

## SFP-FC-8.5G-10KM-PLU

### 8.5Gb/s SFP+ 10km Transceiver

#### PRODUCT FEATURES

- Supports 8.5Gbps bit rates
- Up to 10km transmission on SMF
- DFB Laser and PIN receiver
- Metal enclosure, for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Case operating temperature range: 0°C to 70°C
- Power dissipation < 1.5 W

#### APPLICATIONS

- Multi-rate 8x / 4x / 2x Fiber Channel

#### STANDARD

- Compliance with Fiber Channel FC-P1-4 800-SM-LC-L
- Compliant with 8G, 4G and, 2G Fiber Channel
- RoHS Compliant.

\*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

## I Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40	-	85	°C	
Relative Humidity	RH	5	-	95	%	
Power Supply Voltage	VCC	-0.3	-	4	V	
Signal Input Voltage		Vcc-0.3	-	Vcc+0.3	V	

## II Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	°C	Without air flow
Power Supply Voltage	VCC	3.14	3.3	3.47	V	
Power Supply Current	ICC	-		450	mA	
Data Rate	BR		8.5		Gbps	
Transmission Distance	TD		-	10	km	
Coupled fiber	Single mode fiber					9/125um SMF

## III Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Transmitter						
Output Opt. Power	P <sub>OUT</sub>	-6		-0.5	dBm	1
Optical Wavelength	λ	1260	1310	1355	nm	
Spectral Width (-20dB)	σ			1	nm	
Optical Extinction Ratio	ER	3.5			dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Output Eye Mask	Compliant with FC-PI-4					
Receiver						
Rx Sensitivity	R <sub>SENS</sub>			-14.4	dBm	2
Input Saturation Power (Overload)	P <sub>sat</sub>	0.5			dBm	
Wavelength Range	λ <sub>c</sub>	1270		1610	nm	
LOS De -Assert	LOSD			-17	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5	1.0		dB	

**Notes:**

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Measured with a PRBS  $2^{31}-1$  test pattern, @8.5Gb/s, BER< $10^{-12}$ .

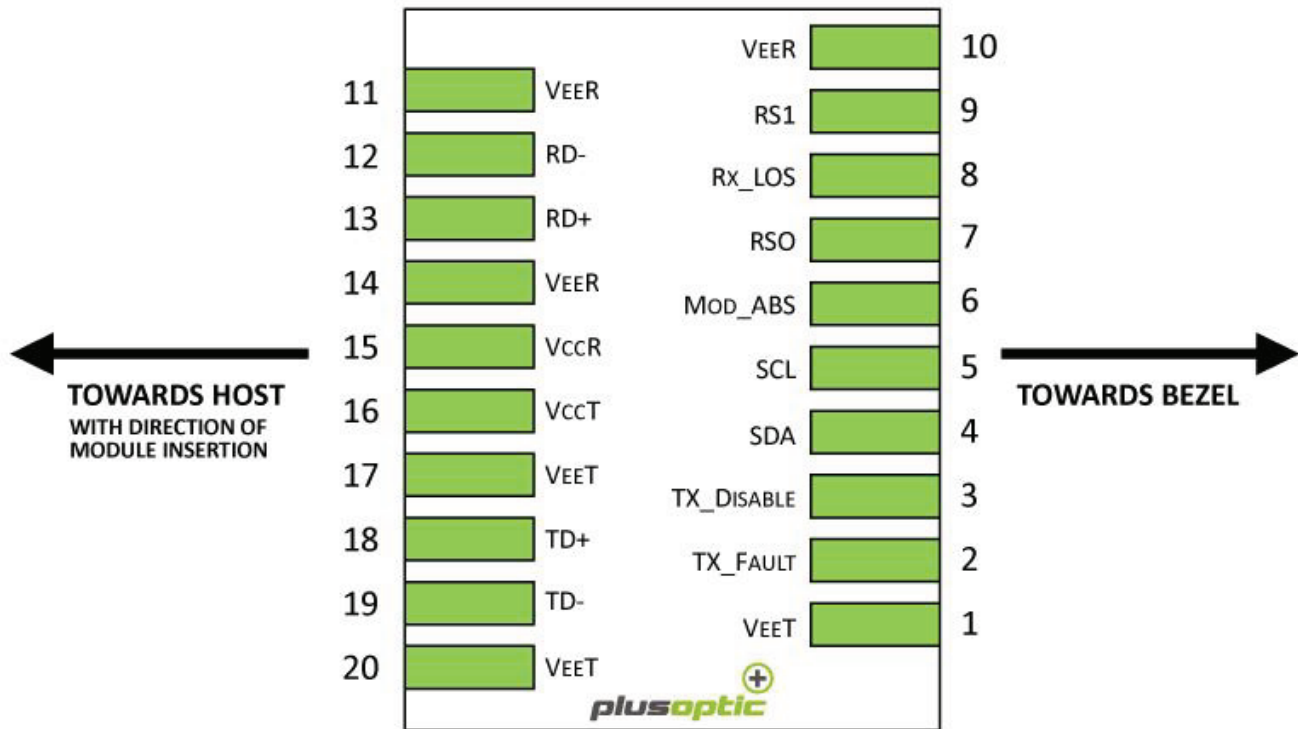
## IV. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Supply Voltage	Vcc	3.14	3.3	3.46	V	
Supply Current	Icc			450	mA	
<b>Transmitter</b>						
Input differential impedance	Rin		100		$\Omega$	1
Single ended data input swing	Vin,pp	180		700	mV	
Transmit Disable Voltage	VD	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	2
Transmit Disable Assert Time				10	us	
<b>Receiver</b>						
Differential data output swing	Vout,pp	300		850	mV	3
Data output rise time	tr	28			ps	4
Data output fall time	tf	28			ps	4
LOS Fault	VLOS fault	Vcc-1.3		VccHOST	V	5
LOS Normal	VLOS norm	Vee		Vee+0.8	V	5
Power Supply Rejection	PSR	100			mVpp	6

**Notes:**

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Into 100 ohms differential termination.
4. 20 – 80 %.
5. Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

## V. Pin Assignment



Pin out of Connector Block on Host Board

Pin	Symbol	Name/Description	NOTE
1	V <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1
2	T <sub>FAULT</sub>	Transmitter Fault.	2
3	T <sub>DIS</sub>	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	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	1
10	V <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
11	V <sub>EER</sub>	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 <sub>EER</sub>	Receiver Ground (Common with Transmitter Ground)	1
15	V <sub>CCR</sub>	Receiver Power Supply	
16	V <sub>CCT</sub>	Transmitter Power Supply	
17	V <sub>EET</sub>	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 <sub>EET</sub>	Transmitter Ground (Common with Receiver Ground)	1

#### Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T<sub>FAULT</sub> 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 threshold. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on T<sub>DIS</sub> >2.0V or open, enabled on T<sub>DIS</sub> <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. Internally pulled down per SFF-8431 Rev 4.1.
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.

## VI. Digital Diagnostic Functions

PLUOPTIC SFP-FC-8.5G-10KM-PLU transceivers support the 2-wire serial communication protocol as defined in the SFP+ MSA. The standard SFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

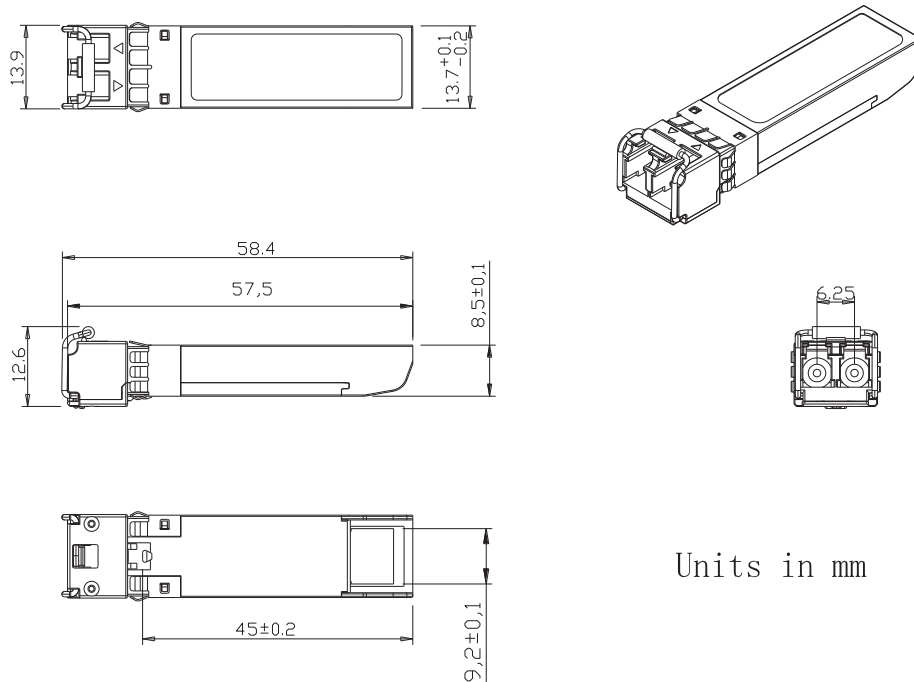
Additionally, PLUOPTIC SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. 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 EEPROM 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 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.

## VII. Outline Dimensions

Comply to SFF-8432 rev. 5.0, the improved Pluggable form factor specification.



## 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-550M-MMD-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	LVN	LVN	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		