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SFP-1G-SX-PLU*

1.25Gb/s 850nm Multi-mode SFP Transceiver

PRODUCT FEATURES

- Up to 1.25Gb/s data links with DDM

- VCSEL laser transmitter and PIN photo-detector

- 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 +3.3V power supply

- Compliant with SFF-8472

- Case operating temperature

  Commercial: 0°C to +70°C

  Extended: -10°C to +80°C

  Industrial: -40°C to +85°C

APPLICATIONS

- 1x Fiber Channel

- Switch to Switch Interface

- Gigabit Ethernet

- Switched Backplane Applications

- Router/Server Interface

- Other Optical Links

*This spec sheet is also for other vendor compatible units with the last 3 digits of the part number varying based on vendor code. Please see the last page of this specification sheet for a list of vendor codes

PRODUCT DESCRIPTION

PLUSOPTIC's SFP-1G-SX-PLU 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 VCSEL laser and the PIN photo-detector. The module data link up to 550m in 50/125um multi 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.

Ordering information

Product part Number	Data Rate (Mbps)	Media	Wavelength (nm)	Transmission Distance(m)	Temperature Range(Tcase) (℃)	
SFP-1G-SX-PLU	1250	Multi mode fiber	850	550	0~70	commercial

I.   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 T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.

3. Should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V.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 – 0.8V):   Reduced Bandwidth

    •   (>0.8, < 2.0V):   Undefined

    •   High (2.0 – 3.465V):   Full Bandwidth

    •   Open: Reduced Bandwidth

5. LOS is open collector output should be pulled up with 4.7k - 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
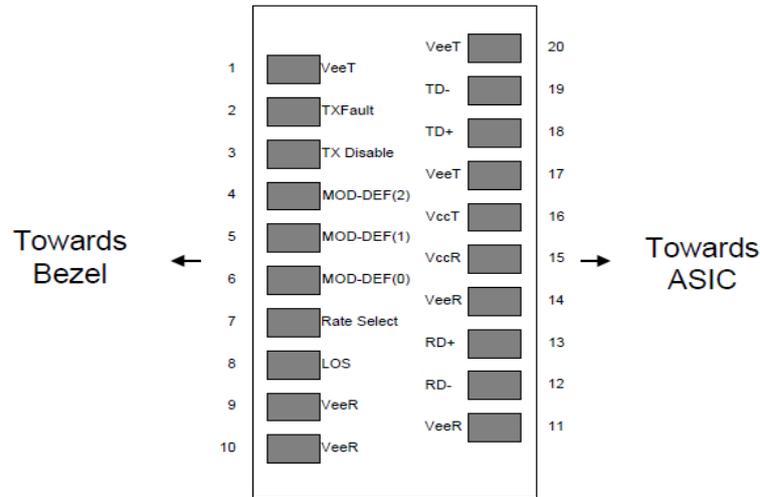
Figure2. Pin out of Connector Block on Host Board

II.   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	-0.5		4	V	
Signal Input Voltage		-0.3		Vcc+0.3	V	
Receiver Damage Threshold		+5			dBm	

III.   Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0		70	ºC	SFP-1G-SX-PLU
		-10		80		SFP-1G-SX-PLU-RGD
		-40		85		SFP-1G-SX-PLU-IND
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			280	mA	
Power Supply Noise Rejection				100	mVp-p	100Hz to 1MHz
Data Rate			1250/1250		Mbps	TX Rate/RX Rate
Transmission Distance				550	M	
Coupled Fiber		Multi mode fiber				50/125um MMF

IV. Specification of Transmitter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P_{OUT}	-9		-3	dBm	Note (1)
Extinction Ratio	ER	9			dB	
Center Wavelength	λ_C	830	850	860	nm	VCSEL Laser
Spectrum Bandwidth(RMS)	σ			0.85	nm	
Transmitter OFF Output Power	P_{off}			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Output Eye Mask	Compliant with IEEE802.3 z (class 1 laser safety)					Note (2)

Note (1): Measure at 2^7-1 NRZ PRBS pattern

Note (2): Transmitter eye mask definition
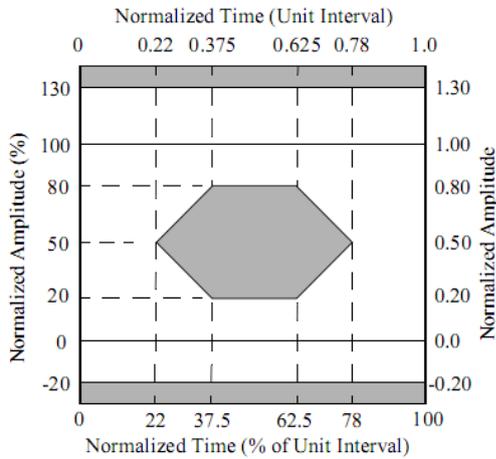
V. Specification of Receiver

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Optical Wavelength	λ_{IN}	770	850	860	nm	PIN-TIA
Receiver Sensitivity	P_{IN}			-17	dBm	Note (1)
Input Saturation Power (Overload)	P_{SAT}	0			dBm	
LOS De-assert	LOSD			-18	dBm	
LOS Assert	LOSA	-35			dBm	Note (2)
LOS Hysteresis		0.5	2	6	dB	

Note (1): Measured with Light source 850nm, ER=9dB; BER =<10^-12 @PRBS=2^7-1 NRZ

Note (2): When LOS de-asserted, the RX data+/- output is High-level (fixed)

VI. 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		Vcc+0.3	V	
Transmitter Disable Input-Low	V_{DISL}	0		0.8	V	
Transmitter Fault Input-High	V_{TxFH}	2		Vcc+0.3	V	
Transmitter Fault Input-Low	V_{TxFL}	0		0.8	V	
Receiver						
Total Supply Current	I_{CC}			B	mA	Note (1)
LOSS Output Voltage-High	V_{LOSH}	2		Vcc+0.3	V	LVTTL
LOSS Output Voltage-Low	V_{LOSL}	0		0.8	V	LVTTL

Note (1): A (TX) + B (RX) = 280mA   (Not include termination circuit)

VII. Digital Diagnostic Functions

PLUSOPTIC SFP-1G-SX-PLU 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, PLUSOPTIC 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-1G-SX-PLU are internally calibrated by default.

VIII. Recommend Circuit Schematic
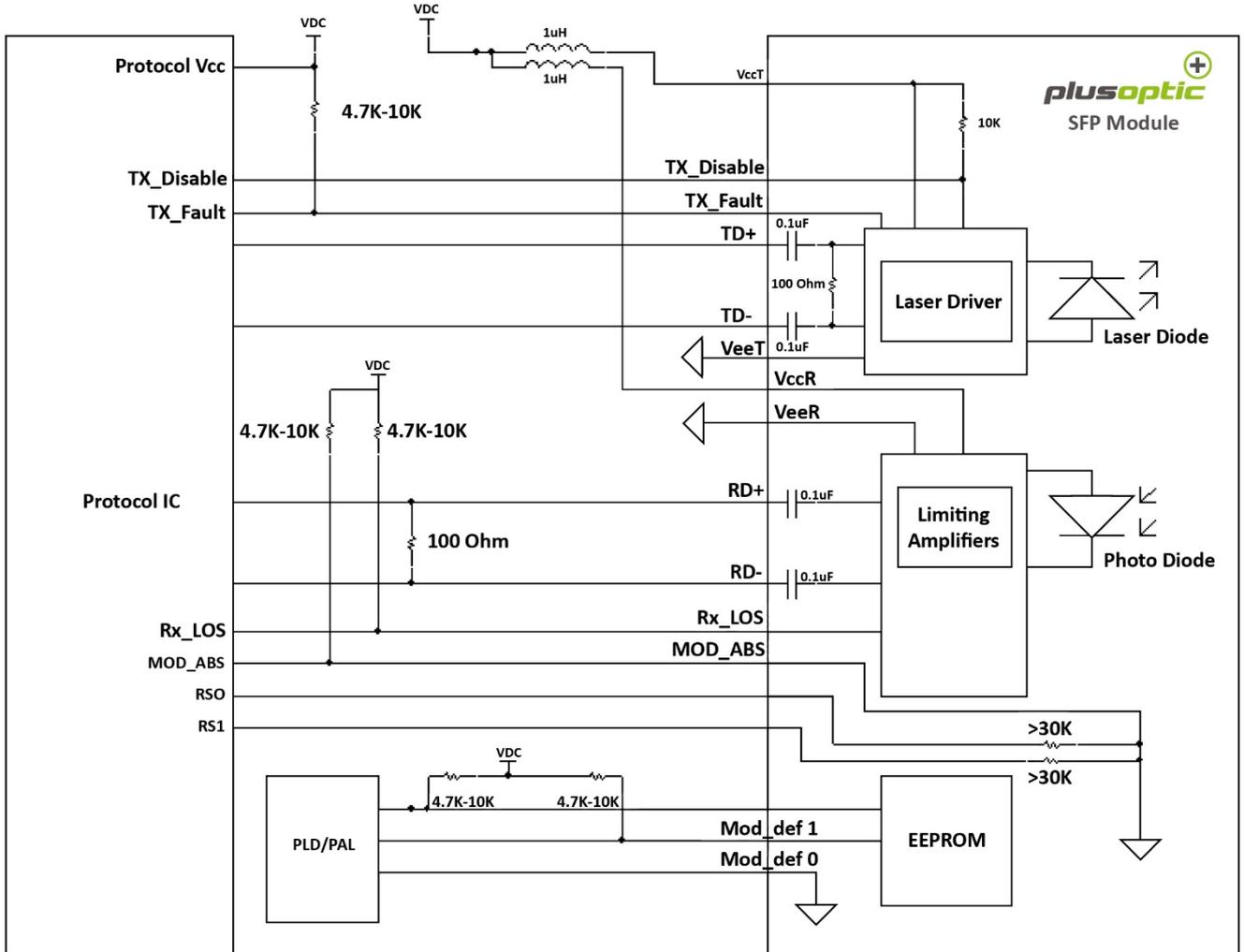
IX.   Mechanical Specifications (Unit: mm)
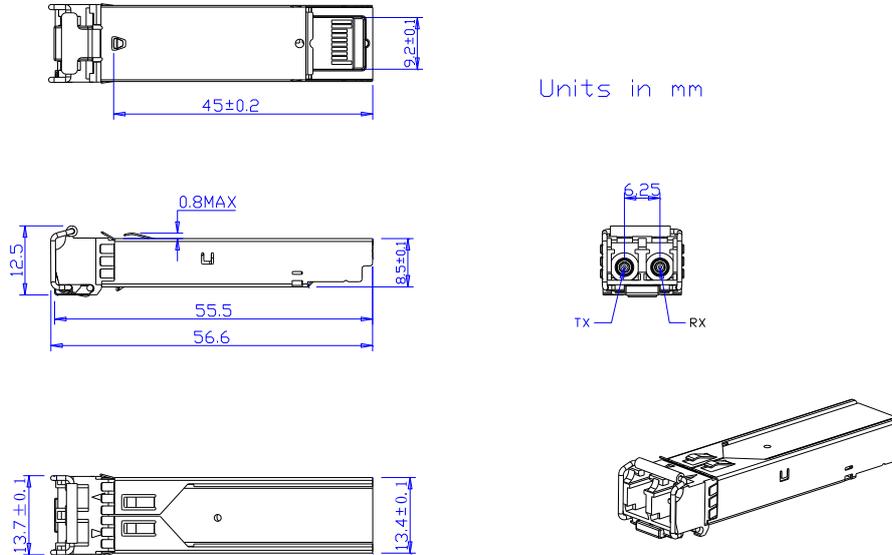
SFP-1G-SX-PLU

X.   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

XI. Ordering Information

When ordering, to choose the vendor you require such as Cisco, HP, Juniper etc you need to replace the 'XXX' at the end of each SKU with the relevant 3 digit vendor code, for instance if you wanted a Cisco Multimode 1.25Gb SFP then the SKU would read SFP-1G-SX-CIS.

VENDOR	CODE	VENDOR	CODE	VENDOR	CODE	VENDOR	CODE
3com	3CO	Cyan	CYN	Huawei	HUA	PlusOptic	PLU
Adtran	ADT	Compaq	COM	IBM	IBM	Q-logic	QLO
Alcatel-Lucent	ALC	Dell	DEL	Intel	INT	QNA	QNA
Allied Telesis	ATE	Delta	DTA	JDS Uniphase	JDS	RAD	RAD
Allnet	ALL	D-LINK	DLI	Juniper	JUN	Redback	RED
Arista Networks	ARI	EMC	EMC	LNV	LNV	Riverstone	RIV
Aruba Networks	ARU	EMU	EMU	Linksys	LIN	Silicom	SIL
Asante	ASA	Enterasys	ENT	Marconi	MAR	Smartoptic	SMO
Avago	AVA	Extreme	EXT	McAfee	McA	SMC	SMC
Avaya	AVY	F5 Networks	F5	Meraki	MER	Solarflare	SLF
Black Box	BLK	Finisar	FIN	Milan Techn	MIL	Sun	SUN
Blade	BLA	Fluke	FLU	Moxa	MOX	SuperMicro	SUP
Bluecoat	BLU	Force 10	F10	NetAPP	NAP	Telco	TEL
Broadcom	BRD	Fortinet	FOR	Netgear	NET	TP-Link	TPL
Brocade	BRO	Foundry	FOU	Nortel	NOR	Transition	TRA
Calix	CAL	Fujitsu	FUJ	Packeteer	PKT	Trendnet	TRE
Ceragon Networks	CRN	Gigamon	GIG	PacketLight	PKL	Voltaire	VOL
Check Point	CHE	H3C	H3C	Palo Alto	PAL	WGD	WGD
CHL	CHL	HIR	HIR	Penguin	PEN	WES	WES
Ciena	CIE	HP	HP	Perle	PER	ZTE	ZTE
Cisco	CIS	HP ProCurve	HPP	PicoLight	PIC	ZYXEL	ZYX
Citrix	CIX	Huawei	HUA	Planet	PLA		

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