

## ***DATASHEET***

### ***DESCRIPTION:***

PeakOptical's PSFP10-1541SF optical transceivers are designed for 10Gb/s serial optical interfaces for data communications with single mode fiber (SMF). The transceiver can support 1.25Gb/s to 11.1Gb/s. The transceiver designs are optimized for high performance and cost effective to supply customers the best solutions for datacom applications.

### ***FEATURES:***

- Multi-Source Package with Duplex LC Connector
- 10Gb/s serial optical interface
- Up to 40km on 9/125um SMF
- Single +3.3V Power Supply
- Hot-Pluggable
- Compliant with Bellcore TA-NWT-000983
- Compliant with Specifications for IEEE802.3Z
- Compliant with SFP+ MSA
- Eye Safety Designed to Meet Laser Class1, Compliant with IEC60825
- Monitoring Interface Compliant with SFF-8472, Real time monitoring of:
  - Transmitter optical power
  - Receiver optical power
  - Laser bias current
  - Temperature
  - Supply voltage
- RoHS Compliant Products

### ***APPLICATIONS:***

- 10G Base-ER/EW
- 10G Fiber Channel
- Other Optical Links

## SPECIFICATIONS:

### Electrical Characteristics: (Condition: $T_a = T_{OP}$ )

Parameter	Symbol	Min	Typical	Max	Unit	Note
<b>Transmitter:</b>						
Differential input voltage swing			500		mVpp	1
Transmit Disable Input	H	$V_{IH}$	2.0		$V_{CC}+0.3$	V
	L	$V_{IL}$	0		0.8	V
Transmit Enable Output	H	$V_{OH}$	2.0		$V_{CC}+0.3$	V
	L	$V_{OL}$	0		0.8	V
Input Differential Impedance	$Z_{in}$		100		$\Omega$	
<b>Receiver</b>						
Differential output voltage swing			500		mVpp	3
LOS Output	H	$V_{OH}$	2.0		$V_{CC}+0.3$	V
	L	$V_{OL}$	0		0.8	V

Note 1) TD+/- are internally AC coupled with 100 $\Omega$  differential termination inside the module.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10k $\Omega$  resistors on the host board. Pull up voltage between 2.0V and  $V_{CC}+0.3V$ .

Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100 $\Omega$  (differential) at the user SERDES.

### Optical Characteristics: (Condition: $T_a = T_{OP}$ )

Parameter	Symbol	Min	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	$\lambda$	1530	1550	1565	nm	
Average output power	Po	-2		4	dBm	1
Optical Extinction Ratio	ER	3.0	5.0		dB	1
Spectral width	$\Delta\lambda$			0.45	nm	
Rise/Fall time (20%~80%)	Tr/Tf			50	ps	2
Optical modulation amplitude	OMA	-1.7			dBm	
Dispersion penalty				1	dB	
Optical Eye Mask		IEEE802.3-2005 Compliant				
Receiver						
Optical Wavelength	$\lambda$	1200	1310	1600	nm	
Receiver Sensitivity@10Gb/s	R			-15.8	dBm	3
Rx Sensitivity@10Gb/s (OMA)	R			-14.1		
Maximum Input Power	PMAX	-1.0			dBm	
LOS De-Assert	LOSD			-16	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		0.5		4	dB	

# 10Gb/s SFP+, Hot Pluggable Duplex LC, +3.3V, 1550nm Single Mode, 40 km, EML Optical Transceiver **PSFP10-1541SF**

## Notes:

Note 1) Measured at 10.3125b/s with PRBS 231 – 1 NRZ test pattern.

Note 2) 20%~80%

Note 3) Under the ER worst case, measured at 10.3125 Gb/s with PRBS 231 – 1 NRZ test pattern for BER < 1x10<sup>-12</sup>

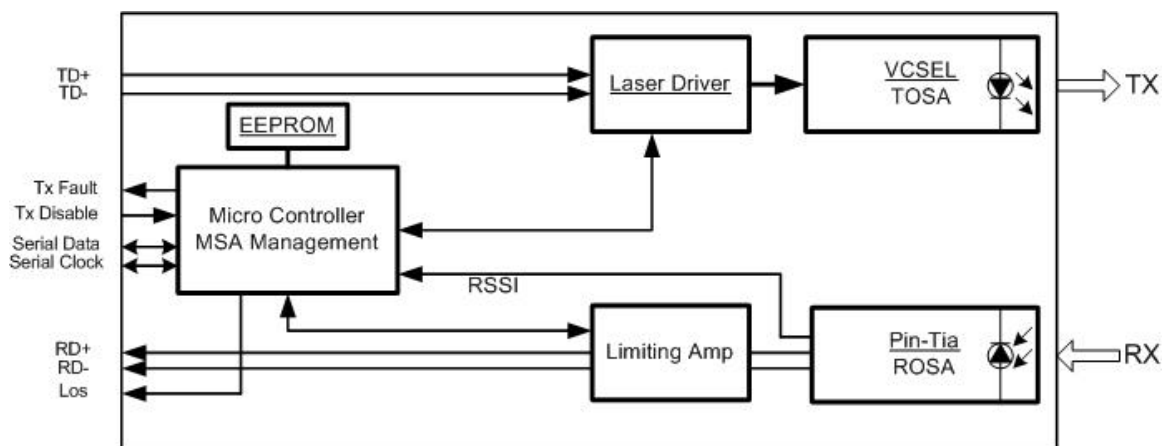
## Absolute Maximum Ratings:

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>ST</sub>	-40	+85	°C
Supply Voltage	V <sub>CC3</sub>	-0.5	+4.0	V
Relative Humidity			85	%

## Recommended Operating Environment:

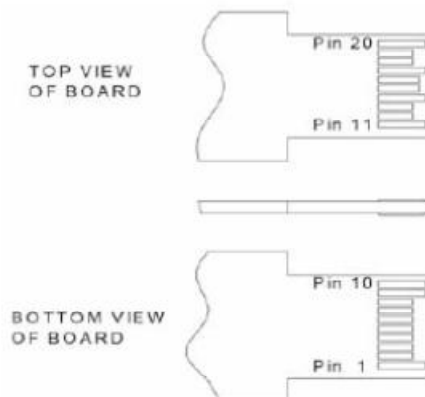
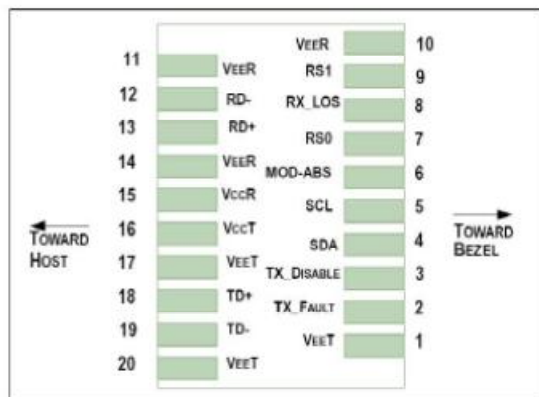
Parameter	Symbol	Min	Typical	Max	Unit
Data Rate	Ethernet		10.3125		Gb/s
	Fiber Channel		10.518		Gb/s
Supply Voltage	V <sub>CC</sub>	+3.13	3.3	+3.47	V
Supply Current	I <sub>CC</sub>			300	mA
Operating Temperature	T <sub>OP</sub>	0	-	+70	°C

## Functional Diagram:



# 10Gb/s SFP+, Hot Pluggable Duplex LC, +3.3V, 1550nm Single Mode, 40 km, EML Optical Transceiver **PSFP10-1541SF**

## Pin Assignment:



Pin out of Connector Block on Host Board

## Pin Description:

PIN #	Name	Function	Notes
1	VeeT	Module transmitter ground	Note1
2	Tx Fault	Module transmitter fault	Note 2
3	Tx Disable	Transmitter Disable; Turns off transmitter laser output	Note 3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	Note 2
7	RS0	Rate select0,optionally control SFP+ receiver. When high, input data rate >4.5Gb/s;when low, input data rate <=4.5Gb/s	
8	LOS	Receiver Loss of Signal Indication	Note4
9	RS1	Rate select0,optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s;when low, input data rate <=4.5Gb/s	
10	VeeR	Module receiver ground	Note 1
11	VeeR	Module receiver ground	Note 1
12	RD-	Receiver inverted data out put	
13	RD+	Receiver non-inverted data out put	
14	VeeR	Module receiver ground	Note 1
15	VccR	Module receiver 3.3V supply	
16	VccT	Module transmitter 3.3V supply	
17	VeeT	Module transmitter ground	Note 1
18	TD+	Transmitter inverted data out put	
19	TD-	Transmitter non-inverted data out put	
20	VeeT	Module transmitter ground	Note1

# 10Gb/s SFP+, Hot Pluggable

## Duplex LC, +3.3V, 1550nm

### Single Mode, 40 km, EML Optical Transceiver

#### PSFP10-1541SF

Note 1) The module ground pins shall be isolated from the module case.

Note 2) This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.

Note 3) This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.

Note 4) This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board. In FC designated as RX\_LOS, inSONET designated as LOS, and in Ethernet designated at Signal Detect.

## Serial ID Memory Contents:

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP MSA. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information(A0h) is listed in Table 2. And the DDM specification(A2h) is described in Table 3. For more details of the memory map and byte definitions, please refer to the SFF-8472 (Rev 9.3, Aug. 2002), "Digital Diagnostic Monitoring Interface for Optical Transceivers".The DDM parameters have been internally calibrated.

**Table 1.** Digital Diagnostic Memory Map (Specific Data Field Descriptions)

2 wire address 1010000X (A0h)	2 wire address 1010001X (A2h)
0	0
Serial ID Defined by SFP MSA (96 bytes)	Alarm and Warning Thresholds (56 bytes)
95	55
Vendor Specific (32 bytes)	Cal Constants (40 bytes)
127	95
Reserved in SFP MSA (128 bytes)	Real Time Diagnostic Interface (24 bytes)
	119
	127
	Vendor Specific (8 bytes)
	User Writable EEPROM (120 bytes)
	247
255	255
	Vendor Specific (8 bytes)

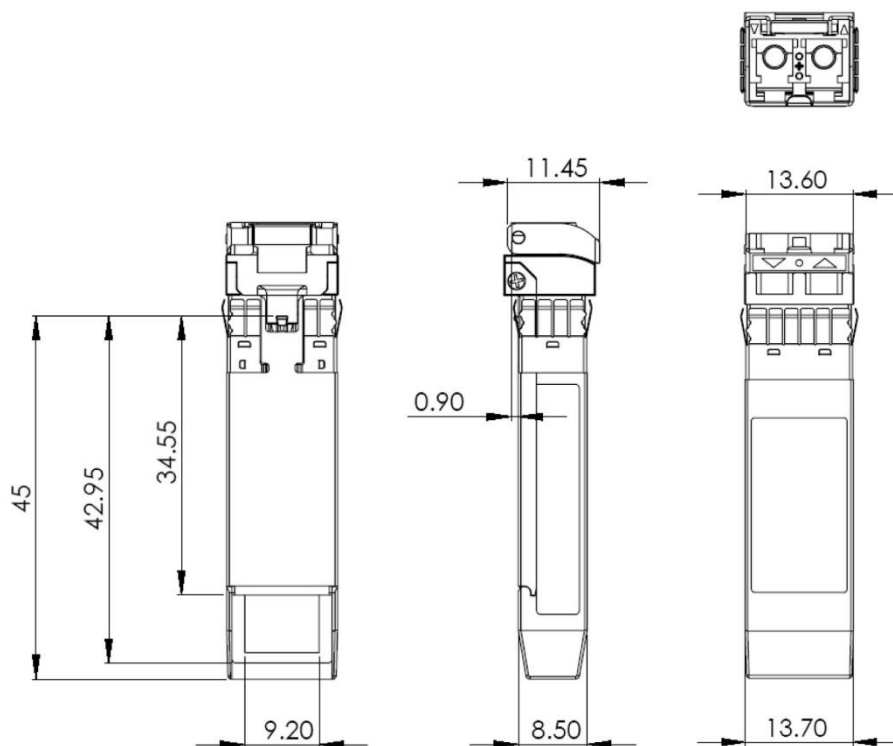
**Table 2** - EEPROM Serial ID Memory Contents (**A0h**)

Data Address	Length (Byte)	Name of Length	Description and Contents
<b>Base ID Fields</b>			
0	1	Identifier	Typical of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of Typical serial transceiver (04h)
2	1	Connector	Code of optical connector Typical (07=LC)
3-10	8	Transceiver	
11	1	Encoding	NRZ(03h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: PeakOptical
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: "PSFP10-xxxxxx" (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
<b>Extended ID Fields</b>			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	PeakOptical's Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
<b>Vendor Specific ID Fields</b>			
96-127	32	Readable	PeakOptical specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

**Table 3** - DDM Specification

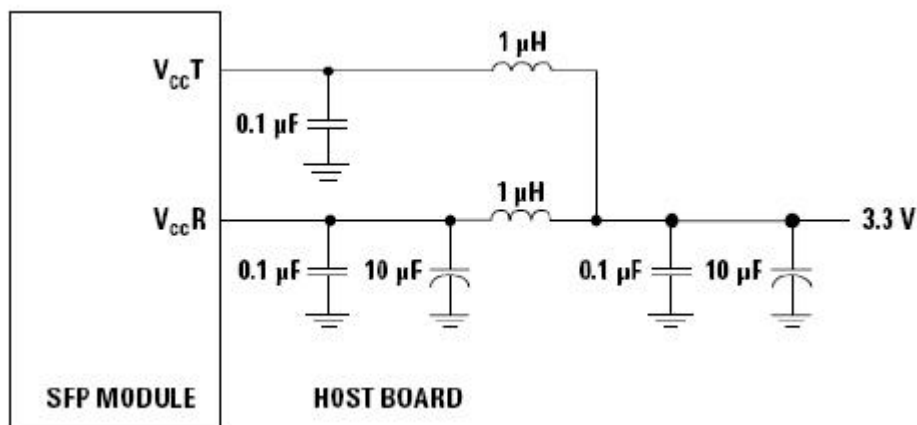
Parameter	Range		Accuracy	Calibration
Temperature	-10	~ +80°C	±3°C	Internal
Voltage	3.0	~ 3.6V	±3%	Internal
Bias Current	0	~ 15mA	±10%	Internal
TX Power	-7	~ 0dBm	±2dB	Internal
RX Power	-15 ~ 0dBm		±2dB	Internal

**Mechanical Dimensions:**

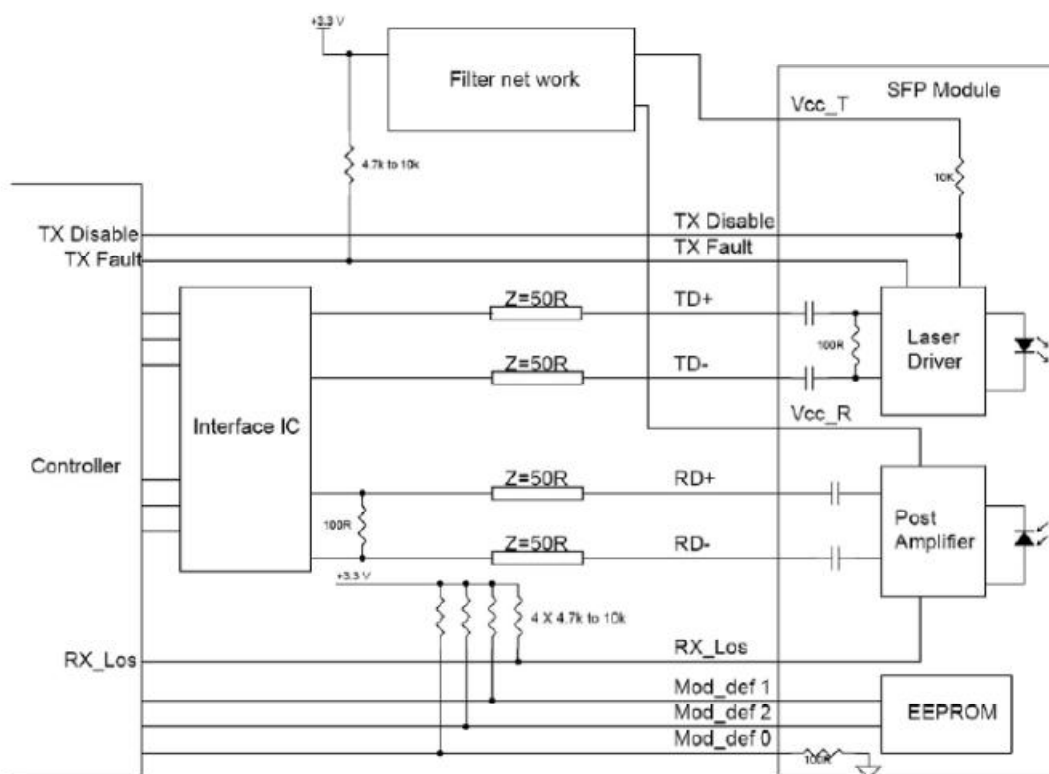


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## Recommended Circuit:



## Recommended Host Board Power Supply Circuit



## Recommended High-speed Interface Circuit

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