10Gb/s SFP+ Transceiver SR 300m Hot Pluggable, Duplex LC, 850nm, VCSEL-FP, Multi-mode, DDM

Features:

- Up to 11.3Gb/s Data Links
- Hot-Pluggable SFP+ footprint
- Duplex LC
- 850nm VCSEL transmitter, PIN photo-detector
- Maximum link length of 300m on 2000 MHZ-km MMF
- 2-wire interface for management specifications compliant with SFF 8472
- Digital Diagnostic Monitoring Interface
- Power dissipation <1W
- Power Supply :+3.3V
- RoHS Compliant

Applications:

- 10GBASE-SR/SW Ethernet
- 10G Fibre Channel
- SONET OC-192/SDH STM-64

Description:

JUHUA's JHP-M85L-XGS3C1 is a very compact 10Gb/s optical transceiver module for serial optical communication applications at 10Gb/s. The JHP-M85L-XGS3C1 converts a 10Gb/s serial electrical data stream to 10Gb/s optical output signal and a 10Gb/s optical input signal to 10Gb/s serial electrical data streams. The high speed 10Gb/s electrical interface is fully compliant with SFI specification. The high performance 850nm VCSEL transmitter and high sensitivity PIN receiver provide superior performance for Ethernet applications at up to 300m links.

The SFP+ Module compliant with SFF-8431, SFF-8432 and IEEE 802.3ae 10GBASE-SR. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472. The fully SFP compliant form factor provides hot pluggability, easy optical port upgrades and low EMI emission.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	Ts	-40		85	ºC
Case operating temperature	T_A	0		70	ºC
Power Supply Voltage	Vcc	-0.5		4	V
Relative Humidity	RH	5		95	%

Recommended Operating Environment:

Parameter		Symbol	Min	Typical	Max	Unit
Case Operating Temperature	Commercial	T_C	0		+70	°C
Supply Voltage		V_{CC}	3.14	3.3	3.47	V
Supply Current		Icc			350	mA
Data Rate		BR		10.3125	11.3	Gbps
Transmission Distance		TD		-	10	km
Coupled Fiber		Singlemode Fiber				9/125um SMF

Electrical Characteristics(TOP = TC, VCC = 3.0 to 3.60 Volts)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			250	mA	
Power Consumption	P			1	W	
Transmitter Section:						
Input Differential Impedance	R_{IN}		100		Ω	1
Tx Input Single Ended DC Voltage Tolerance (Ref VeeT)	V	-0.3		4	V	
Differential input voltage swing	Vin,pp	180		700	mV	2
Total Power Supply Current	Icc	-		450	mA	
Transmit Disable Voltage	V_D	2	-	Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee	-	Vee+0.8	V	
Receiver Section:						
Single Ended Output Voltage Tolerance	V	-0.3		4	V	
Rx Output Diff Voltage	Vo	300		850	mV	
Rx Output Rise and Fall Time	Tr/Tf	30			ps	4
LOS Fault	$V_{LOSfault}$	2		Vcc$_{HOST}$	V	5
LOS Normal	$V_{LOS\ norm}$	Vee		V_{ee}+0.8	V	5

Note: 1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.

2. Per SFF-8431 Rev 3.0

3. Into 100 ohms differential termination.

4. 20%～80%

5. LOS is an open collector output. Should be pulled up with 4.7k – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

Optical Parameters(TOP = Tc, VCC = 3.0 to 3.60 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λc	840	850	860	nm	
RMS Spectral Width	λ_{RMS}			4	nm	
Average Optical Power	Pavg	-6	-	-1	dBm	1
Optical Power OMA	Poma		-1.5		dBm	
Laser Off Power	Poff			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Transmitter Dispersion Penalty	TDP			3.9	dB	2
Relative Intensity Noise	Rin			-128	dB/Hz	3
Optical Return Loss Tolerance		20			dB	
Receiver Section:						
Center Wavelength	λc	790		870	nm	
Receiver Sensitivity (OMA)	Sen			-11.1	dBm	4
Stressed Sensitivity (OMA)	Sen_{ST}			-7.5	dBm	4
LOS Assert	LOS_A	-30			dBm	
LOS Deassert	LOS_D			-12	dBm	
LOS Hysteresis	LOS_H	0.5			dB	
Overload	Sat	0			dBm	5
Receiver Reflectance	Rrx			-12	dB	

Note:

1. Average power figures are informative only, per IEEE802.3ae.

2. TWDP figure requires the host board to be SFF-8431compliant. TWDP is calculated using the Matlab code provided in clause 68.6.6.2 of IEEE802.3ae.

3. 12dB reflection.

4. Conditions of stressed receiver tests per IEEE802.3ae. CSRS testing requires the host board to be SFF-8431 compliant.

5. Receiver overload specified in OMA and under the worst comprehensive stressed condition.

Timing Characteristics:

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			10	us
TX_Disable Negate Time	t_on			1	ms
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms
TX_FAULT from Fault to Assertion	t_fault			100	us
TX_Disable Time to Start Reset	t_reset	10			us
Receiver Loss of Signal Assert Time	T_A,RX_LOS			100	us
Receiver Loss of Signal Deassert Time	T_d,RX_LOS			100	us
Rate-Select Chage Time	t_ratesel			10	us
Serial ID Clock Time	t_serial-clock			100	kHz

General Specifications

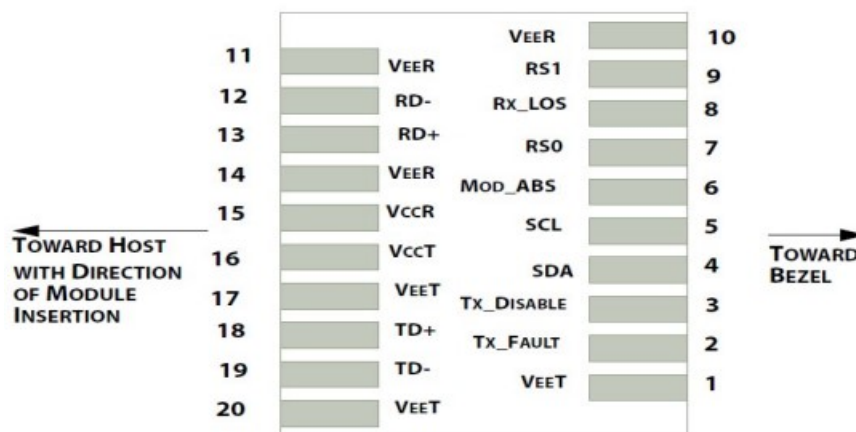| Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Bit Rate	BR	9.95		11.3	Gb/s	
Bit Error Ratio	BER			10-12		
Maximum Supported Distances						
Fiber Type	850nm OFL Bandwidth					
62.5μm	160 MHz-km			26	m	
	OM1 200 MHz-km			33	m	
50μm	400 MHz-km			66	m	
	OM2 500 MHz-km			82	m	
	OM3 2000 MHz-km			300	m	
	OM3 4700 MHz-km			500	m	

Pin Assignment:

Diagram of Host Board Connector Block Pin Numbers and Names

Pin Function Definitions:

Pin	Symbol	Name/Description	Ref.
1	$V_{EE}T$	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault	2
3	TDIS	Transmitter Disable. Laser output disabled on high or open	3
4	SDA	2-wire Serial Interface Data Line	
5	SCL	2-wire Serial Interface Clock Line	
6	MOD_ABS	Module Absent. Grounded within the module.	2
7	RS0	Rate Select 0	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	4
9	RS1	No connection required	
10	VeeR	Receiver Ground (Common with Transmitter Ground)	1

11	VeeR	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	VeeR	Receiver Ground (Common with Transmitter Ground)	1
15	VccR	Receiver Power Supply	
16	VccT	Transmitter Power Supply	
17	VeeT	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	VeeT	Transmitter Ground (Common with Receiver Ground)	1

Notes:

Note 1) The module ground pins shall be isolated from the module case.

Note 2) This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

Note 3) This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.

Note 4) This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host_Vcc on the host board.

SFP Module EEPROM Information and Management

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP -8472. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2 C interface at address A0h and A2h.

The memory is mapped in Table 1.

Detailed ID information (A0h) is listed in Table 2.

And the DDM specification at address A2h.

For more details of the memory map and byte definitions, please refer to the SFF-8472, "Digital Diagnostic Monitoring Interface for Optical Transceivers". The DDM parameters have been internally calibrated.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)
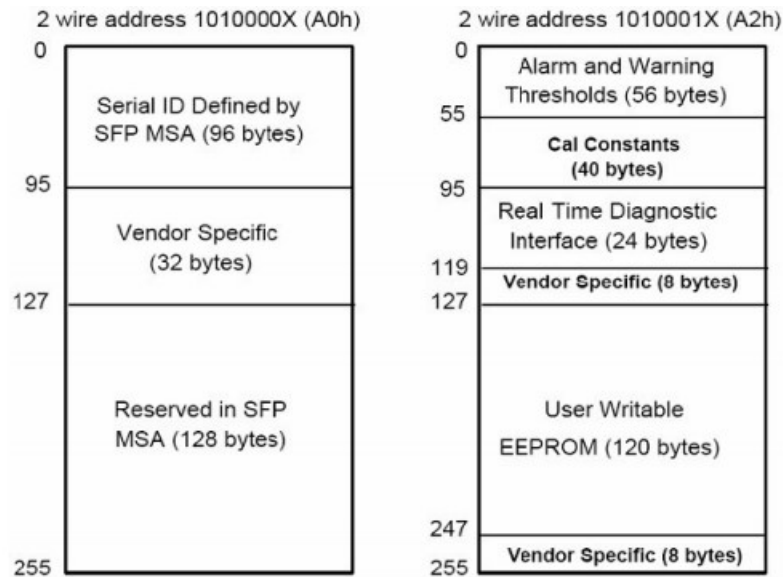
Table 2 - EEPROM Serial ID Memory Contents (A0h)

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	10G Base-LR
11	1	Encoding	64B/66B
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, unit of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, unit of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, unit of 10m
18	1	Length(Copper)	Link length supported for copper, unit of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: JUHUA
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "JHP-M85L-XGS3C1" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented(001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %

68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	JUHUA's Manufacturing date code
92-94	3	Reserved	Diagnostics
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	JUHUA specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

Digital Diagnostic Monitor Characteristics:

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales stuff.

| Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	°C
98-99	VCC3 Internal Supply Voltage	±5.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dBm
104-105	Rx Input Power	±3.0	dBm

Regulatory Compliance:

The JHP-M85L-XGS3C1 complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

| Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

Recommended Circuit:
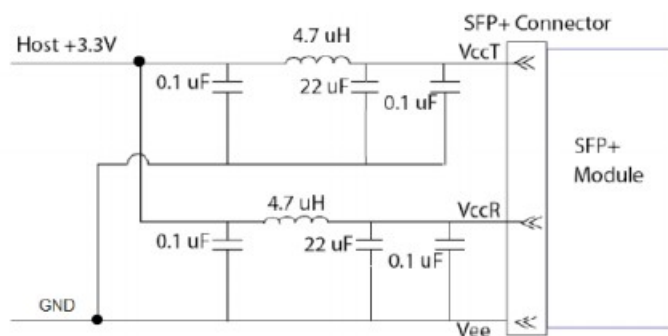
Recommended Host Board Power Supply Circuit
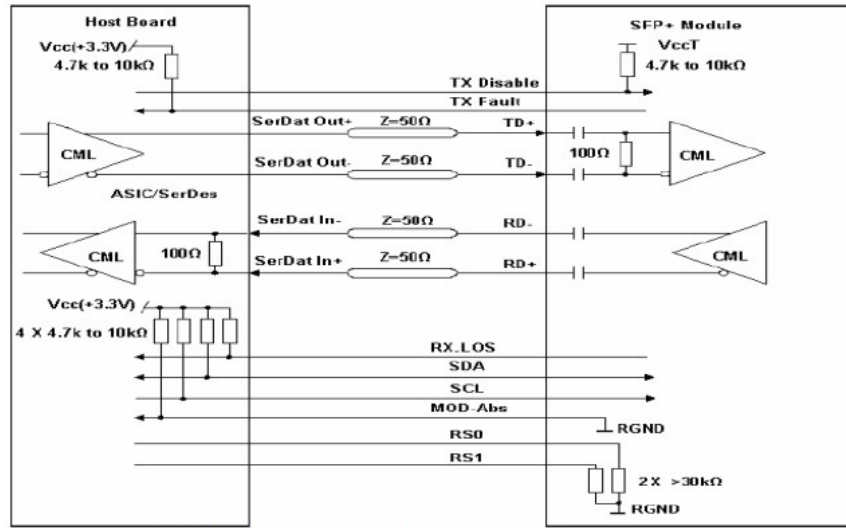
Recommended High-speed Interface Circuit

Mechanical Dimensions:
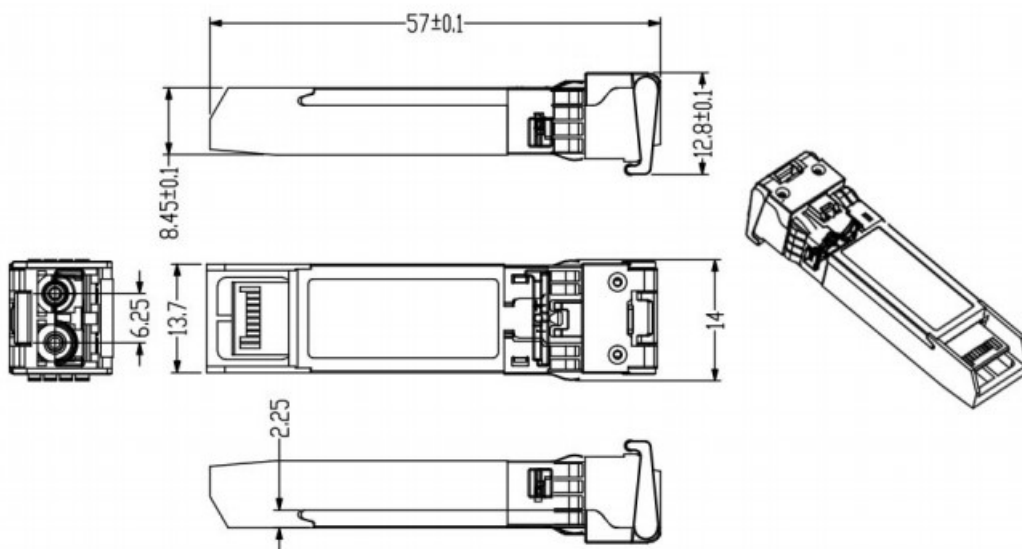
10Gb/s SFP+ Transceiver SR 300m (JHP-M85L-XGS3C1)
Hot Pluggable, Duplex LC, 850nm, VCSEL-FP, Multimode, DDM