1.25Gb/s 3km SFP Transceiver Bi-directional Hot Pluggable, LC, +3.3V, 1550nm, DFB-LD, Single-mode, DDM

Features:

- Up to 1.25Gb/s Data Links
- Hot-Pluggable
- Single LC connector
- Up to 3km on 9/125μm SMF
- 1550nm FP Laser transmitter
- 1310nm PIN Photo-detector
- Single +3.3V Power Supply
- Monitoring Interface Compliant with SFF-8472
- Low power dissipation <1W Typically
- Commercial operating temperature range: 0°C to 70°C Version available
- RoHS compliant and Lead Free

Applications:

- Metro/Access Networks
- 1.25 Gb/s 1000Base-LR Ethernet
- 1×Fibre Channel
- Other Optical Links

Description:

JUHUA's JHP-B53L-GE03C1 Transceiver is a high performance, cost effective module which have a Single LC optics interface. They are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA) and Digital diagnostics functions are available via the 2-wire serial bus specified in SFF-8472. The receiver section uses a PIN receiver and the transmitter uses a 1550 nm FP laser, up to 12dB link budge ensure this module 1000Base-SX Ethernet 3km application.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	Ts	-40		85	ºC
Supply Voltage	Vcc	-0.5		4	V
Relative Humidity	RH	0		85	%

Recommended Operating Environment:

Parameter		Symbol	Min	Typical	Max	Unit
Case Operating Temperature	Commercial	TC	0		+70	°C
Supply Voltage		VCC	3.135		3.465	V
Supply Current		Icc			250	mA
Inrush Current		Isurge			Icc+30	mA
Maximum Power		Pmax			1	W

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter Section:						
Input differential impedance	Rin	90	100	110	Ω	1
Single ended data input swing	Vin PP	200		1200	mVp-p	
Transmit Disable Voltage	VD	Vcc – 1.3		Vcc	V	2
Transmit Enable Voltage	VEN	Vee		Vee+0.8	V	
Transmit Disable Assert Time	Tdessert			10	us	
Receiver Section:						
Single ended data output swing	Vout,pp	300		800	mv	3
Data output rise time	tr			150	ps	4
Data output fall time	tf			150	ps	4
LOS Fault	Vlosfault	Vcc – 0.5		V_{CC_host}	V	5
LOS Normal	Vlos norm	Vee		$V_{ee+0.5}$	V	5
Power Supply Rejection	PSR	100			mVpp	6
Deterministic Jitter Contribution	RXΔDJ			51.7	ps	7
Total Jitter Contribution	RXΔDJ			122.4	ps	

Note:

1. AC coupled.
2. Or open circuit.
3. Into 100 ohm differential termination.
4. 20 – 80 %
5. LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000. 7. Measured with DJ-free data input signal. In actual application, output DJ will be the sum of input DJ and DJ.

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

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λc	1530	1550	1570	nm	
Spectral Width(RMS)	σ			4	nm	
Optical Output Power	P_{out}	-9		-3	dBm	1
Optical Rise/Fall Time	t_r / t_f			260	ps	2
Extinction Ratio	ER	9			dB	
Deterministic Jitter Contribution	TXΔDJ			56.5	ps	
Total Jitter Contribution	TXΔTJ			0.284	UI	3
Relative Intensity Noise	RIN			-120	dB/Hz	
Eye Mask for Optical Output	Compliant with IEEE 802.3z standard (class 1 laser safety)					
Receiver Section:						
Optical Input Wavelength	λc	1270	1310	1600	nm	
Receiver Overload	P_{ol}	-3			dBm	4
RX Sensitivity	Sen			-21	dBm	4
RX_LOS Assert	LOS_A	-35			dBm	
RX_LOS Deassert	LOS_D			-22	dBm	
RX_LOS Hysteresis	LOS_H	0.5			dB	
General Specifications						
Data Rate	BR		1.25			
Bit Error Rate	BER			10^{-12}		
Max. Supported Link Length on 9/125μm SMF@1.25G	LMAX		3		km	
Total System Budget	LB	12			dB	

Note

1. The optical power is launched into SMF.
2. 20-80%.
3. Contributed total jitter is calculated from DJ and RJ measurements using TJ = RJ + DJ. Contributed RJ is calculated for $1x10^{-12}$ BER by multiplying the RMS jitter (measured on a single rise or fall edge) from the oscilloscope by 14. Per FC-PI (Table 9 - SM jitter output, note 1), the actual contributed RJ is allowed to increase above its limit if the actual contributed DJ decreases below its limits, as long as the component output DJ and TJ remain within their specified FC-PI maximum limits with the worst case specified component jitter input.
4. Measured with PRBS 2^{7-1} at 10^{-12} BER

Pin Assignment:

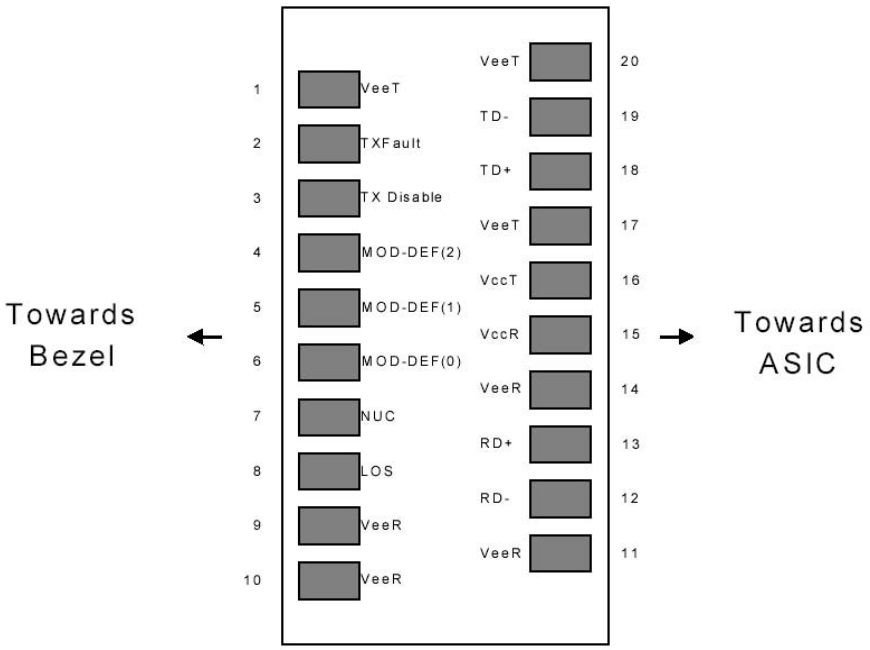


Diagram of Host Board Connector Block Pin Numbers and Names

Pin Function Definitions:

Pin	Symbol	Name/Description	Ref.
1	$V_{EE}T$	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault	
3	TDIS	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
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	6
13	RD+	Receiver Non-inverted DATA out. AC Coupled	6
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	1
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	
18	TD+	Transmitter Non-inverted DATA in. AC Coupled	6
19	TD-	Transmitter Inverted DATA in. AC Coupled	6
20	VEET	Transmitter Ground (Common with Receiver Ground)	

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS
3. Should be pulled up with 4.7k - 10 kohms 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. Rate select is not used
5. LOS is open collector output. Should be pulled up with 4.7k – 10 kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. AC Coupled

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. Digita

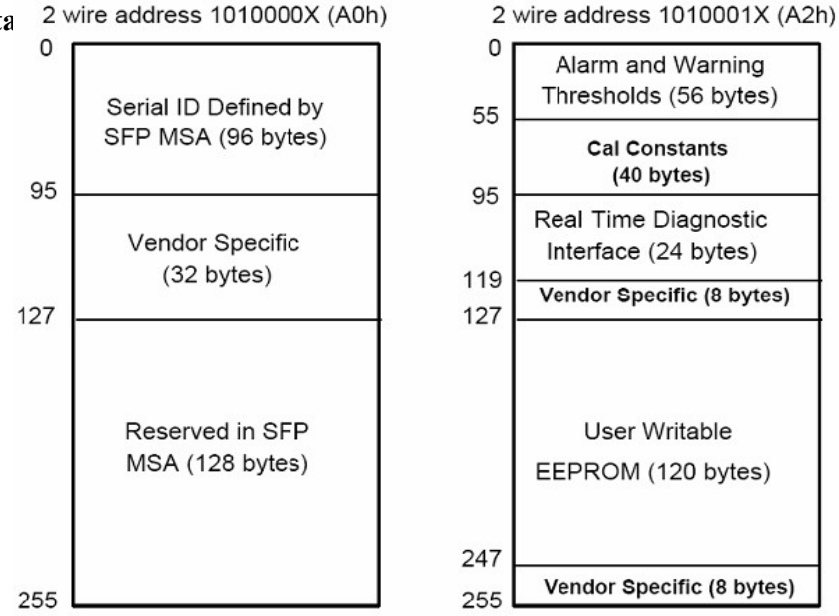


Table 2 - EEPROM Serial ID Memory Contents (A0h)

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	
11	1	Encoding	NRZ(03h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13	1	Reserved	(0000h)
14	1	Length(9um,km)	Link length supported for 9/125um fiber, units of km
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-B53L-GE03C1” (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-61	2	Wavelength	Laser Wavelength
62	1	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	1	Diagnostic Type	Diagnostics
93	1	Enhanced Options	Diagnostics
94	1	SFF-8472	Diagnostics
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	Vendor specific date, read only

Diagnostics Memory Contents(A2h):

Data Address	Length (Byte)	Name of Length	Description and Contents
Diagnostic and control/status fields			
0-39	40	A/W Thresholds	Diagnostic Flag Alarm and Warning Thresholds
40-55	16	Unallocated	
56-91	16	Ext Cal Constants	Diagnostic calibration constants for optional External Calibration
92-94	3	Unallocated	
95	1	CC_DMI	Check code for Base Diagnostic Fields (addresses 0 to 94)
96-105	10	Diagnostics	Diagnostic Monitor Data (internally or externally calibrated)
106-109	4	Unallocated	
110	1	Status/Control	Optional Status and Control Bits
111	1	Reserved	Reserved for SFF-8079
112-113	2	Alarm Flags	Diagnostic Alarm Flag Status Bits
114-115	2	Unallocated	
116-117	2	Warning Flags	Diagnostic Warning Flag Status Bits
118-119	2	Ext Status/Control	Extended module control and status bytes
General use fields			
120-127	8	Vendor Specific	Vendor specific memory addresses
128-247	120	User EEPROM	User writable non-volatile memory
248-255	8	Vendor Control	Vendor specific control addresses

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.

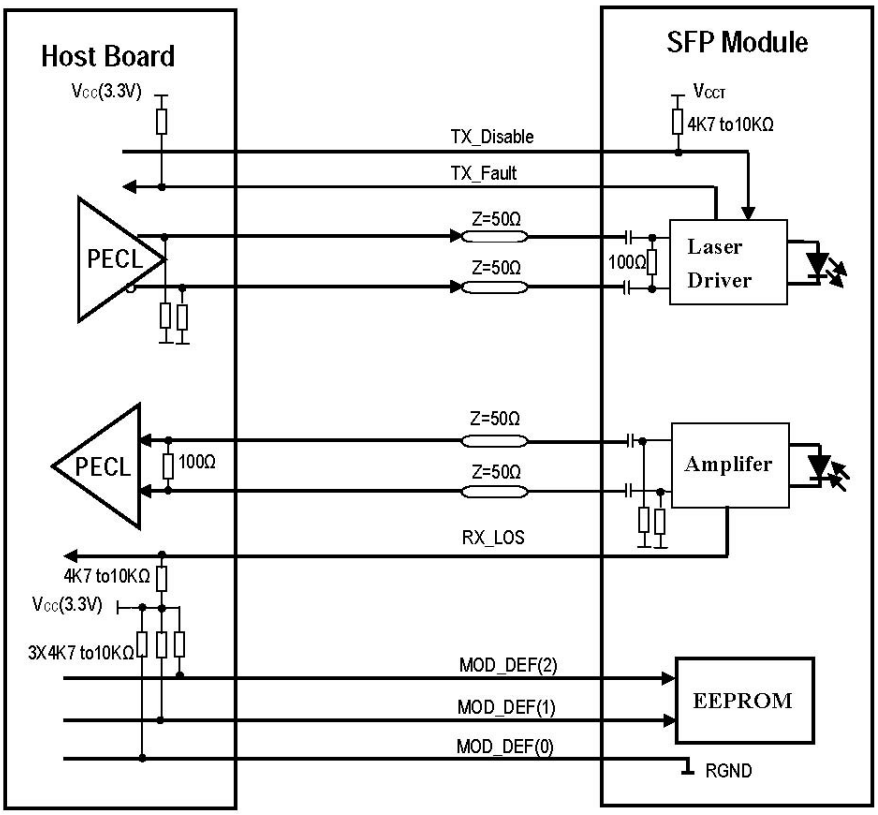
Data Address	Parameter	Accuracy	Unit
96-97	Transceiver Internal Temperature	±3.0	°C
98-99	VCC3 Internal Supply Voltage	±5.0	%
100-101	Laser Bias Current	±10	%
102-103	Tx Output Power	±3.0	dBm
104-105	Rx Input Power	±3.0	dBm

Regulatory Compliance:

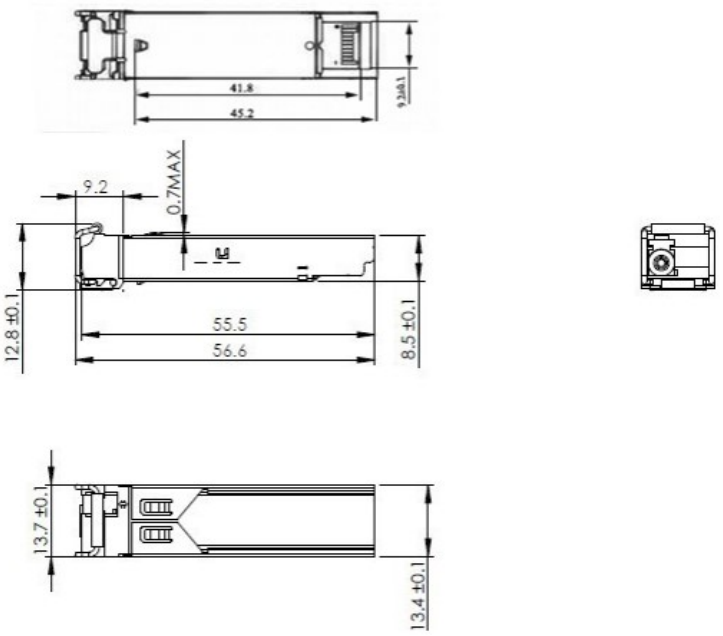
The JHP-B53L-GE03C1 complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

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:



Mechanical Dimensions:



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