



PICadvanced

1.25 Gbps 1310/1490 Compact SFP Transceiver

PA-CSFPB43-2CH-1000B-E-E-I

Revision 1

Revision History

Revision nr.	Description	Date
1	Initial release	March 2019

Features:

- 1250Mbps Typical Data Rate
- DFB laser transmitter
- PIN photo-detector
- Up to 40km on 9/125um SMF
- Hot-pluggable CSFP footprint
- LC/UPC type pluggable optical interface
- Achieve operational compatibility with conventional SFP
- Metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- Support Digital Diagnostic Monitoring interface
- Compliant with SFF-8472
- Case operating temperature: -40C to +85C

Applications:

- Point to Point FTTH Application
- Switched Backplane Applications
- Router/Server Interface
- Switch to Switch Interface
- Other Optical Links

General

These transceivers are compatible with the Compact Small Form- Factor Pluggable (CSFP) Multi-Source Agreement (MSA) option 2, The transceiver consists of 2-channel Bi-directional Optical Transceiver unit with five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the 1310nm FP laser (the 1490nm 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. Conventional SFP will function when plugged into a C-SFP socket, at the same time no damage to C-SFP and host board if C-SFP module is plugged into a conventional SFP socket.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Relative Humidity	RH	5	95	%
Power Supply Voltage	V _{CC}	-0.5	+4	V
Input Voltage	-	-0.3	V _{CC} +0.3	V
Receiver damage threshold		3		dBm

Recommended Operating Conditions

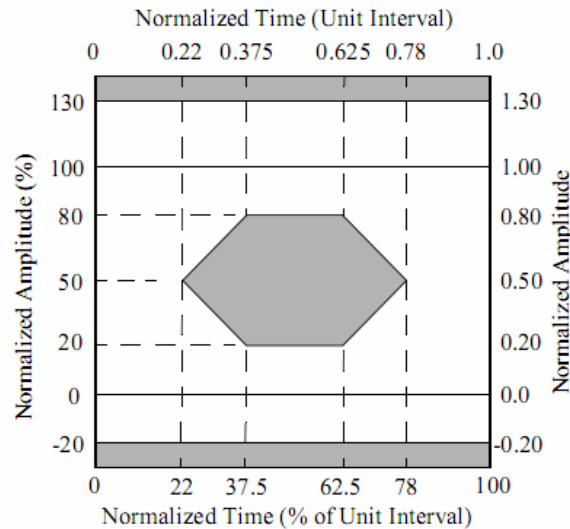
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature		-40	-	85	°C	
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Supply Current	-	-		450	mA	
Power Supply Noise Rejection	-	-	-	100	mVp-p	100Hz to 1Mhz
Data Rate	DR	-	1.25/1.25	-	Gbps	Tx rate/ Rx rate
Transmission Distance	TD	-	-	40	km	
Coupled fiber	Single mode fiber					9/125um SMF

Electrical-Optical Transmitter Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	note
Center Wavelength	λ	1480	1490	1500	nm	
Average Optical Power	PO	-5	-	0	dBm	1
Extinction Ratio	ER	9		-	dB	
Spectrum width (-20dB)	σ			1	nm	
SMSR		30				
Transmitter OFF Output Power	P _{off}			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ω	
Optical Eye Diagram Mask	Compliant with ITU recommendation IEEE 802.3Z					2

Electrical-Optical Receiver Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Optical Central Wavelength	λ_C	1260	1310	1360	nm	-
Sensitivity	P _{sen}	-	-	-21	dBm	3
Saturation Optical Power	P _{sat}	-0.5	-	-	dBm	
LOS Assert Power	PA	-35	-	-	dBm	-
LOS De-Assert Power	PD	-	-	-24	dBm	4
LOS Hysteresis	-	0.5	2	6	dB	-



Note:

1. Measure at 2⁷-1 NRZ PRBS pattern
2. Transmitter eye mask definition, and eye mask diagram with at least 10% margin.
3. Measured with Light source 1490nm(1310nm), ER=9dB; BER =<10⁻¹² @PRBS=2⁷-1 NRZ.
4. When LOS de-asserted, the RX data+/- output is signal output.

Transmitter Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Total Supply Current	I _{CC}	-		450	mA	
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	V _{TxFH}	2		V _{CC} +0.3	V	
Transmitter Fault Input-Low	V _{TxFL}	0		0.8	V	

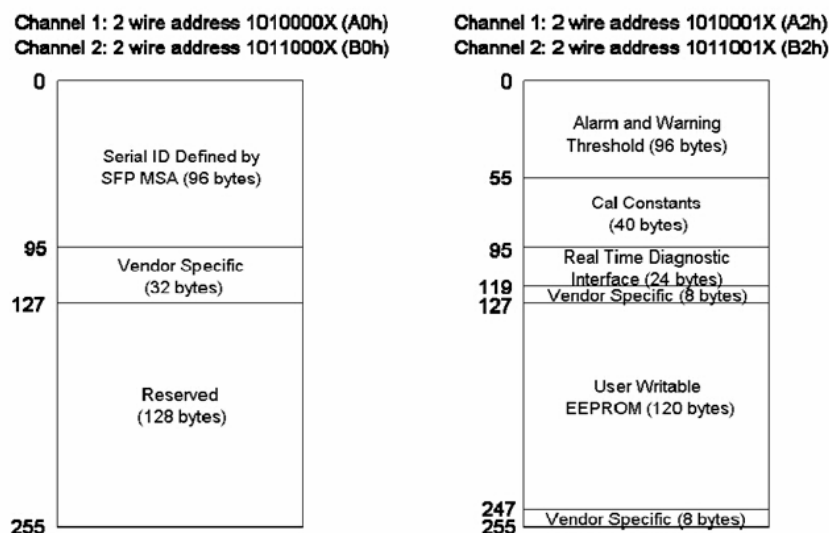
Receiver Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Total Supply Current	I _{CC}	-		450	mA	
LOSS Output Voltage-High	V _{LOSH}	2		V _{CC} +0.3	V	LVTTTL
LOSS Output Voltage-Low	V _{LOSL}	0		0.8	V	

Digital Diagnostic Functions

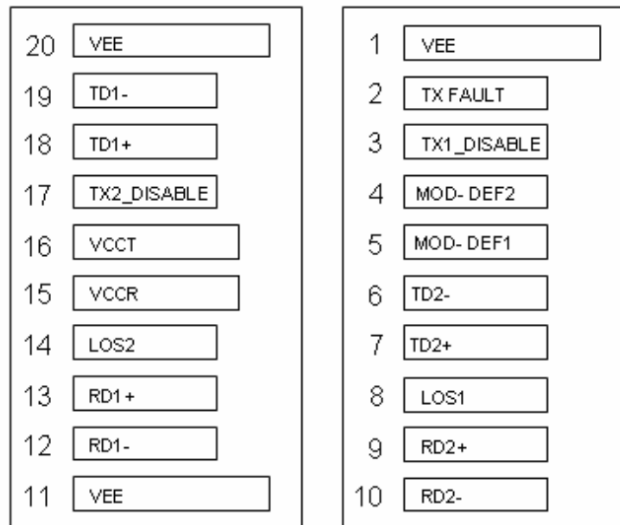
These transceivers support the 2-wire serial communication protocol as defined in the CSFP MSA. It is very closely related to the E2PROM defined in the GBIC standard, with the same electrical specifications. The standard CSFP serial ID provides access to identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. Additionally, CSFP 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 operating parameters are outside of a factory set normal range.

The CSFP 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) or 1011000X(B0h). The digital diagnostic monitoring interface makes use of the 8-bit address 1010001X (A2h) or 1011001X(B2h), so the originally defined serial ID memory map remains unchanged. The digital diagnostic memory is defined as follow:



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.

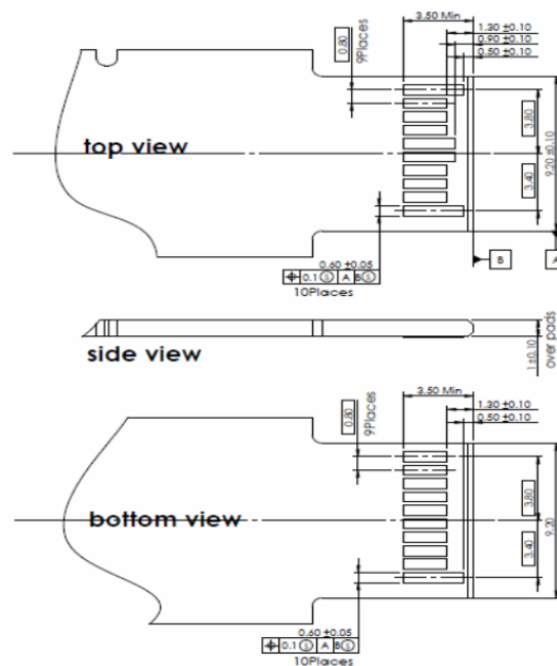
PIN Diagram



Top view of Board

Bottom view of Board

(As a view through top of board)



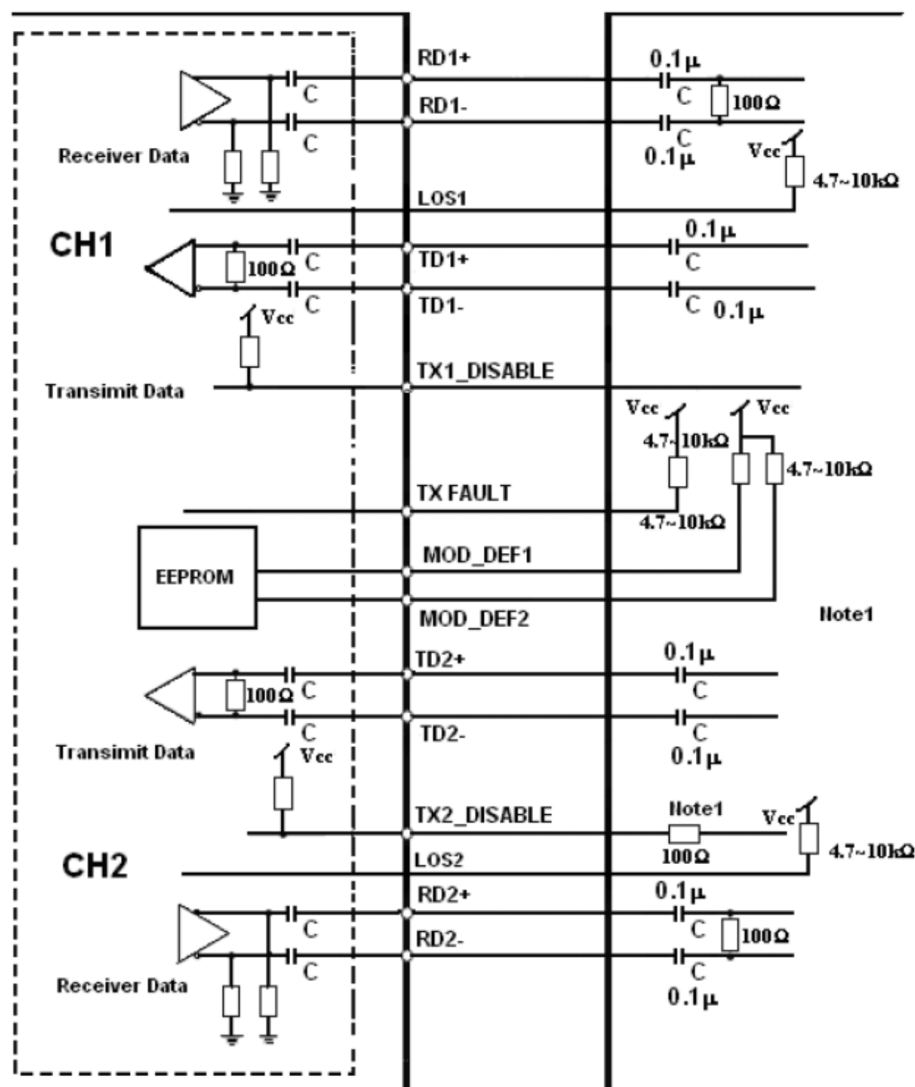
PIN Description

Pin	Name	Function	Notes
1	VeeT	Transmitter Ground	VEE may be internally connected within the SFP module
2	Tx Fault	Transmitter Fault Indication	TX Fault is an open collector/drain output, which should be pulled up with a 4.7K-10K resistor on the host board. Note 1 for more information

3	Tx1_Disable	Transmitter Disable of Ch A	Module channel A disables function
4	MOD-DEF2	Two-wires interface Data	2 wire serial ID interface, SDA
5	MOD-DEF1	Two-wires interface Clock	2 wire serial ID interface, SCL
6	TD2-	Inverted transmit data input of Ch B	These are the differential transmitter puts. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
7	TD2+	Transmit data input of Ch B	
8	LOS1	Los Of Signal Ch A	Loss of Signal detected function. Note 2 for more information.
9	RD2+	Received data output of Ch B	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
10	RD2-	Inverted received data output of Ch B	
11	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.
12	RD1-	Inverted Received Data Output of Ch A	These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100 (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
13	RD1+	Received Data Output of Ch A	
14	LOS2	Loss of Signal of CH B	Loss of Signal detected function.
15	VCCR	Receiver Power	3.3V± 5%. Note 3 for more information
16	VCCT	Transmitter Power	3.3V±5%. Note 3 for more information
17	TX2_Disable	Transmitter Disable of Ch B	Module channel B disables function
18	TD1+	Transmit Data Input of Ch A	These are the differential transmitter puts. They are AC-coupled, differential lines with 100 differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board
19	TD1-	Inverted Transmit Data Input of Ch A	
20	VEE	Transceiver Ground	VEE may be internally connected within the SFP module.

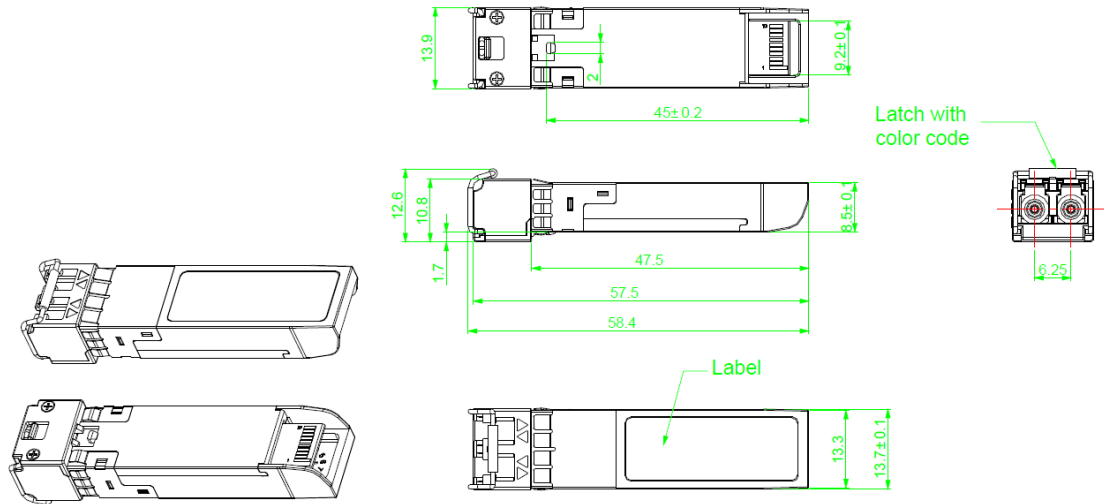
Notes:

1. When high, output indicates a laser fault of some kind either in Channel A or Channel B. The Host shall read Channel A/B for details: TX Fault from channel A if bit 2 is set in [A2H:110]; TX Fault from channel B if bit 2 is set in [B2H: 110]. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
2. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.
3. VccT VccR are the power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 400Ma@3.3V. Vcc may be internally connected within the SFP transceiver module.

Recommended Circuit


Note1: Recommendation 100Ω series resistance on host board.

Package Diagram



Unit: mm

Order information:

Please contact PICadvanced for ordering and quotation: global@picadvanced.com