



Features

- Support IEEE 802.3ah™-2004 1000BASE-PX10-U GEAPON ONU side application
- Single fiber bi-directional data links with symmetric 1.25Gbps upstream and downstream
- Integrated with micro-optics WDM filter for dual wavelength Tx/Rx operation at 1310/1490nm
- 1310nm burst-mode transmitter with FP laser
- 1490nm continuous-mode receiver with PIN-TIA
- 1550nm optical signal rejection
- Digital diagnostic interface compliant with SFF-8472 Rev 9.5
- Single 3.3V power supply
- Operating case temperature: 0~70°C
- RoHS compliance

Regulatory Compliance

Table 1 - Absolute Maximum Ratings

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	
Operating Relative Humidity	RH	5		95	%	
Power Supply Voltage	V_{CC}	0		4	V	
Input Voltage		GND		V_{CC}	V	
Receiver Damaged Threshold		7			dBm	
Soldering Temperature/Time				400/5	°C/s	1
				260/10	°C/s	2

Note 1: Soldering by iron

Note 2: Wave soldering

Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Operating Case Temperature	T_C	0		70	°C	
Operating Relative Humidity	RH	5		95	%	
Data Rate			1.25		Gbit/s	
Data Rate Drift		-100		100	PPM	

Optical Characteristics

Table 4 – Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength	λ_C	1276		1356	nm	
Optical Spectrum Width (RMS)	$\Delta\lambda$			2.8	nm	
Average Launch Power	P_{OUT}	-1		4	dBm	1
Average Launch Power-OFF Transmitter	P_{OFF}			-45	dBm	
Extinction Ratio	EX	9			dB	2
Total Jitter	TJ			0.35	UI	2
Rise/Fall Time (20%-80%)	T_R/T_F			260	ps	2,3

Burst Turn On Time	T _{BURST_ON}			30	ns	4
Burst Turn Off Time	T _{BURST_OFF}			30	ns	
Burst Enable Duration	T _{EN_DUR}	600			ns	
Burst Disable Duration	T _{DIS_DUR}	100			ns	
RIN ₁₅ OMA				-115	dB/Hz	
Optical Return Loss Tolerance				15	dB	
Transmitter Reflectance				-6	dB	
Optical Eye Mask	Compliant With IEEE Std 802.3ah™-2004					2,5
Receiver						
Operating Wavelength	λ _C	1480		1500	nm	
Sensitivity	P _{SEN}			-26	dBm	6
Saturation	P _{SAT}	-3			dBm	
Signal-Detected Assert Level	P _{SDA}			-27	dBm	2
Signal-Detected Deassert Level	P _{SDD}	-39			dBm	3
Signal-Detected Hysteresis	P _{SDA} - P _{SDD}	0.5		6	dBm	
Receiver Reflectance				-12	dB	
WDM Filter Isolation	ISO(1550)	38			dB	1550nm
	ISO(1650)	35			dB	1650nm

Notes:

1. The optical power is launched into 9/125um SMF.
2. Measured with PRBS 2^7-1 test pattern @1.25Gbps.
3. Measured with the Bessel-Thompson filter OFF.
4. Refer to [Timing Parameter Definition in Burst Mode Sequence](#).
5. Transmitter eye mask definition {0.22UI, 0.375UI, 0.20UI, 0.20UI, 0.30UI}.
6. Measured with a PRBS 2^7-1 test pattern @1.25Gbit/s and ER=9dB, BER = 10^{-12} .
7. An increase in optical power above the specified level will cause the Signal Detect output to switch from a low state to a high state.
8. A decrease in optical power below the specified level will cause the Signal Detect output to switch from a high state to a low state.

Electrical Characteristics

Table 5 – Electrical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Supply Current	I_{CC_TX}			200	mA	
Data Input Differential Swing	V_{IN}	200		1600	mVp-p	1
Input Differential Impedance	Z_{IN}	90	100	110	Ω	
Transmitter Disable Voltage - Low	V_{TDIS_L}	0		0.8	V	2
Transmitter Disable Voltage - High	V_{TDIS_H}	2.0		Vcc	V	

Receiver						
Power Supply Current	I_{CC_RX}			150	mA	
Data Output Differential Swing	V_{OUT}	400		1600	mV _{P-P}	3
Signal-Detected Voltage - Low	$V_{SD, L}$	0		0.8	V	4
Signal-Detected Voltage - High	$V_{SD, H}$	2.0		V_{CC}	V	
Signal-Detected Assert Time	T_{ASS}			100	μs	
Signal-Detected Deassert Time	T_{DAS}			100	μs	

Notes:

1. Compatible with LVPECL/CML input, AC coupled internally. (See [Recommended Interface Circuit](#)).
2. TX_nBRST (See [Pin Function Definitions](#)).
3. LVPECL output, AC coupled internally, guaranteed in the full range of input optical power (-3dBm to -27dBm) (See [Recommended Interface Circuit](#)).
4. SD (See [Pin Function Definitions](#)).

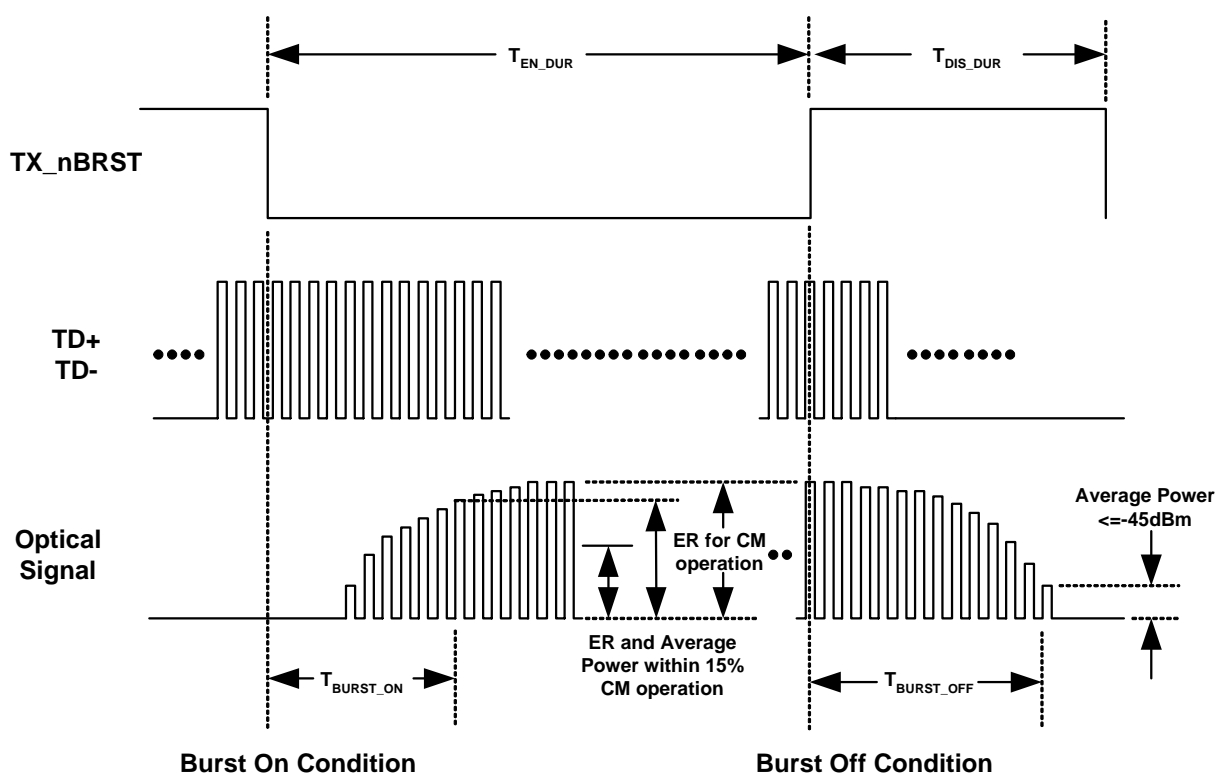
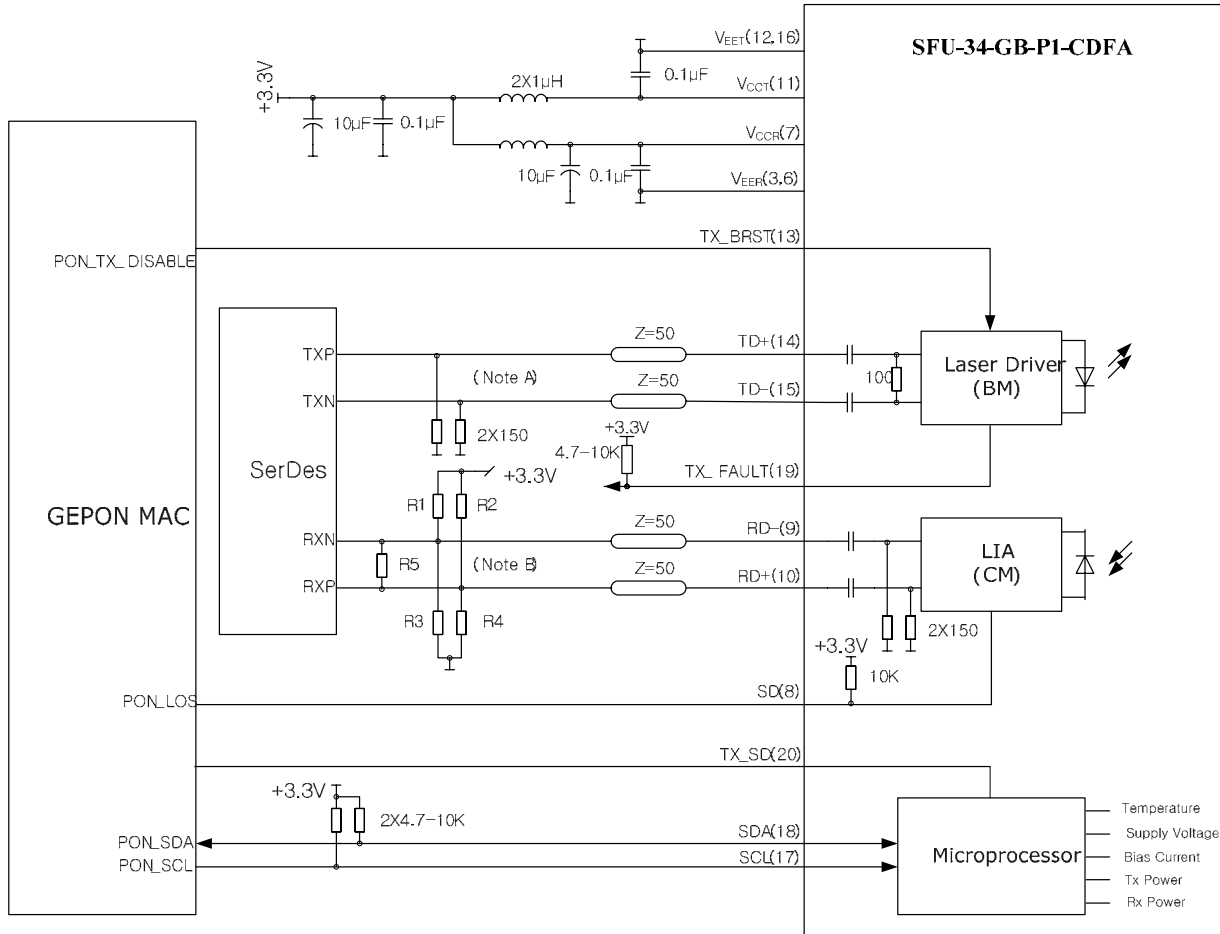


Figure 1, Timing Parameter Definition in Burst Mode Sequence

Recommended Interface Circuit



Note A: Open emitter output internally.

Note B: LVPECL output, AC coupled internally.

Input stage in SerDes IC is assumed with high impedance and internal bias to Vcc-1.3V

R1=R2=R3=R4=N.C, R5=100 Ω

Input stage in SerDes IC is assumed without internal bias to Vcc-1.3V

R1=R2=82 Ω , R3=R4=130 Ω , R5=N.C

Figure 2, Recommended Interface Circuit

Pin Definitions

Figure 6 below shows the pin information of electrical interface and mounting studs. Functions are described in Table 7 with some accompanying notes.

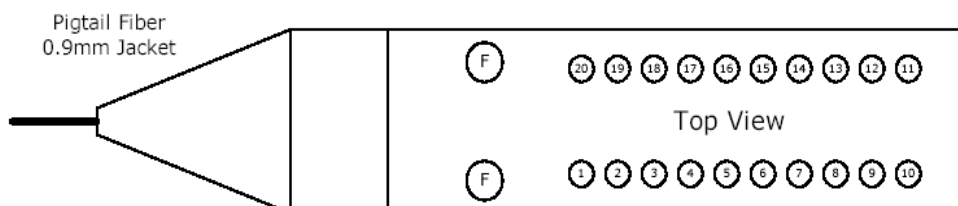


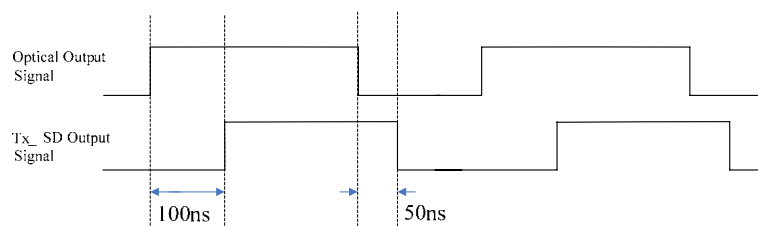
Figure 3, 2x10 SFF Planform

Table 6 –Pin Function Definitions

Pin	Name	Description	Notes
1	NC	No Function Definition	Not connected
2	NC	No Function Definition	Not connected
3	V _{EER}	Receiver Signal Ground	
4	NC	No Function Definition	Not connected
5	NC	No Function Definition	Not connected
6	V _{EER}	Receiver Signal Ground	
7	V _{CCR}	Receiver Power Supply	
8	SD	Receiver Signal-Detected Indication	1
9	RD-	Inverted Receiver Data Output	2
10	RD+	Non-inverted Receiver Data Output	
11	V _{CCT}	Transmitter Power Supply	
12	V _{EET}	Transmitter Signal Ground	
13	TX_nBRST	Transmitter Burst Control	3
14	TD+	Transmitter Non-inverted Data Input	4
15	TD-	Transmitter Inverted Data Input	
16	V _{EET}	Transmitter Signal Ground	
17	SCL	Clock Line of the I ² C interface	5
18	SDA	Data Line of the I ² C interface	5
19	TX_FAULT	Transmitter Fault Alarm Indication	6
20	TX_SD	Tx Signal Detect	7
MS	MS	Mounting Studs	8
HL	HL	Housing Leads	9

Notes:

- 1: LVTTTL logic output, with internal 10K Ω pull-up resistor. Optical Signal-Detected: High; Optical Signal Loss: Low.
- 2: LVPECL logic output, AC coupled internally. (See [Recommended Interface Circuit](#)).
- 3: A negative level enable optical signal output under burst mode (See [Timing Parameter Definition in Burst Mode Sequence](#)).
- 4: Compatible with LVPECL/CML input, AC coupled internally (See [Recommended Interface Circuit](#)).
- 5: I²C interface, they should be pulled up with two 4.7-10K Ω resistors on the host board.
- 6: TTL logic output, pulled up by a 4.7-10k Ω pull-up resistor on the host board.
Laser Normal State: Low; Laser Failure State: High.
- 7: Tx Signal Detect, Tx Active State: High.



- 8: The mounting studs are provided for transceiver mechanical attachment to circuit board. They may also

provide an optional connection of the transceiver to the equipment chassis ground. The holes in the circuit board must be tied to chassis ground. It is not recommended that the mounting studs be connected to signal ground.

- 9: The housing leads may be provided for additional signal grounding. These additional grounds may improve signal integrity, EMC, or ESD performance. The holes in the circuit board must be included and be tied to signal ground.

EEPROM Information

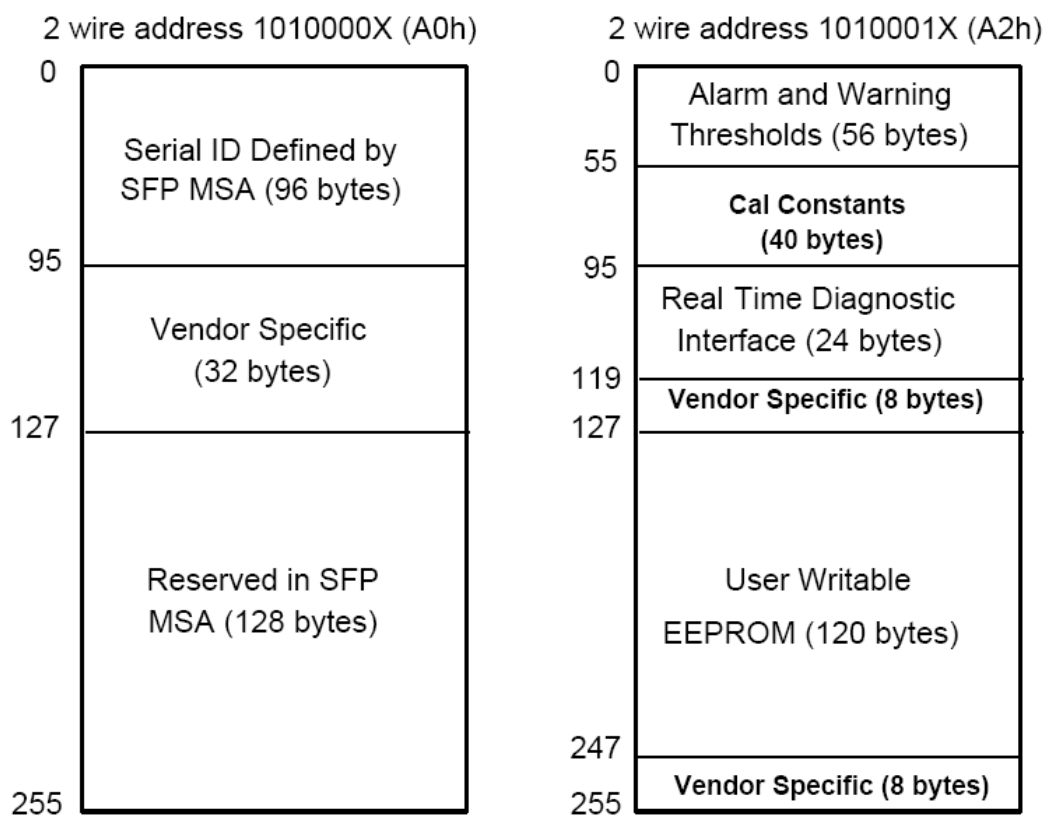


Figure 4, 2-wire Serial Digital Diagnostic Memory Map

Table 7 –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	0B	Optical pigtail
3-10	8	Transceiver	00 00 00 80 00 00 00 00	BASE-PX
11	1	Encoding	01	8B10B
12	1	BR, Nominal	0D	1.25Gbps
13	1	Reserved	00	

14	1	Length (9um)-km	A	10(km)
15	1	Length (9um)	64	100(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 55 33 34 47 42 50 31 43 44 46 41 20 20 20	"SFU34GBP1CDFA" (ASCII)
56-59	4	Vendor Rev	xx xx 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 06	SD,LAS_FAIL and TX_DISABLE
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_SD 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	64	Vendor Specific		

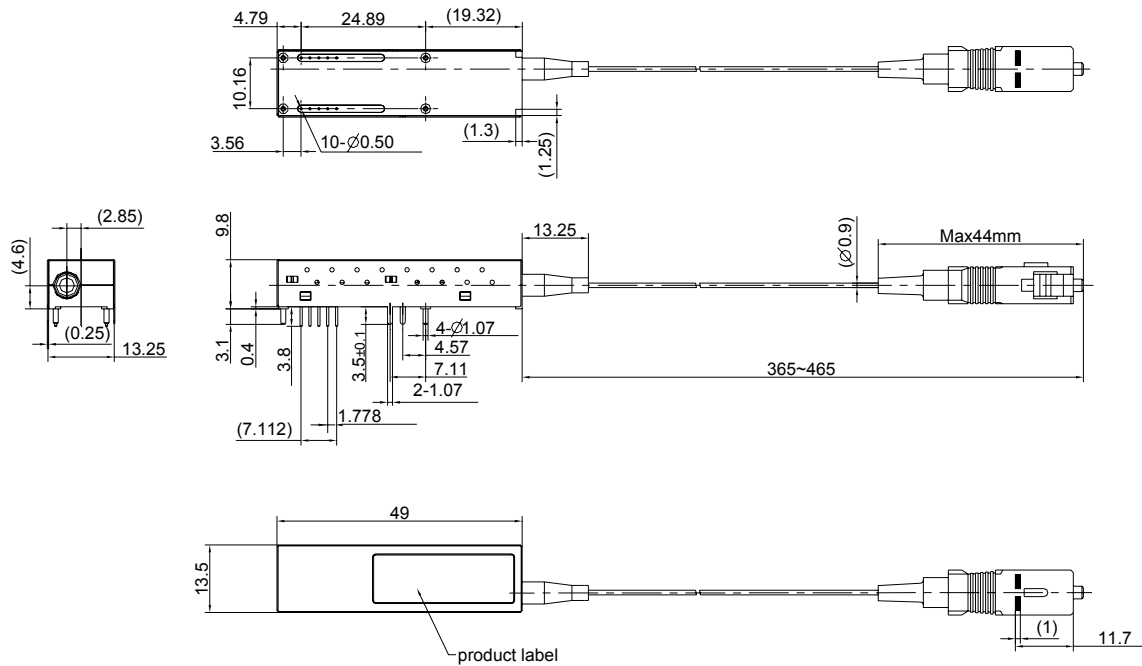
Note: The "xx" byte should be filled in according to practical case. For more information, please refer to the related document of SFF-8472 Rev 9.5.

Table 8 – Digital Diagnostic Specification (A2h)

Data Address	Parameter	Range	Accuracy
96-97	Temperature	-40 to 100°C	±3°C
98-99	Vcc Voltage	3.0V to 3.6V	±3%
100-101	Bias Current	0 to 100mA(Note)	±10%
102-103	TX Power	-1 to 4dBm	±3dB
104-105	RX Power	-26 to -3dBm	±2dB

Note: Only for continuous mode

Mechanical Diagram


Figure 5, Mechanical Diagram
Table 9 - Pigtail Fiber Characteristics

Parameter	Min.	Typical	Max.	Unit
Mode Field Diameter		9		µm
Cladding Diameter		125		µm
Jacket Diameter		0.9		mm
Bending Radius of Pigtail Fiber	30			Mm
Tension Force on Pigtail Fiber			1	kg
Pigtail Fiber Length	365		465	mm
Optical Return Loss -1310nm	50			dB

Order Information

Table 10 – Order Information

Part No.	Application	Data Rate	Laser Source	Fiber Type
SFU-34-GB-P1-CDFA	1000BASE-PX10 ONU	1.25Gb/s symmetric	1310nm FP	SMF

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.

Legal Notice

IMPORTANT NOTICE!

All information contained in this document is subject to change without notice, at Source Photonics' sole and absolute discretion. Source Photonics warrants performance of its products to current specifications only in accordance with the company's standard one-year warranty; however, specifications designated as "preliminary" are given to describe components only, and Source Photonics expressly disclaims any and all warranties for said products, including express, implied, and statutory warranties, warranties of merchantability, fitness for a particular purpose, and non-infringement of proprietary rights. Please refer to the company's Terms and Conditions of Sale for further warranty information.

Source Photonics assumes no liability for applications assistance, customer product design, software performance, or infringement of patents, services, or intellectual property described herein. No license, either express or implied, is granted under any patent right, copyright, or intellectual property right, and Source Photonics makes no representations or warranties that the product(s) described herein are free from patent, copyright, or intellectual property rights. Products described in this document are NOT intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. Source Photonics customers using or selling products for use in such applications do so at their own risk and agree to fully defend and indemnify Source Photonics for any damages resulting from such use or sale.

THE INFORMATION CONTAINED IN THIS DOCUMENT IS PROVIDED ON AN "AS IS" BASIS. Customer agrees that Source Photonics is not liable for any actual, consequential, exemplary, or other damages arising directly or indirectly from any use of the information contained in this document. Customer must contact Source Photonics to obtain the latest version of this publication to verify, before placing any order, that the information contained herein is current.

Contact

U.S.A. Headquarters

20550 Nordhoff Street
Chatsworth, CA 91311
USA

Tel: +1-818-773-9044

Fax: +1-818-773-0261

sales@sourcephotonics.com

China

Building #2&5, West Export Processing Zone
No. 8 Kexin Road, Hi-Tech Zone
Chengdu, 611731, China

Tel: +86-28-8795-8788

Fax: +86-28-8795-8789

sales@sourcephotonics.com.cn

Taiwan

9F, No 81, Shui Lee Rd.
Hsinchu, Taiwan,
R.O.C.

Tel: +886-3-5169222

Fax: +886-3-5169213

sales@sourcephotonics.com.tw

© Copyright Source Photonics, Inc. 2007~2009

All rights reserved