

2.5 Gbps CWDM Single-mode SFP Transceiver

- Up to 2.7 Gbps
- Up to 40 km on 9/125 μ m SMF
- Switch to switch interface
- Gigabit Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links



ASCENT SFP-2G-LP-CXX-40 Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the CWDM XXnm DFB laser and the PIN photo-detector. The module data link up to 40KM in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

Key Features

- Up to 2.7 Gbps data links
- DFB laser transmitter and PIN photo-detector
- Up to 40 km on 9/125 μ m SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- Metal enclosure for lower EMI
- RoHS compliant and lead-free
- Single +3.3 V power supply
- Supports Digital Diagnostic Monitoring interface
- Compliant with SFF-8472

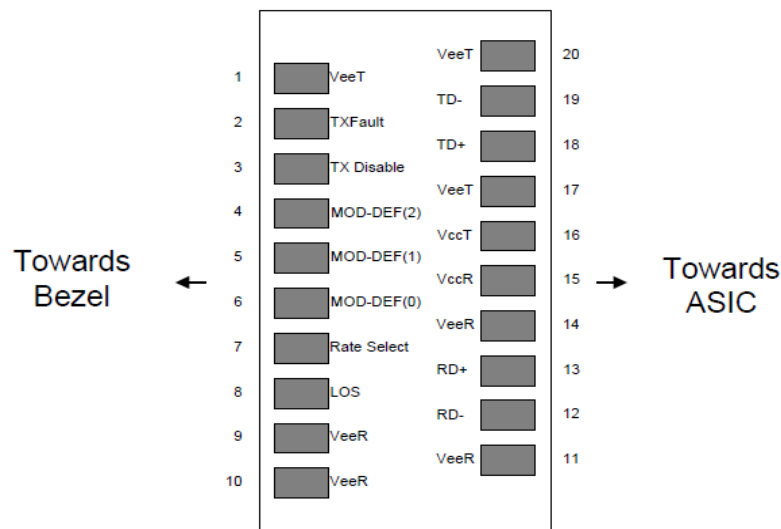
Pin Descriptions

Pin	Symbol	Name/Description	NOTE
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault	
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	5
9	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
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

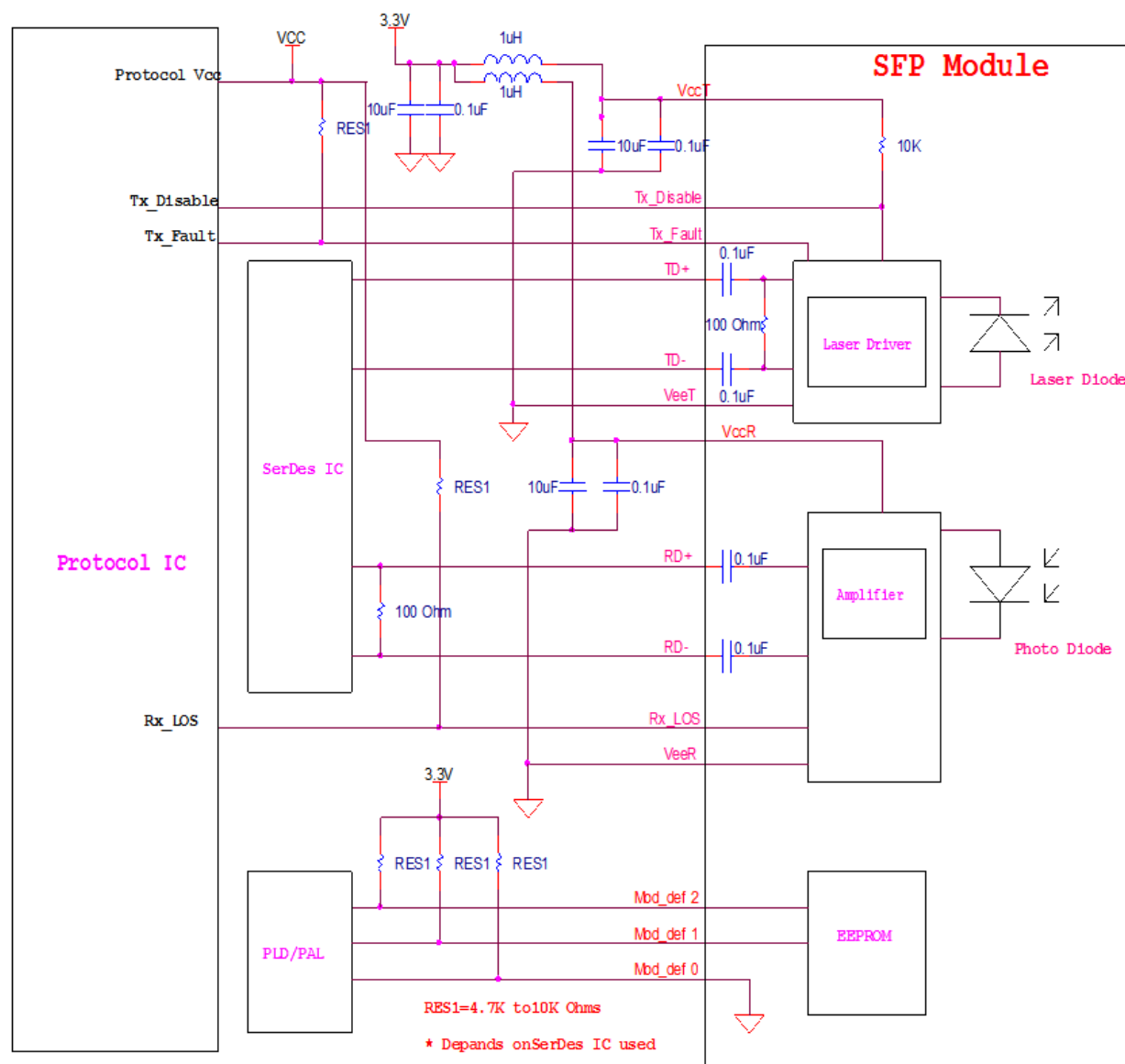
Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS > 2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7 kΩ to 10 kΩ on host board to a voltage between 2.0 V and 3.6 V. MOD_DEF (0) pulls line low to indicate module is plugged in.
4. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:
 - Low (0 to 0.8 V): Reduced Bandwidth
 - (>0.8, <2.0 V): Undefined
 - High (2.0 V to 3.465 V): Full Bandwidth
 - Open: Reduced Bandwidth
5. LOS is open collector output should be pulled up with 4.7 kΩ to 10 kΩ on host board to a voltage between 2.0 V and 3.6 V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



Pin out of Connector Block on Host Board

Recommend Circuit Schematic



Digital Diagnostic Functions

Ascent SFP-2G-LP-CXX-40 transceivers support the 2-wire serial communication protocol as defined in the SFP MSA. It is very closely related to the E2PROM defined in the GBIC standard, with the same electrical specifications.

The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

Additionally, Ascent SFP transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power, and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in E2PROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged. The interface is identical to, and is thus fully backward compatible with both the GBIC Specification and the SFP Multi Source Agreement.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

Digital diagnostics for the SFP-2G-LP-CXX-40 are internally calibrated by default.

Specifications

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T _s	-40		85	°C	
Relative Humidity	RH	5		95	%	
Power Supply Voltage	V _{CC}	-0.5		4	V	
Signal Input Voltage		-0.3		V _{CC} +0.3	V	
Receiver Damage Threshold		5			dBm	

Recommended Operating Conditions

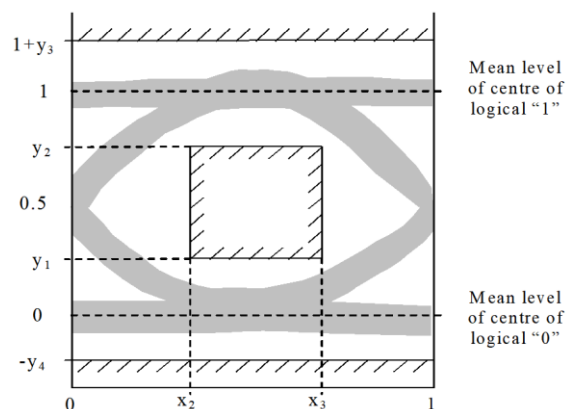
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T _{case}	0		70	°C	Commercial
		-40		85	°C	Industrial
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}			300	mA	
Power Supply Noise Rejection				100	mVp-p	100 Hz to 1 MHz
Data Rate			2500/2500	2700	Mbps	TX Rate/RX Rate
Transmission Distance				40	km	
Coupled Fiber	Single-mode fiber					9/125 μm SMF

Specification of Transmitter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P _{OUT}	-2		3	dBm	Note (1)
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λ _c	(1XX0)-Δλ	1XX0	(1XX0)+Δλ	nm	DFB Laser Note (2)
Side Mode Suppression Ratio	SMSR	30			dB	
Spectrum Bandwidth (-20 dB)	σ			1	nm	
Transmitter OFF Output Power	P _{OFF}			-45	dBm	
Differential Line Input Impedance	R _{IN}	90	100	110	Ω	
Output Eye Mask	Compliant with G.957 (class 1 laser safety)					Note (3)

Notes:

1. Measure at 2²³-1 NRZ PRBS pattern
2. "XX" is: 27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59 and 61; "Δλ" is 10
3. Transmitter eye mask definition



x ₃ - x ₂	0.2
y ₁	0.25
y ₂	0.75
y ₃	0.25
y ₄	0.25

Receiver Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	1270		1610	nm	PIN-TIA
Receiver Sensitivity	P _{IN}			-19	dBm	Note (1)
Input Saturation Power (Overload)	P _{SAT}	0			dBm	
LOS De-assert	LOSD			-20	dBm	
LOS Assert	LOSA	-35			dBm	Note (2)
LOS Hysteresis		0.5	2	6	dB	

Notes:

1. Measured with Light source 1XX0 nm, ER=8.2dB; BER = <10⁻¹² @PRBS=2²³-1 NRZ, "XX" is: 27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59 and 61.
2. When LOS de-asserted, the RX data+/- output is High-level (fixed)

Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Total Supply Current	I _{CC}			A	mA	Note (1)
Transmitter Disable Input-High	V _{DISH}	2		V _{CC} +0.3	V	
Transmitter Disable Input-Low	V _{DISL}	0		0.8	V	
Transmitter Fault Input-High	VTxFH	2		V _{CC} +0.3	V	
Transmitter Fault Input-Low	VTxFL	0		0.8	V	
Receiver						
Total Supply Current	I _{CC}			B	mA	Note (1)
LOSS Output Voltage-High	V _{LOSH}	2		V _{CC} +0.3	V	LVTTL
LOSS Output Voltage-Low	V _{LOSL}	0		0.8	V	

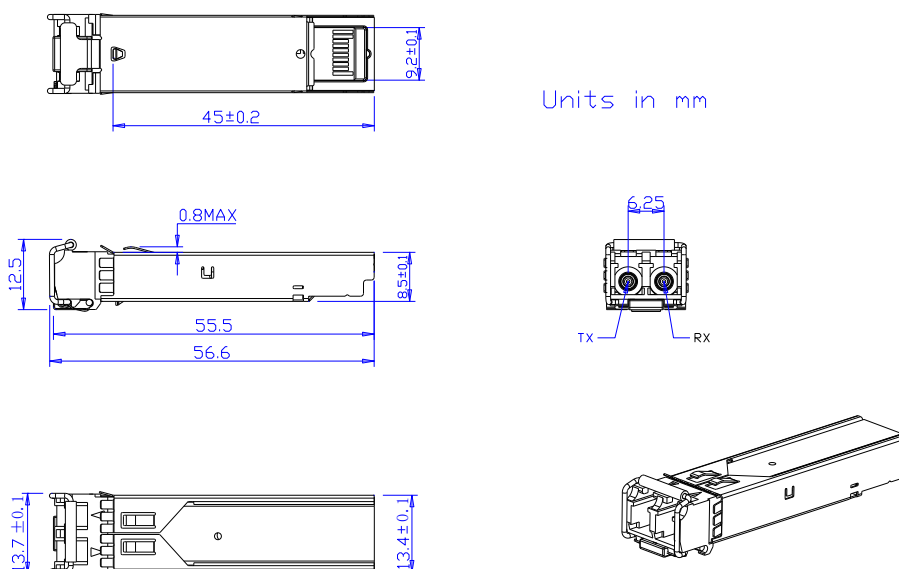
Note:

1. A (TX) + B (RX) = 300 mA (Not including termination circuit)

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

Mechanical Specifications



SFP-2G-LP-CXX-40

Ordering Information

Item	Description
SFP-2G-LP-CXX-40	SFP Plug-in, 2.5 Gbps, 40 km, TX = CWDM Ch 1XX0/RX wide, on two single-mode fibers, LC/PC

Wavelength	XX	Clasp Color Code	Wavelength	XX	Clasp Color Code
1270 nm	27	Gray	1450 nm	45	Brown
1290 nm	29	Gray	1470 nm	47	Gray
1310 nm	31	Gray	1490 nm	49	Purple
1330 nm	33	Purple	1510 nm	51	Blue
1350 nm	35	Blue	1530 nm	53	Green
1370 nm	37	Green	1550 nm	55	Yellow
1390 nm	39	Yellow	1570 nm	57	Orange
1410 nm	41	Orange	1590 nm	59	Red
1430 nm	43	Red	1610 nm	61	Brown

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