

Features

- Simplex SC Connector, Bi-directional
- Single 3.3V Power Supply
- Commercial Temperature Available
- 1310nm DFB Laser transmitter,
- 1577nm Burst mode receiver with APD-TIA
- Compliant with IEEE 802.3-av 10/1G-PRX30
- Sleep Mode for Power Consumption
- SFP+ MSA SFF-8431 Compliant
- Digital Diagnostic SFF-8472 Compliant
- Telcordia GR-468 Compliant
- Operating case temperature: -5~70°C
- RoHS 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) at the Faceplate	IEC 61000-4-2	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
RoHS Compliance	2011/65/EU	Compatible with Standards

Note:

In light of item 5 in Annex of 2011/65/EU, “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 Temperature	T_s	-40	-	+85	°C	
Supply Voltage	Vcc	-0.5	-	4.0	V	
Operating Relative Humidity	RH	-	-	85	%	

Recommended Operating Conditions

Table 3 – Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	Vcc	3.14	3.3	3.46	V	
Supply Current	Icc	-	-	350	mA	
Maximum Power Dissipation	Pvcc	-	-	1.3	W	
Inrush Current	$I_{IN-RUSH}$	-	-	300	mA	1
Operating Temperature (Case)	T_{opr}	-5	-	70	°C	
Data Rate	DR	10.3125			Gb/s	2
Data Rate Drift		-100		100	PPM	

Note 1: Max. duration 500ms

Note 2: PRBS $2^{31}-1$.

Optical and Electrical Characteristics

Table 4– Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Centre Wavelength	λ_c	1260		1360	nm	
Optical Spectrum Width (-20dB)				1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power	P_{OUT}	0.62		+5.62	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}			16	ns	4
Burst Turn Off Time	T_{BURST_OFF}			16	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	1575	1577	1580	nm	
Sensitivity	$P_{SEN1(BOL)}$			-24	dBm	6
	$P_{SEN2(BOL)}$			-28	dBm	
Saturation	P_{SAT}	-8			dBm	
Receiver Total Jitter	TJ	-	-	±0.70	UI	
Receiver Deterministic Jitter	DJ	-	-	±0.42	UI	
LOS Assert	P_{LOSA}	-45	-	-	dBm	
LOS De-Assert	P_{LOSD}	-	-	-29.5	dBm	
LOS Hysteresis	$P_{LOSD} - P_{LOSA}$	0.5	-	6	dB	
Receiver Reflectance				-12	dB	
WDM Filter Isolation	ISO(1550)	38			dB	1550n
	ISO(1650)	35			dB	1650n

Notes:

1. The optical power is launched into 9/125um SMF.
2. Measured with PRBS 2⁷-1 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. P_{SEN1} Measured with a PRBS2³¹-1 test pattern @10.3125Gbps, BER ≤ 10⁻¹⁰ for reference
 P_{SEN2} Measured with a PRBS2³¹-1 test pattern @10.3125Gbps, BER ≤ 10⁻³

Table 5 – Electrical Specifications and Timing

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	
Tx Fault Assert Time	T_{fault_on}	-	-	50	ms	

Tx Fault Reset	TX_Fault Reset	10	-	-	μ s	
Power Down Voltage _Low	V_PDL	0		0.8	V	
Power Down Voltage _High	V_PDH	2.0		V _{CC}	V	
Receiver						
Power Supply Current	I _{CC_RX}			150	mA	
Data Output Differential Swing	V _{OUT}	400		800	mV _{P-P}	3
Loss of Signal Assert Time	T _{LOSA}			100	μ s	
Loss of Signal Deassert Time	T _{LOSD}			100	μ s	
Output Differential Impedance	R _{out}	80	100	120	Ω	
	V _{OL}	0.0	-	0.4	V	
RX_LOS	V _{OH}	V _{CC} -0.5	-	V _{CC}	V	
Time to Initialize 2-Wire Interface	t _{2w_start_up}	-	-	300	ms	
Time to Initialize	t _{start_up}	-	-	300	ms	

Notes:

1. Compatible with LVPECL/CML input, AC coupled internally. (See [Recommended Interface Circuit](#)).
2. TX_nBRST (See [Pin Function Definitions](#)).
3. CML output, AC coupled internally, guaranteed in the full range of input optical power (-9dBm to -24dBm) (See [Recommended Interface Circuit](#)).

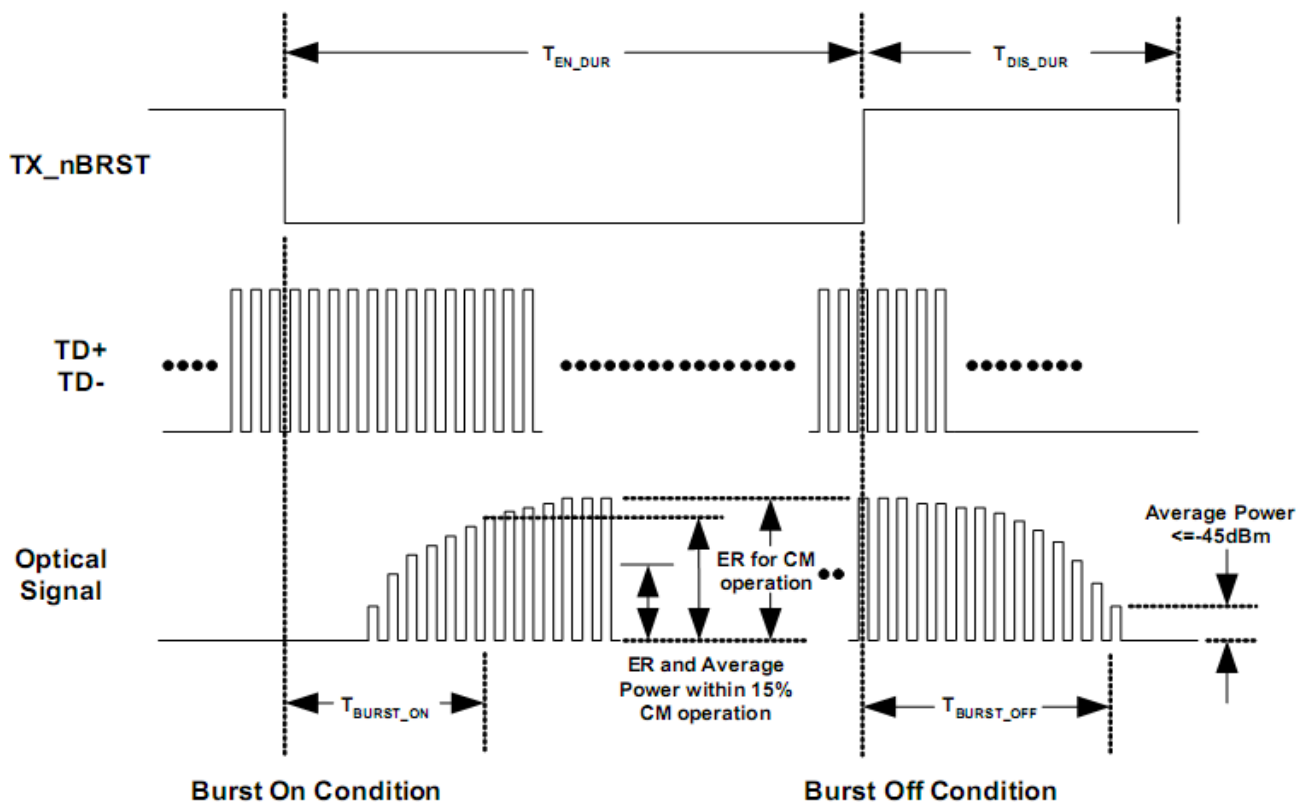


Figure 1, Timing Parameter Definition in Burst Mode Sequence

Diagnostics

Table 6 – Diagnostics

Register(A2h)	Parameter	Range	Accuracy	Unit	Calibration
96-97	Temperature	-5 to 70	±3	°C	Internal
98-99	Voltage	0 to Vcc	±3%	V	Internal
100-101	Bias Current	0 to 120(notes)	±10%	mA	Internal
102-103	Tx Power	-1 to 6	±2	dB	Internal
104-105	Rx Power	-28 to -8	±2	dB	Internal

Notes: only for continuous mode

Table 7 – EEPROM Serial ID (A0h)

Name of Field	Description of Field	Address	Hex	ASCII
Identifier	Type of transceiver	0	03	SFP+
Ext. Identifier	Extended identifier of type of transceiver	1	04	
Connector	Code for connector type	2	01	SC
Transceiver	Code for electronic compatibility or optical compatibility	3	00	BASE-P X
		4	00	
		5	00	
		6	80	
		7	00	
		8	00	
		9	00	
		10	00	
Encoding	Code for high speed serial encoding algorithm (8B/10B)	11	01	
BR.Nominal	Nominal signalling rate, units of 100MBd.	12	0D	1.25Gbps
Rate Identifier	Type of rate select functionality	13	00	
Length (SMF,km)	Link length supported for single mode fiber, units of km	14	14	20
Length (SMF)	Link length supported for single mode fiber, units of 100 m	15	C8	200
Length (50µm)	Link length supported for 50 um OM2 fiber, units of 10 m	16	00	
Length (62.5µm)	Link length supported for 62.5 um OM1 fiber, units of 10 m	17	00	
Length (Copper)	Link length supported for copper, units of meters	18	00	
Length (OM3)	Link length supported for 50 um OM3 fiber, units of 10 m	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
Unallocated		36	00	
Vendor OUI	SFP vendor IEEE company ID for Source Photonics Inc.	37	00	
		38	1F	
		39	22	
Vendor PN	Part number in ASCII, e.g. SPPS37GB0X3CDFA	40	53	S
		41	50	P
		42	50	P
		43	53	S
		44	33	3
		45	37	7
		46	47	G
		47	42	B
		48	4F	O
		49	58	X
		50	33	3
		51	43	C
		52	44	D
53	46	F		
54	41	A		

		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	Laser wavelength, 1310nm	60	05	
		61	1E	
Unallocated		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 9 – 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 SN	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	68	Internal
Enhanced Options	Indicates which optional enhanced features are implemented in the transceiver	93	F0	
SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with	94	03	
CC_EXT	Check code for Extended ID Fields (addresses 64 to 94)	95	xx	
Vendor Specific	Vendor Specific EEPROM	96-127	xx	

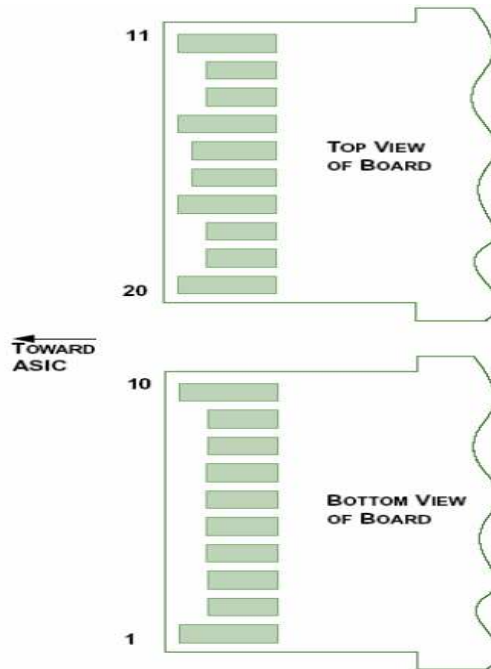
Table 10 – Pin Definitions

Pin	Symbol	Name/Description
1	VeeT	Module Transmitter Ground(1)
2	TX_FAULT	Module Transmitter Fault
3	TX_nBRST	Transmitter Burst Control
4	SDA	2-Wire Serial Interface Data Line (MOD-DEF2) (2)
5	SCL	2-Wire Serial Interface Clock (MOD-DEF1)
6	MOD_ABS	Module Absent, connected to VeeT or VeeR in the module
7	Tx_SD	Tx Signal Detect(3)
8	RX_LOS	Receiver Loss of Signal Indication
9	PDWN_TX	Power saving of Tx side, On/off time less than 300ns, high active, if not use this feature, main board connection should be NC.
10	VeeR	Module Receiver Ground
11	VeeR	Module Receiver Ground
12	RXD-	Receiver Inverted Data Output
13	RXD+	Receiver Non-Inverted Data Output
14	VeeR	Module Receiver Ground
15	VCCR	Module Receiver 3.3V Supply
16	VCCT	Module Transmitter 3.3V Supply
17	VeeT	Module Transmitter Ground
18	TXD+	Transmitter Non-Inverted Data Input
19	TXD-	Transmitter Inverted Data Input
20	VeeT	Module Transmitter Ground

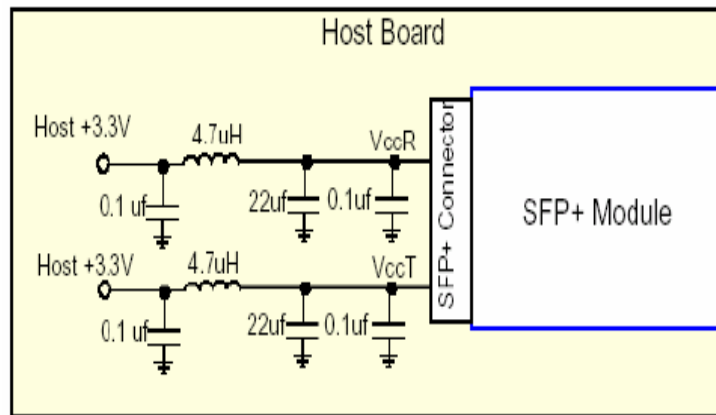
Note

1. The module ground pins, VeeR and VeeT, shall be isolated from the module case.
2. This pin is an open collector/drain input pin and shall be pulled up with 4.7K-10K ohms to VccT in the module.
3. Tx Signal Detect, Tx Active State: High.

SFP+ Module PCB Pinout



Recommended Host Board Power Supply Circuit



Recommended Interface Circuit

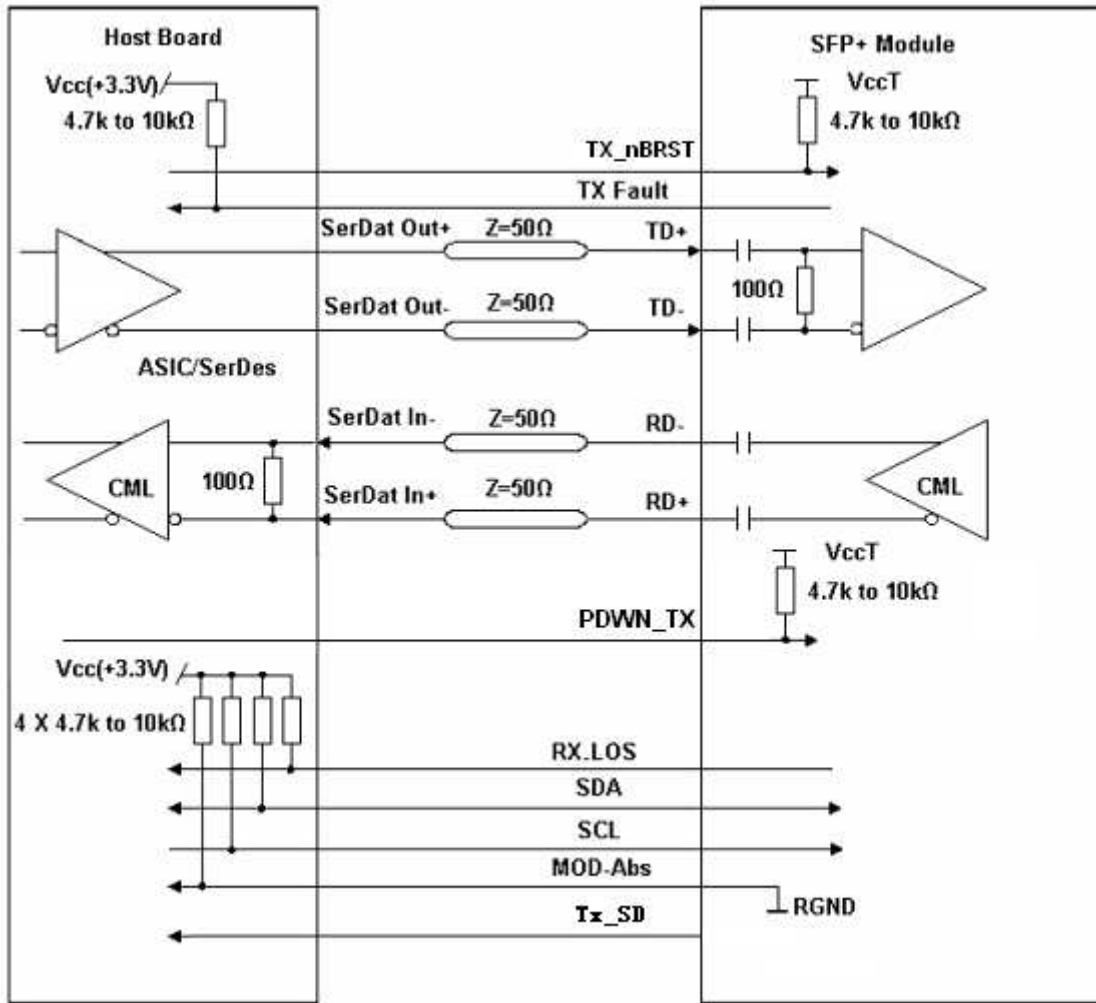
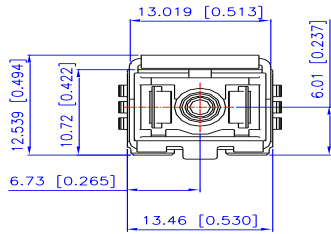


Figure 2, Recommended Interface Circuit

Mechanical Diagram



Units in mm(inch)

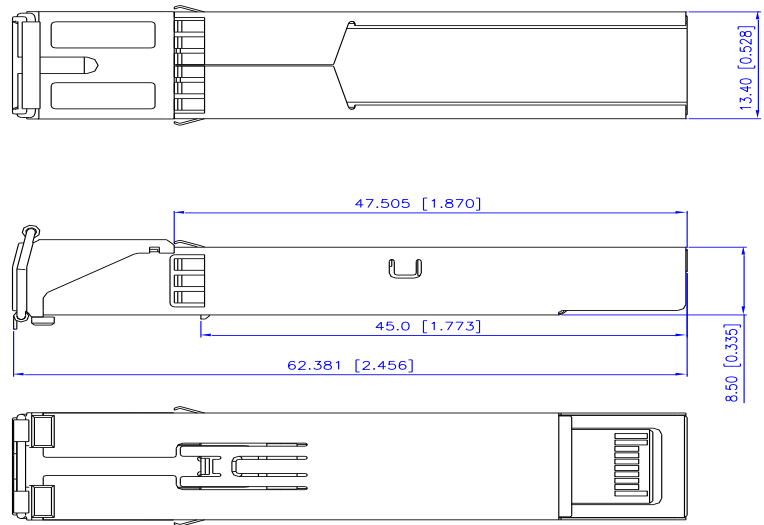


Figure 3, Mechanical Diagram

Order Information

Table 11 – Order Information

Part No.	Application	Data Rate	Laser Source	Fiber Type
SPPS-37-GBO-X3-CDFA	10/1G Base PRX30 ONU	Tx 1.25Gb/s and Rx 10.3125Gb/s asymmetric	1310nm DFB	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.

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