Features

- Data rate 1.062 to 1.25 Gb/s
- Single 3.3 V Supply
- 120 km Reach
- 32 dB Min, 36 dB Typical Link Budget
- Commercial Temperature Available (-CxA)
- Reduced Industrial Temperature Available (-RxA)
- Industrial Temperature Available (-TxA)
- 1550 nm DFB laser
- APD receiver
- Digital Diagnostic SFF-8472 Compliant
- SFP MSA SFF-8074i Compliant
- Telcordia GR-468 Compliant
- Color Coded Bail Latch: White
- RoHS Compliant

Table 1 – General Operating

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	Vcc	3.135	3.3	3.465	V	
Total Current	Icc	-	-	300	mA	
Power Supply Noise Rejection	PSR	100	-	-	mVp-p	1
Operating Temperature (Case) (-CxA)	T_{opr}	-5	-	70	ºC	2
Operating Temperature (Case) (-RxA)	T_{opr}	-20	-	85	ºC	2
Operating Temperature (Case) (-TxA)	T_{opr}	-40	-	85	ºC	2
Storage Temperature	T_{stg}	-40	-	85	ºC	
Data Rate GbE	DR	-	1250	-	Mbps	
Data Rate FC	DR	-	1062.5	-	Mbps	

Note 1: 20Hz to 155MHz

Note 2: Please refer to order information

Table 2 – Transmitter Specifications (Optical)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Optical Power	P_{op}	0	2	5	dBm	
Average Launch Power Tx_Off	P_{off}	-	-	-45	dBm	
Extinction Ratio	ER	9	-	-	dB	
Eye Mask		IEEE 802.3ah Compliant				
Total Jitter	TJ	-	-	200	ps	
Optical Rise/Fall Time	t_r/t_f	-	-	260	ps	3
Mean Wavelength	λ	1500	1550	1580	nm	
Spectral Width (20dB)	$\Delta\lambda$	-	-	1	nm	

Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Optical Path Penalty at 120km	dp	-	1	2	dB	4
Relative Intensity Noise	RIN	-	-	-120	dB/Hz	
Reflection Tolerance	rp	-24	-	-	dB	5

Note 3: 20%~80% values

Note 4: Measured at BER of 10^{-12}, PRBS of 2^7-1, at eye center

Note 5: 1dB degradation of receiver sensitivity

Table 3 – Transmitter Specifications (Electrical)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Input Differential Impedence	R_{in}	80	100	120	Ω	
PECL Single Ended Data Input Swing	$V_{in,\ p\text{-}p}$	250	-	1200	mV	
TxFault_Fault	V_{fault}	2	-	Vcc	V	
TxFault_Normal	V_{normal}	Vee	-	Vee + 0.5	V	
TxDisable_Disable	V_d	2	-	Vcc	V	
TxDisable_Enable	V_{en}	Vee	-	Vee + 0.8	V	

Table 4 – Receiver Specifications (Optical)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Receiver Power Low	$R_{sens,low}$	-	-34	-32	dBm	6
Receiver Power High	$R_{sens,high}$	-3	-	-	dBm	6
Damage Threshold For Receiver	$P_{in,\ damage}$	6	-	-	dBm	
Wavelength	λ	1500	1550	1580	nm	7
Maximum Reflectance of Receiver	RX_r	-	-	-14	dB	
LOS Assert	-	-42	-	-	dBm	
LOS De-Assert	-	-	-	-32	dBm	
LOS Hysteresis	-	0.5	-	-	dB	

Note 6: 10^{-12} at nominal wavelength

Note 7: Operational over 1200-1625nm

Table 5 – Receiver Specifications (Electrical)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
PECL Single Ended Data Output Swing	$V_{out,p\text{-}p}$	185	-	800	mV	
Data Output Rise/Fall Time	t_r/t_f	-	-	175	ps	

Table 6 – Timing and Electrical

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Tx Disable Negate Time	t_on	-	-	1	ms	
Tx Disable Assert Time	t_off	-	-	10	μs	
Time to Initialize, Including Reset of Tx Fault	t_init	-	-	300	ms	
Tx Fault Assert Time	t_fault	-	-	100	μs	
Tx Disable to Reset	t_reset	10	-	-	μs	
LOS Assert Time	t_loss_on	-	-	100	μs	
LOS De-Assert Time	t_loss_off	-	-	100	μs	
Serial ID Clock Rate	f_serial_clock	-	-	100	kHz	
RX_LOS Voltage (High)	Rx_LOS_H	2	-	-	V	
RX_LOS Voltage (Low)	RX_LOS_L	-	-	0.8	V	
LOS Output Voltage-Fault	V_{LOS} fault	2	-	V_{cc}	V	
LOS Output Voltage-Normal	V_{LOS} normal	V_{ee}	-	V_{ee} + 0.5	V	
MOD_DEF (0:2)-High	V_H	2	-	Vcc	V	
MOD_DEF (0:2)-Low	V_L	V_{ee}	-	V_{ee} + 0.5	V	

Table 7 – Diagnostics

Parameter	Range	Accuracy	Unit	Calibration	Formula
Temperature(-CDA)	-5 to 70	±3	ºC	External	Tc(C) = Tslope*Tad(16 bit signed twos complement value) + Toffset
Temperature(-RDA)	-20 to 85	±3	ºC	External	Tc(C) = Tslope*Tad(16 bit signed twos complement value) + Toffset
Temperature(-TDA)	-40 to 85	±3	ºC	External	Tc(C) = Tslope*Tad(16 bit signed twos complement value) + Toffset
Voltage	0 to Vcc	0.1	V	External	V(Volts) = Vslope*Vad (16 bit unsigned integer) + Voffset
Bias Current	0 to 120	5	mA	External	I(mA) = Islope * Iad(16 bit unsigned integer) + Ioffset
Tx Power	0 to 5	±3	dBm	External	Tx_PWR(μW) = Tx_PWRslope*Tx_PWRad (16 bit unsigned integer)+Tx_PWRoffset
Rx Power	-32 to -3	±3	dBm	External	Rx_PWR(μW) = A0+A1*x+A2*x^2+A3*x^3+A4*x^4

Table 8 – EEPROM Serial ID (A0h)

Name of Field	Description of Field	Address	Hex	ASCII
Identifier	Type of serial transceiver	0	03	
Ext. Identifier	Extended identifier of type of serial transceiver	1	04	
Connector	Code for connector type	2	07	
Transceiver	Code for electronic compatibility or optical compatibility	3	00	
		4	00	
		5	00	
		6	02	
		7	00	
		8	00	
		9	00	
		10	00	
Encoding	Code for serial encoding algorithm	11	01	
BR.Nominal	Units of 100 MBits/sec.	12	0D	
Reserved	Reserved	13	00	
Length (9µm,km)	9/125 µm fiber, units of km	14	78	
Length (9µm)	9/125 µm fiber, units of 100 m	15	FF	
Length (50µm)	50/125 µm fiber, units of 10 m	16	00	
Length (62.5µm)	62.5/125 µm fiber, units of 10 m	17	00	
Length (Copper)	Units of meters	18	00	
Reserved	Reserved	19	00	
Vendor Name	SFP vendor name (ASCII)	20	53	S
		21	4F	O
		22	55	U
		23	52	R
		24	43	C
		25	45	E
		26	50	P
		27	48	H
		28	4F	O
		29	54	T
		30	4F	O
		31	4E	N
		32	49	I
		33	43	C
		34	53	S
		35	20	[Space]

Table 8 – EEPROM Serial ID (A0h)

Name of Field	Description of Field	Address	Hex	ASCII
Reserved	Reserved	36	00	
Vendor OUI	SFP vendor IEEE company ID for Source Photonics Inc.	37	00	
		38	1F	
		39	22	
Vendor P/N	Part number in ASCII, e.g. SPGBEZXCDA	40	53	S
		41	50	P
		42	47	G
		43	42	B
		44	45	E
		45	5A	Z
		46	58	X
		47	43	C
		48	44	D
		49	41	A
		50	20	[Space]
		51	20	[Space]
		52	20	[Space]
		53	20	[Space]
		54	20	[Space]
		55	20	[Space]
Vendor Rev.	Revision level for part number provide by vendor (ASCII)	56	41	A
		57	20	[Space]
		58	20	[Space]
		59	20	[Space]
Wavelength	1550nm	60	06	
		61	0E	
Reserved	Reserved	62	00	
CC_BASE	Check code for Base ID Fields (addresses 0 to 62)	63	xx	
Options	Indicates which optional transceiver signals are implemented	64	00	
		65	1A	

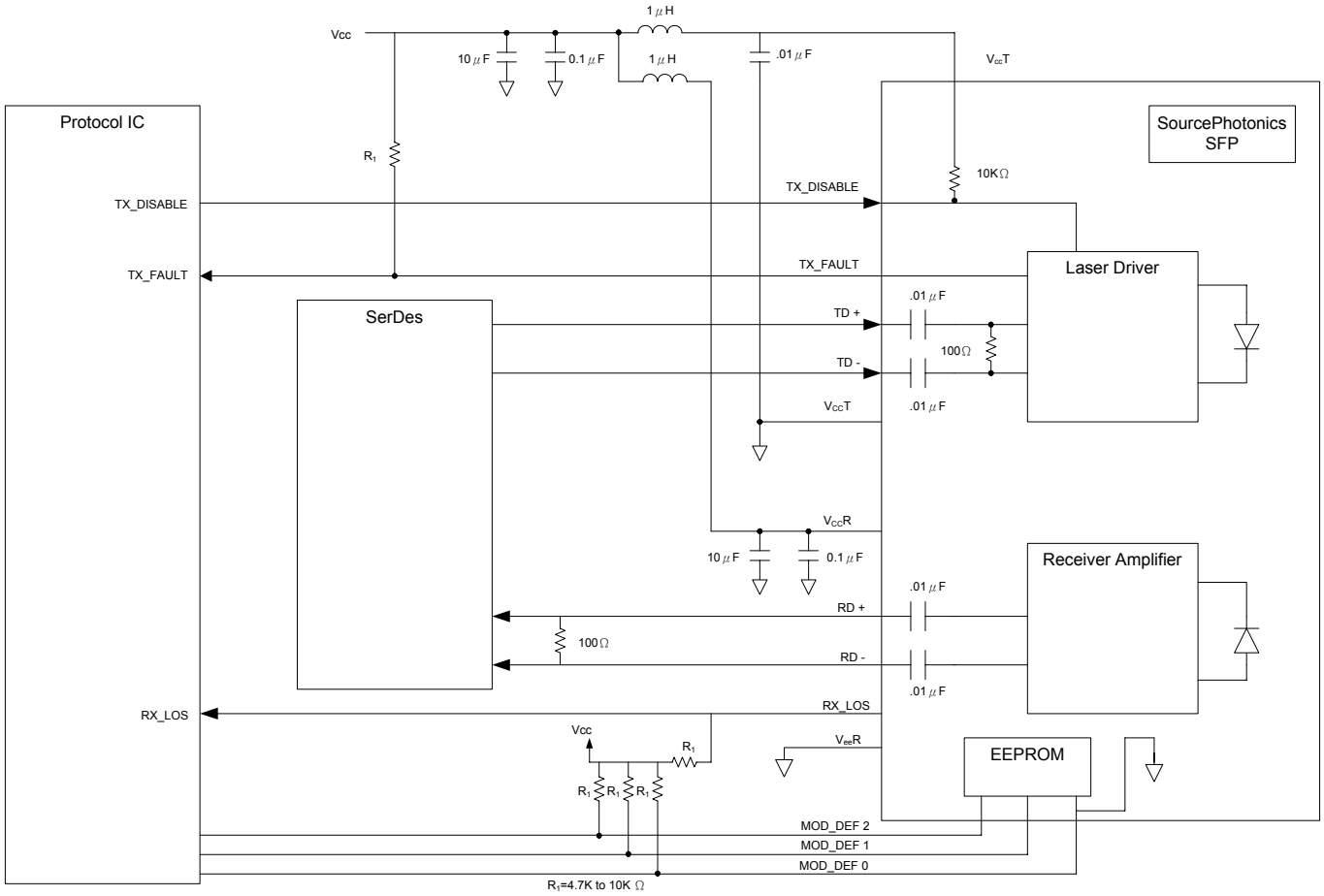
Table 8 – EEPROM Serial ID (A0h)

Name of Field	Description of Field	Address	Hex	ASCII
BR, max	Upper bit rate margin, unit of %	66	00	
BR, min	Lower bit rate margin, unit of %	67	00	
Vendor S/N	Serial number	68-83	xx	
Date Code	Vendor's manufacturing date code	84-91	xx	
Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented in the transceiver	92	58	
Enhanced Options	Indicates which optional enhanced features are implemented in the transceiver	93	B0	
SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with	94	02	
CC_EXT	Check code for Extended ID Fields (addresses 64 to 94)	95	xx	
Vendor Specific	Vendor Specific EEPROM	96-127	xx	

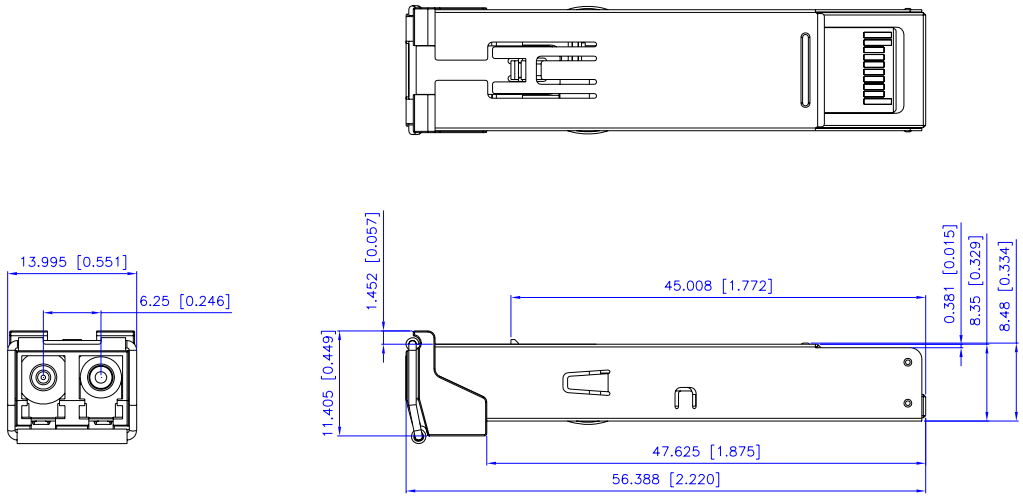
Table 9 – Pin Definitions

Pin	Unit	Notes
1	VeeT	TX GND
2	TX_FAULT	Open Collector
3	TX_DISABLE	Internally Pulled High
4	MOD_DEF2	Serial Data Input
5	MOD_DEF1	Serial Clock Input
6	MOD_DEF0	Internally Grounded
7	NC	Not Connected
8	LOS	Open Collector
9	VeeR	RX Ground
10	VeeR	RX Ground
11	VeeR	RX Ground
12	RXD-	RX Data Negative
13	RXD+	RX Data Positive
14	VeeR	RX GND
15	VCCR	RX Power
16	VCCT	TX Power
17	VeeT	TX GND
18	TXD+	TX Data Positive
19	TXD-	TX Data Negative
20	VeeT	TX GND

Recommended Interface Circuit



Mechanical Diagram



Units in mm(inch)

Order Information

Table 10 – Order Information

Part No.	Part No.
SP-GB-EZX-CDA	SP-GB-EZX-CNA
SP-GB-EZX-RDA	SP-GB-EZX-RNA
SP-GB-EZX-TDA	SP-GB-EZX-TNA

Part Numbering Definition:

SP - GB - EZX - Temperature Diagnostic Revision

- **SP = Small Form Pluggable**
- **Data Rate**
  GB = 1.25 Gbps
- **EZX = IEEE 802.3ah 120km**
- **Operating Temperature**
  C = Commercial Temperature (-5 to 70℃)
  R = Reduced Industrial Temperature (-20 to 85℃)
  T = Industrial Temperature (-40 to 85℃)
- **D = Digital Diagnostic (SFF-8472)**
  N = No Digital Diagnostic
- **Design Revision**
  A = RoHS Compliant

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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