelength	λ	1100		1650	nm	
Receiver Sensitivity	Sen	-	-	-14.4	dBm	3
Receiver Overload	P_{SAT}	0.5	-	-	dBm	
Receiver Reflectance	RFL	-	-	-12	dB	
LOS Assert	LOSA	-30	-	-	dBm	
LOS De-Assert	LOSD	-	-	-17	dBm	
LOS Hysteresis	LOSH	0.5	3	5	dB	
Notes						

1. λ is :1271,1291,1311,1331,1351,1371,1391,1411,1431,1451,1471,1491,1511,1531,1551,1571,1591,1611, please refer to the ordering information.
2. Average power figures are informative only, per IEEE 802.3ae.
3. Measured with 2^{31}-1 PRBS pattern@10.3125Gbps, BER<$10^{-12.}$

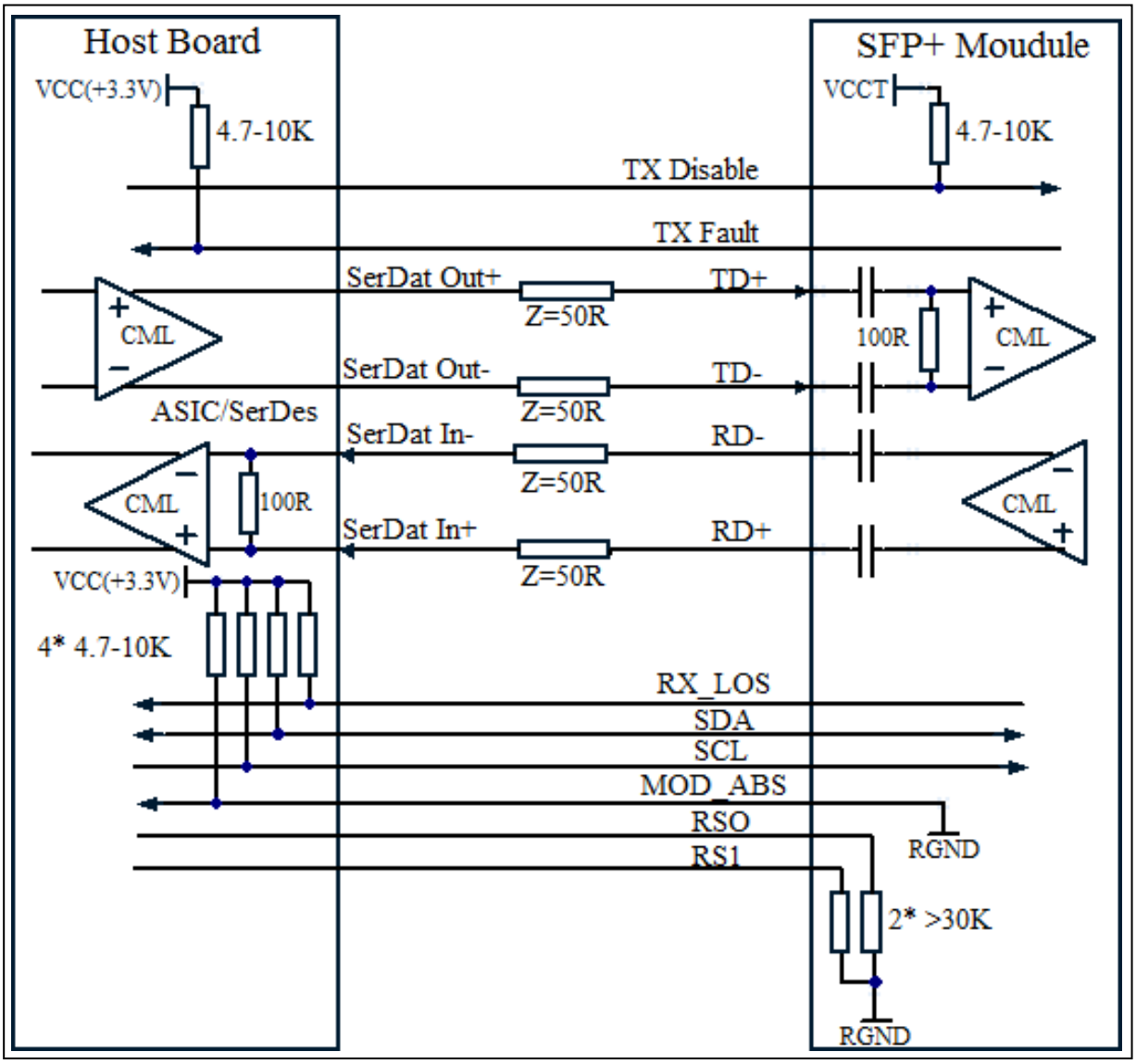
Pin Description



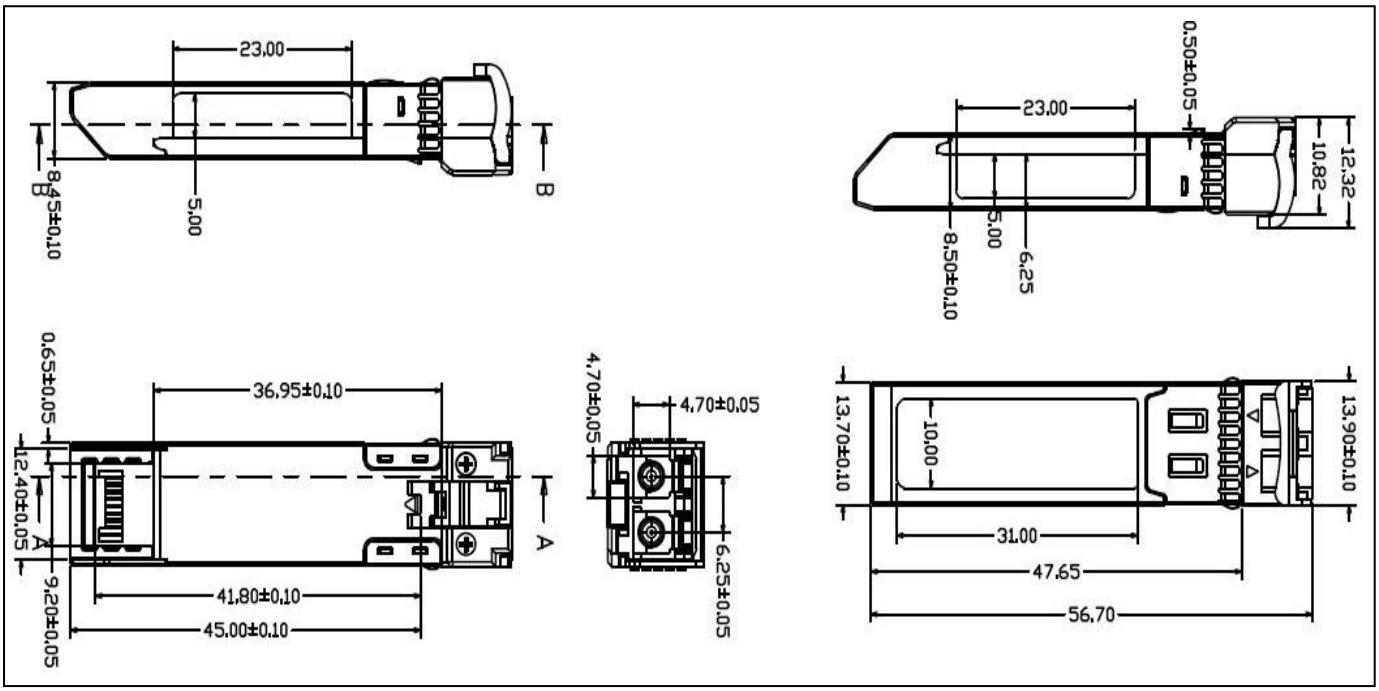
Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	V_{EET}	Transmitter Ground	1	

Notes:
Plug Seq.: Pin engagement sequence during hot plugging.
1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3) LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
4) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
5) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



Mechanical 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	IEC/EN 60825-1, 2	Class 1 laser product
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards