

Features



- Integrated Diplexer Transceiver
- 2x10 SFF pinout supports I²C digital diagnostics
- Voice/Data FTTx ONT/ONU Applications
- FSAN G.984.2 Specifications
- 1244 Mbps Tx, 2488 Mbps Rx Asymmetric Data Rate
- 1310 nm Tx, 1490 nm Rx
- Burst Mode Transmission
- Digital diagnostic interface compliant with SFF-8472 Rev 9.5
- 28 dB link budget; 20 km reach
- Commercial (0 to 70°C) or Industrial (-40 to 85°C) temperature operating range
- Compliant to IEC-60825 Class 1 laser diode
- RoHS-6/6 compliant

Regulatory Compliance

Table 1 - Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>500 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B)	Compatible with standards
Immunity	IEC 61000-4-3	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class I laser product.
Component Recognition	UL and CSA	Compliant with standards
RoHS	2002/95/EC 4.1&4.2 2005/747/EC	Compliant with standards ^{note}

Note:

In light of item 5 in Annex of 2002/95/EC, "Pb in the glass of cathode ray tubes, electronic components and fluorescent tubes." and item 13 in Annex of 2005/747/EC, "Lead and cadmium in optical and filter glass.", the two exemptions are being concerned for Source Photonics transceivers, because Source Photonics transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Absolute Maximum Ratings

Table 2 - Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Ambient Temperature	T _s	-40		85	°C	
Operating Case Temperature	T _c	0		70	°C	C-temp
		-40		85	°C	I-temp
Operating Relative Humidity	RH	10		95	%	
V _{cc_Rx}		-0.3		4.2	V	
V _{cc_Tx}		-0.5		6.0	V	
Soldering Temperature/Time				260/10	°C/s	

Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Voltage	V _{CC}	3.14	3.3	3.46	V	
Operating Case Temperature	T _c	0		70	°C	C-temp
		-40		85	°C	I-temp
Operating Relative Humidity	RH	10		95	%	
Data Rate(Upstream/Downstream)			1244.16/2488.32		Mbit/s	
Consecutive Identical Digital Immunity				72	Bit	

Module Characteristics

Table 4 –Module Characteristics

Parameter	Min.	Typical	Max.	Unit	Notes
1310nm Tx to 1490nm Rx Crosstalk	-	-	-47	dB	
1555nm Rx to 1490nm Isolation	30	-	-	dB	
G.984.5 Wavelength Filter (WBF) X/S	7	-	-	dB	1530nm to 1539nm
	22	-	-	dB	1539nm to 1625nm
Total Tx Supply Current	-	-	175	mA	
Total Rx Supply Current	-	-	175	mA	

Optical Characteristics

Table 5 – Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength	λ_C	1290		1330	nm	
Optical Spectrum Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30				
Average Launch Power	P_{OUT}	0.5		5	dBm	
Average Launch Power-OFF Transmitter	P_{OFF}			-50	dBm	
Extinction Ratio	EX	10			dB	1
Optical Rise and Fall Time				250	ps	2
Tx_Burst Enable Time	T_{EN}			12.86	ns	3
Tx_Burst Disable Time	T_{DIS}			12.86	ns	
Optical Eye Diagram	Compliant With ITU-T G984.2					
Receiver						
Operating Wavelength	λ_C	1480		1500	nm	
Sensitivity	P_{SEN}			-28	dBm	4
Overload	P_{OL}	-8			dBm	
Signal-Detected Assert Level	P_{SDA}			-28	dBm	5
Signal-Detected Deassert Level	P_{SDD}	-45			dBm	6
Signal-Detected Hysteresis	$P_{SDA} - P_{SDD}$	0.5		6	dBm	
RSSI Range		-28		-8	dBm	
RSSI Accuracy		-3		3	dB	
Optical Return Loss		20			dB	

Notes:

1. PRBS $2^{23}-1$, NRZ, 50% duty cycle
2. 20% to 80%
3. 16 bits data @1244Mbps
4. $BER \leq 10^{-10}$, PRBS $2^{23}-1$, 50% duty cycle
5. Transition during increasing light
6. Transition during decreasing light

Electrical Characteristics

Table 6 – Electrical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Data Input Differential Swing	V_{IN}	200		2000	mVp-p	
Input Differential Impedance	Z_{IN}		100		Ω	
Transmitter Burst Control Voltage - Low	$V_{burst, L}$	0		0.8	V	
Transmitter Burst Control Voltage - High	$V_{burst, H}$	2.0		3.3	V	
Receiver						
Data Output Rise and Fall Time	T_{OUT}			160	ps	1
Data Output Differential Swing	V_{OUT}	400		1600	mV _{P-P}	2
Signal-Detected Voltage - Low	$V_{SD, L}$			0.4	V	3
Signal-Detected Voltage - High	$V_{SD, H}$	2.4		3.3	V	4

Notes:

1. 20% to 80%
2. CML output, ac coupled (0.1 μ F)
3. LVTTTL. De-asserts LOW when input data amplitude is below threshold.
4. LVTTTL with internal pull up resistor. Asserts HIGH when input data amplitude is above threshold.

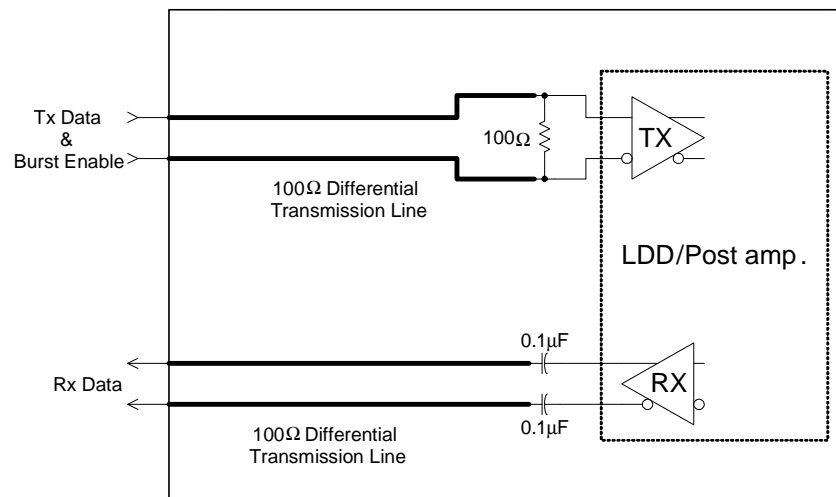


Figure 1 - Schematic representation of the module high speed inputs/outputs

Pin Definitions

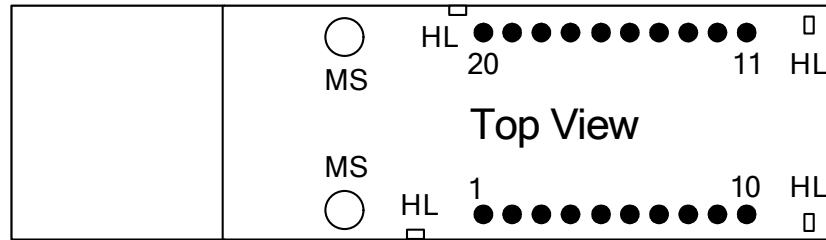


Figure 2, 2×10 SFF Platform

Table 7 –Pin Function Definitions

Pin	Name	Description
1	NC	No User Connection
2	GND_RX	Digital Rx Ground
3	GND_RX	Digital Rx Ground
4	NC	Reserved. No User Connection
5	NC	Reserved. No User Connection
6	GND_RX	Digital Rx Ground
7	V _{CC} _RX	Digital Rx Vcc
8	SD	Signal Detect output, pull up internally. Asserts high when input optical power level is above threshold
9	RxD-	RX data bar output, CML. 50Ω terminated to Vcc and AC coupled to module output (0.1μF)
10	RxD+	RX data output, CML. 50Ω terminated to Vcc and AC coupled to module output (0.1μF)
11	V _{CC} _TX	Digital TX Vcc
12	GND_TX	Digital TX Ground
13	TX_ENB	TX Burst Enable, LVTTTL Input, Asserts high when burst is enabled.
14	TxD+	TX data input, CML. Internally DC coupled. 100Ω differential termination.
15	TxD-	TX data bar input, CML. Internally DC coupled. 100Ω differential termination.
16	GND_TX	Digital TX Ground
17	SCL	Clock Line of the I ² C interface
18	SDA	Data Line of the I ² C interface
19	TX Fault	TX Fault Alarm, LVTTTL Output, TX Fault State: High; TX Normal State: Low
20	NC	Reserved. No User Connection (Reserved for TX_SD function)
S	HL	Housing Leads, Optional for signal grounding
F	MS	Mounting Studs, Optional for equipment chassis ground

EEPROM Information

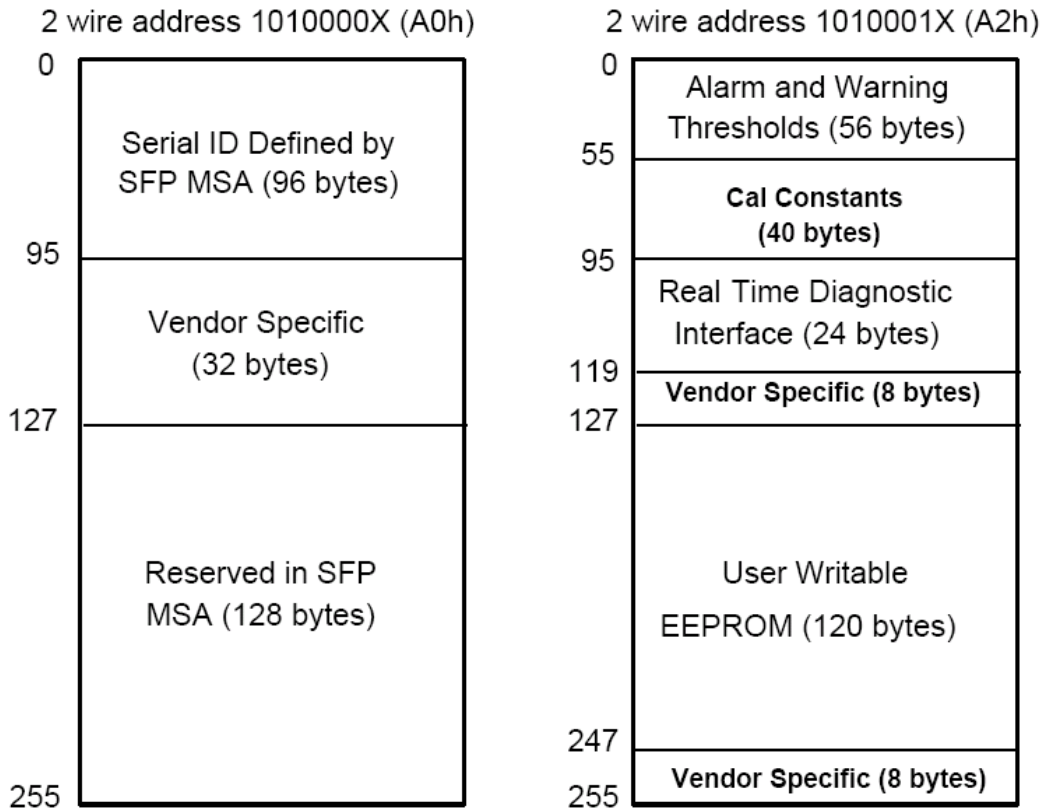


Figure 3, 2-wire Serial Digital Diagnostic Memory Map

Table 8 –EEPROM Serial ID Memory Contents (A0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
0	1	Identifier	02	SFF transceiver
1	1	Ext. Identifier	04	MOD4
2	1	Connector	01	SC
3-10	8	Transceiver	00 00 00 00 00 00 00 00	(Transmitter Code, not defined for GPON)
11	1	Encoding	03	NRZ
12	1	BR, Nominal	0C	1.244Gbps
13	1	Reserved	00	
14	1	Length (9um)-km	14	20(km)
15	1	Length (9um)	C8	200(100m)
16	1	Length (50um)	00	Not Support MMF
17	1	Length (62.5um)	00	Not Support MMF
18	1	Length (Copper)	00	Not Support Copper

19	1	Reserved	00	
20-35	16	Vendor name	53 4F 55 52 43 45 50 48 4F 54 4F 4E 49 43 53 20	“SOURCEPHOTONICS”(ASC II)
36	1	Reserved	00	
37-39	3	Vendor OUI	00 00 00	
40-55	16	Vendor PN	53 46 53 33 34 32 34 54 48 50 43 44 41 20 20 20	“SFS3424THPCDA”(ASCII)
40-55	16	Vendor PN	53 46 53 33 34 32 34 54 48 50 54 44 41 20 20 20	“SFS3424THPTDA”(ASCII)
56-59	4	Vendor Rev	31 30 20 20	ASCII(“31 30 20 20” means 1.0 Revision)
60-61	2	Wavelength	05 1E	1310nm Laser Wavelength
62	1	Reserved	00	
63	1	CC_BASE	xx	Check sum of byte 0-62
64-65	2	Options	00 0A	TX-fault, Loss of Signal
66	1	BR, max	00	
67	1	BR, min	00	
68-83	16	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	ASCII
84-91	8	Date code	xx xx xx xx xx xx 20 20	Year(2 bytes),Month(2 bytes), Day(2 bytes)
92	1	Diagnostic Monitoring Type	68	Compliant with SFF-8472 V9.5 Internally Calibrated Received power measurement type -Average Power
93	1	Enhanced Options	B0	Diagnostics (Optional Alarm/warning flags). Soft TX_FAULT monitoring implemented. Soft RX_Los monitoring implemented.
94	1	SFF-8472 Compliance	02	Diagnostics Compliance(SFF-8472 V9.5)
95	1	CC_EXT	xx	Check sum of byte 64-94
96-255	160	Customer Specific		

Note: The “xx” byte should be filled in according to practical case. For more information, please refer to the related document of SFF-8472 Rev 9.5.

Table 7 – Digital Diagnostic Specification (A2h)

Data Address	Parameter	Range	Accuracy
96-97	Micro-controller Temperature	-5 to 85°C (C-temp) -40 to 85°C (I-temp)	±3°C
98-99	Vcc Voltage	2.97 to 3.63V	±3%
100-101	Tx Bias	0 to 70 mA	±10%
102-103	TX Power	0 to 5dBm	±2dB
104-105	RX Power	-28 to -8dBm	±3dB

Recommended Interface Circuit

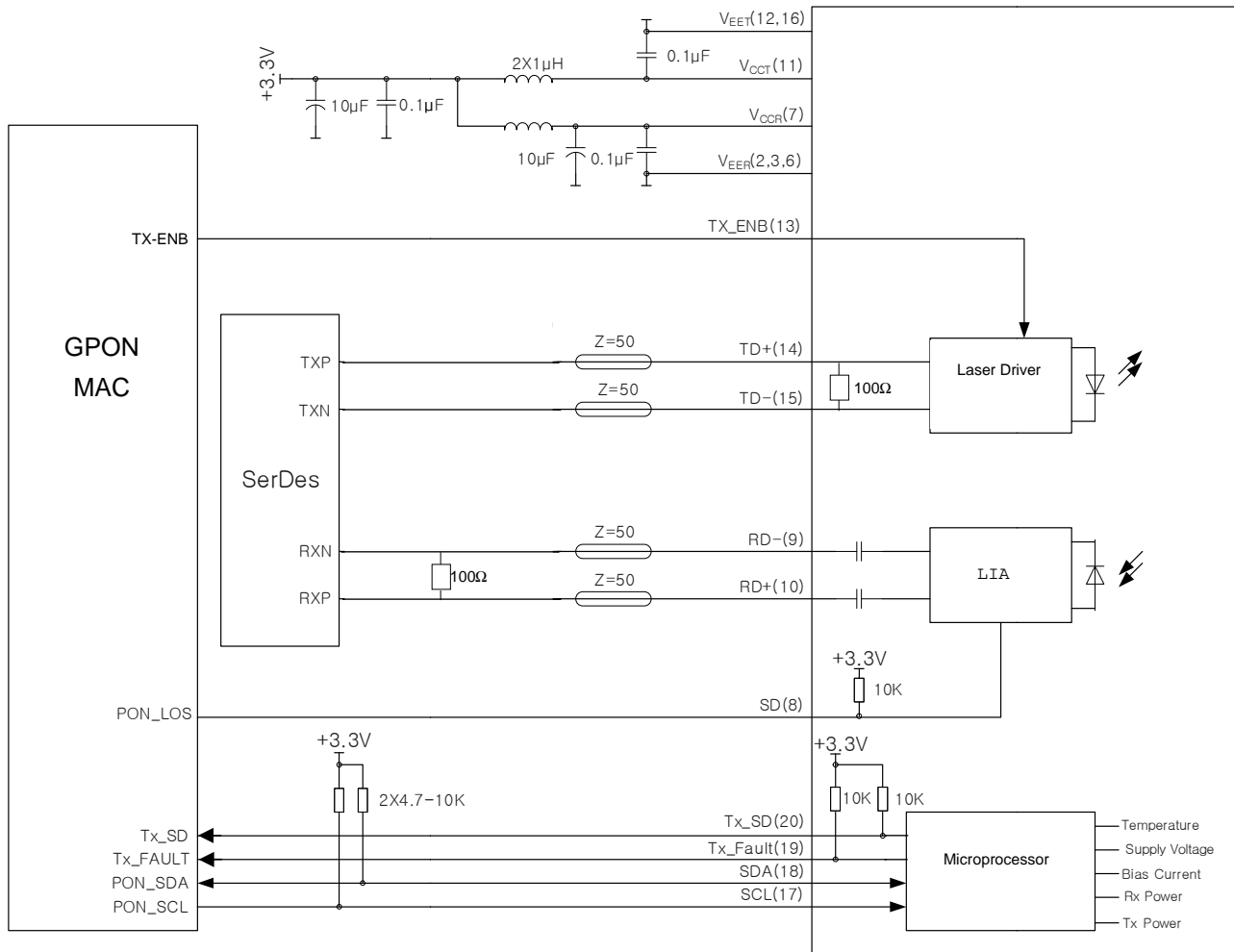


Figure 4, Recommended Interface Circuit

Mechanical Diagram

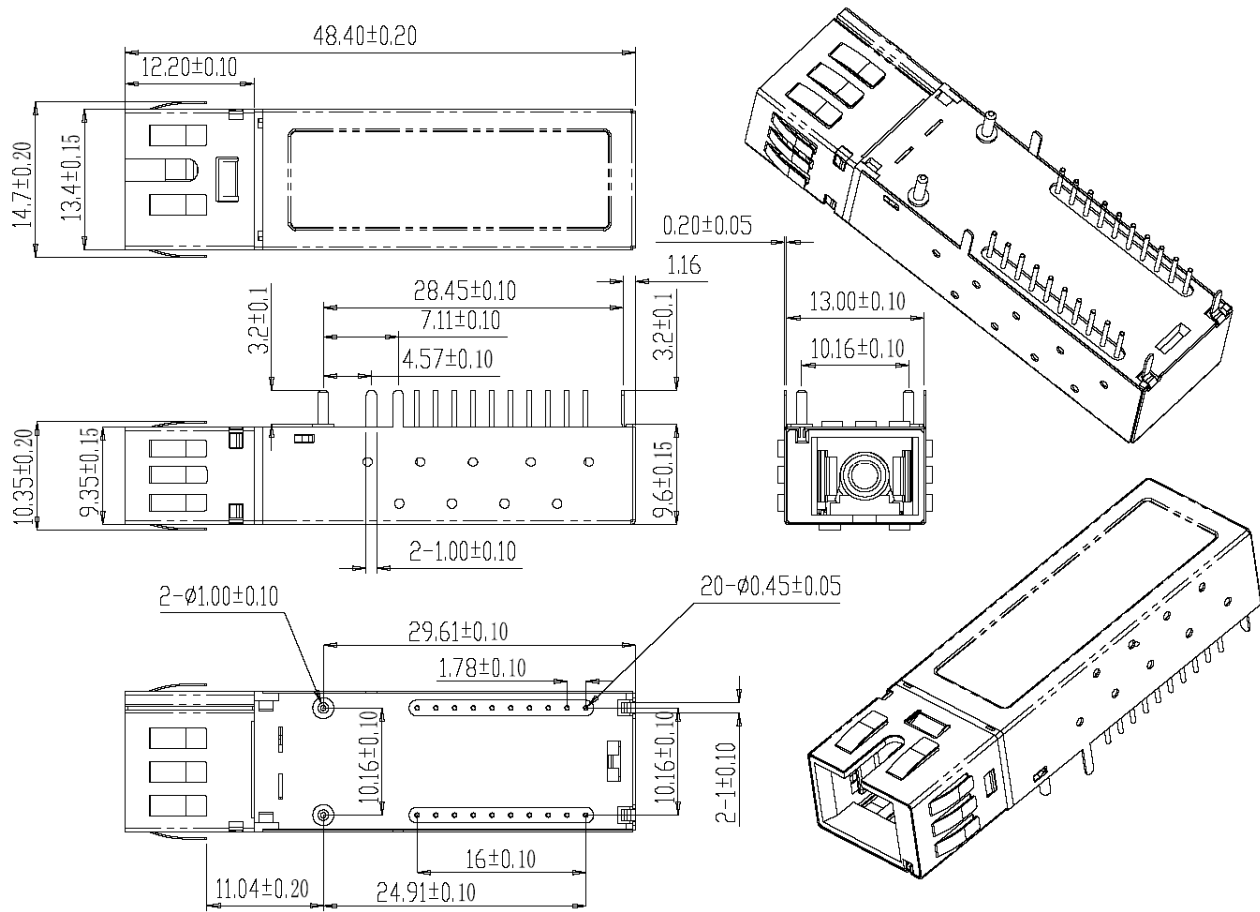


Figure 5, Mechanical Diagram

Order Information

Table 8 – Order Information

Part No.	Application	Data Rate	Laser Source	Temp. Range
SFS-34-24T-HP-CDA	GPON ONT	1244.16Mb/s / 2488.32Mb/s	1310nm DFB	0 to 70°C
SFS-34-24T-HP-TDA	GPON ONT	1244.16Mb/s / 2488.32Mb/s	1310nm DFB	-40 to 85°C

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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