

## PT4-M3-4D53Q

### Description

The PT4-M3-4D53Q of Small Form Factor Pluggable (SFP) transceiver module is specifically designed for high performance integrated duplex data link over multi mode optical fiber. The high-speed oxide VCSEL and photo diode are provided as a light source and a detector, respectively. An EEPROM contained the detailed product information for the host equipment is accessed by the 2-wire serial CMOS EEPROM protocol. It complies with SFP MSA, SONET/SDH standards, Class 1 laser products, EN60825, and EN60950.



### Features

- Operation Temperature: -10°C~85°C
- 850nm oxide VCSEL
- 500m link distance, 50/125 um MMF
- Hot pluggable
- Metal enclosure, low EMI
- Single 3.3V power supply
- Low Power Dissipation

### Applications

- Metro Access Rings
- Point-to-Point networking
- 1x Fiber Channel
- Gigabit Ethernet
- Suitable for Fast Ethernet and OC-12

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T <sub>S</sub>	-40		+85	°C	
Supply Voltage	V <sub>CC</sub> T V <sub>CC</sub> R	0		5.5	V	
Relative Humidity	RH	0		85	%	

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Temperature	T <sub>OP</sub>	-10		85	°C	
Supply Voltage	V <sub>CC</sub> T,R	3.1	3.3	3.5	V	
Supply Current	I <sub>TX</sub> +I <sub>RX</sub>		200	300	mA	

### Ordering Information

P	T	4	-	M	3	-	4	D	5	3	Q																																																																																																																																					
a	b	X	c	d	e	f	g	h																																																																																																																																								
<table border="1"> <tr> <td rowspan="5">Function parameter</td> <td>P:</td> <td>may be Blank, or 000~999→ Pigtail length ( unit : cm )</td> </tr> <tr> <td>C:</td> <td>or 0~9 → Case Color ( 0: Black, 1: Blue )</td> </tr> <tr> <td>S:</td> <td>or B/F → Shield ( B: Backward , F: Forward ,X:Non)</td> </tr> <tr> <td>1~4</td> <td>→ Composite Specifications</td> </tr> <tr> <td>1:</td> <td>Case Color Blue + Shield Forward</td> </tr> <tr> <td>W:</td> <td>2: Case Color Blue + Shield Backward, Lead pin X 6 (TB: Half Shield, Lead pin X 6)</td> </tr> <tr> <td></td> <td>3:</td> <td>Case Color Blue + Full Shield Backward, Lead pin X 4</td> </tr> <tr> <td></td> <td>4:</td> <td>Case Color Black + Full Shield Backward, Lead pin X 6</td> </tr> </table>																		Function parameter	P:	may be Blank, or 000~999→ Pigtail length ( unit : cm )	C:	or 0~9 → Case Color ( 0: Black, 1: Blue )	S:	or B/F → Shield ( B: Backward , F: Forward ,X:Non)	1~4	→ Composite Specifications	1:	Case Color Blue + Shield Forward	W:	2: Case Color Blue + Shield Backward, Lead pin X 6 (TB: Half Shield, Lead pin X 6)		3:	Case Color Blue + Full Shield Backward, Lead pin X 4		4:	Case Color Black + Full Shield Backward, Lead pin X 6																																																																																																												
Function parameter	P:	may be Blank, or 000~999→ Pigtail length ( unit : cm )																																																																																																																																														
	C:	or 0~9 → Case Color ( 0: Black, 1: Blue )																																																																																																																																														
	S:	or B/F → Shield ( B: Backward , F: Forward ,X:Non)																																																																																																																																														
	1~4	→ Composite Specifications																																																																																																																																														
	1:	Case Color Blue + Shield Forward																																																																																																																																														
W:	2: Case Color Blue + Shield Backward, Lead pin X 6 (TB: Half Shield, Lead pin X 6)																																																																																																																																															
	3:	Case Color Blue + Full Shield Backward, Lead pin X 4																																																																																																																																														
	4:	Case Color Black + Full Shield Backward, Lead pin X 6																																																																																																																																														
<table border="1"> <tr> <td>Function distinction</td> <td colspan="17">may be Blank, or P ( P → Pigtail ), or C ( Case Color ), or S ( S → Shield ), or W ( W → Composite Specifications ), or F ( F → POE ), or I ( I → DDMT )</td> </tr> </table>																		Function distinction	may be Blank, or P ( P → Pigtail ), or C ( Case Color ), or S ( S → Shield ), or W ( W → Composite Specifications ), or F ( F → POE ), or I ( I → DDMT )																																																																																																																													
Function distinction	may be Blank, or P ( P → Pigtail ), or C ( Case Color ), or S ( S → Shield ), or W ( W → Composite Specifications ), or F ( F → POE ), or I ( I → DDMT )																																																																																																																																															
<table border="1"> <tr> <td rowspan="7">Potential energy &amp; temperature</td> <td>I→AC/AC</td> <td>PECL</td> <td>0℃~70℃</td> <td>RoHS</td> <td>W→DC/AC</td> <td>TTL</td> <td>0℃~70℃</td> <td>RoHS</td> </tr> <tr> <td>J→AC/AC</td> <td>PECL</td> <td>-40℃~85℃</td> <td>RoHS</td> <td>N→DC/DC</td> <td>PECL</td> <td>-40℃~85℃</td> <td>RoHS</td> </tr> <tr> <td>K→AC/AC</td> <td>TTL</td> <td>0℃~70℃</td> <td>RoHS</td> <td>O→DC/DC</td> <td>TTL</td> <td>0℃~70℃</td> <td>RoHS</td> </tr> <tr> <td>L→AC/AC</td> <td>TTL</td> <td>-40℃~85℃</td> <td>RoHS</td> <td>P→DC/DC</td> <td>TTL</td> <td>-40℃~85℃</td> <td>RoHS</td> </tr> <tr> <td>M→DC/DC</td> <td>PECL</td> <td>0℃~70℃</td> <td>RoHS</td> <td>R→DC/DC</td> <td>PECL</td> <td>-10℃~85℃</td> <td>RoHS</td> </tr> <tr> <td>Q→AC/AC</td> <td>TTL</td> <td>-10℃~85℃</td> <td>RoHS</td> <td>X→DC/AC</td> <td>TTL</td> <td>-40℃~85℃</td> <td>RoHS</td> </tr> </table>																		Potential energy & temperature	I→AC/AC	PECL	0℃~70℃	RoHS	W→DC/AC	TTL	0℃~70℃	RoHS	J→AC/AC	PECL	-40℃~85℃	RoHS	N→DC/DC	PECL	-40℃~85℃	RoHS	K→AC/AC	TTL	0℃~70℃	RoHS	O→DC/DC	TTL	0℃~70℃	RoHS	L→AC/AC	TTL	-40℃~85℃	RoHS	P→DC/DC	TTL	-40℃~85℃	RoHS	M→DC/DC	PECL	0℃~70℃	RoHS	R→DC/DC	PECL	-10℃~85℃	RoHS	Q→AC/AC	TTL	-10℃~85℃	RoHS	X→DC/AC	TTL	-40℃~85℃	RoHS																																																																														
Potential energy & temperature	I→AC/AC	PECL	0℃~70℃	RoHS	W→DC/AC	TTL	0℃~70℃	RoHS																																																																																																																																								
	J→AC/AC	PECL	-40℃~85℃	RoHS	N→DC/DC	PECL	-40℃~85℃	RoHS																																																																																																																																								
	K→AC/AC	TTL	0℃~70℃	RoHS	O→DC/DC	TTL	0℃~70℃	RoHS																																																																																																																																								
	L→AC/AC	TTL	-40℃~85℃	RoHS	P→DC/DC	TTL	-40℃~85℃	RoHS																																																																																																																																								
	M→DC/DC	PECL	0℃~70℃	RoHS	R→DC/DC	PECL	-10℃~85℃	RoHS																																																																																																																																								
	Q→AC/AC	TTL	-10℃~85℃	RoHS	X→DC/AC	TTL	-40℃~85℃	RoHS																																																																																																																																								
	<table border="1"> <tr> <td>Operating voltage</td> <td colspan="9">3→3.3V</td> <td colspan="9">5→5V</td> </tr> </table>																		Operating voltage	3→3.3V									5→5V																																																																																																																			
Operating voltage	3→3.3V									5→5V																																																																																																																																						
<table border="1"> <tr> <td>Distance</td> <td colspan="6">D1~D9 : D1→100M, D2→200M</td> <td colspan="6">01~99 : 01→1km, 10→10km</td> <td colspan="6">00→100km</td> </tr> </table>																		Distance	D1~D9 : D1→100M, D2→200M						01~99 : 01→1km, 10→10km						00→100km																																																																																																																	
Distance	D1~D9 : D1→100M, D2→200M						01~99 : 01→1km, 10→10km						00→100km																																																																																																																																			
<table border="1"> <tr> <td>Optical connector</td> <td colspan="4">1→FC</td> <td colspan="4">2→SC</td> <td colspan="4">3→ST</td> <td colspan="4">4→LC</td> </tr> </table>																		Optical connector	1→FC				2→SC				3→ST				4→LC																																																																																																																	
Optical connector	1→FC				2→SC				3→ST				4→LC																																																																																																																																			
<table border="1"> <tr> <td rowspan="3">Wavelength</td> <td colspan="4">M3→Multi-mode 850 nm</td> <td colspan="4">S1→Single-mode 1310 nm</td> <td colspan="4">S3→For Bi-direction : Single-mode Tx1310 / Rx1550 nm</td> </tr> <tr> <td colspan="4">M4→Multi-mode 1310 nm</td> <td colspan="4">S2→Single-mode 1550 nm</td> <td colspan="4">S4→For Bi-direction : Single-mode Tx1550 / Rx1310 nm</td> </tr> <tr> <td colspan="16">00~99 (CWDM Wavelength)</td> <td colspan="2">S5→For Bi-direction : Single-mode Tx1310 / Rx1490 nm</td> </tr> <tr> <td colspan="16"></td> <td colspan="2">S6→For Bi-direction : Single-mode Tx1490 / Rx1310 nm</td> </tr> </table>																		Wavelength	M3→Multi-mode 850 nm				S1→Single-mode 1310 nm				S3→For Bi-direction : Single-mode Tx1310 / Rx1550 nm				M4→Multi-mode 1310 nm				S2→Single-mode 1550 nm				S4→For Bi-direction : Single-mode Tx1550 / Rx1310 nm				00~99 (CWDM Wavelength)																S5→For Bi-direction : Single-mode Tx1310 / Rx1490 nm																		S6→For Bi-direction : Single-mode Tx1490 / Rx1310 nm																																																																			
Wavelength	M3→Multi-mode 850 nm				S1→Single-mode 1310 nm				S3→For Bi-direction : Single-mode Tx1310 / Rx1550 nm																																																																																																																																							
	M4→Multi-mode 1310 nm				S2→Single-mode 1550 nm				S4→For Bi-direction : Single-mode Tx1550 / Rx1310 nm																																																																																																																																							
	00~99 (CWDM Wavelength)																S5→For Bi-direction : Single-mode Tx1310 / Rx1490 nm																																																																																																																															
																S6→For Bi-direction : Single-mode Tx1490 / Rx1310 nm																																																																																																																																
<table border="1"> <tr> <td rowspan="2">Bit rate</td> <td colspan="4">1→155Mbps</td> <td colspan="4">3→1.0625Gbps</td> <td colspan="4">5→2.125 Gbps</td> <td colspan="4">7→2.7 Gbps</td> </tr> <tr> <td colspan="4">2→622Mbps</td> <td colspan="4">4→1.25 Gbps</td> <td colspan="4">6→2.5 Gbps</td> <td colspan="4">8→3.125 Gbps</td> </tr> </table>																		Bit rate	1→155Mbps				3→1.0625Gbps				5→2.125 Gbps				7→2.7 Gbps				2→622Mbps				4→1.25 Gbps				6→2.5 Gbps				8→3.125 Gbps																																																																																																	
Bit rate	1→155Mbps				3→1.0625Gbps				5→2.125 Gbps				7→2.7 Gbps																																																																																																																																			
	2→622Mbps				4→1.25 Gbps				6→2.5 Gbps				8→3.125 Gbps																																																																																																																																			
<table border="1"> <tr> <td rowspan="6">Electric connector</td> <td colspan="6">TR→Dual Fiber 1×9 Transceiver</td> <td colspan="6">PT→Dual Fiber SFP Transceiver</td> <td colspan="6">EUFB→ EPON ONU SFF 2×5 BIDI Transceiver</td> </tr> <tr> <td colspan="6">TB→Single Fiber 1×9 Transceiver</td> <td colspan="6">PB→Single Fiber SFP Transceiver</td> <td colspan="6">ETFB→ EPON OLT SFF 2×5 BIDI Transceiver</td> </tr> <tr> <td colspan="6">FT→Dual Fiber SFF Transceiver</td> <td colspan="6">PM→Dual Fiber SFP Transceiver ( DDM )</td> <td colspan="6">GUFB→ GPON ONU SFF 2×5 BIDI Transceiver</td> </tr> <tr> <td colspan="18">UB→Dual Bi-Direction SFP Transceiver ( OM PIN Assignment )</td> </tr> <tr> <td colspan="18">GTFB→ GPON OLT SFF 2×5 BIDI Transceiver</td> </tr> <tr> <td colspan="18">UM→Dual Bi-Direction SFP Transceiver ( CSFP MSA )</td> </tr> <tr> <td colspan="18">GUFM→GPON OLT SFF 2×5 BIDI Transceiver(DDMI)</td> </tr> </table>																		Electric connector	TR→Dual Fiber 1×9 Transceiver						PT→Dual Fiber SFP Transceiver						EUFB→ EPON ONU SFF 2×5 BIDI Transceiver						TB→Single Fiber 1×9 Transceiver						PB→Single Fiber SFP Transceiver						ETFB→ EPON OLT SFF 2×5 BIDI Transceiver						FT→Dual Fiber SFF Transceiver						PM→Dual Fiber SFP Transceiver ( DDM )						GUFB→ GPON ONU SFF 2×5 BIDI Transceiver						UB→Dual Bi-Direction SFP Transceiver ( OM PIN Assignment )																		GTFB→ GPON OLT SFF 2×5 BIDI Transceiver																		UM→Dual Bi-Direction SFP Transceiver ( CSFP MSA )																		GUFM→GPON OLT SFF 2×5 BIDI Transceiver(DDMI)																	
Electric connector	TR→Dual Fiber 1×9 Transceiver						PT→Dual Fiber SFP Transceiver						EUFB→ EPON ONU SFF 2×5 BIDI Transceiver																																																																																																																																			
	TB→Single Fiber 1×9 Transceiver						PB→Single Fiber SFP Transceiver						ETFB→ EPON OLT SFF 2×5 BIDI Transceiver																																																																																																																																			
	FT→Dual Fiber SFF Transceiver						PM→Dual Fiber SFP Transceiver ( DDM )						GUFB→ GPON ONU SFF 2×5 BIDI Transceiver																																																																																																																																			
	UB→Dual Bi-Direction SFP Transceiver ( OM PIN Assignment )																																																																																																																																															
	GTFB→ GPON OLT SFF 2×5 BIDI Transceiver																																																																																																																																															
	UM→Dual Bi-Direction SFP Transceiver ( CSFP MSA )																																																																																																																																															
GUFM→GPON OLT SFF 2×5 BIDI Transceiver(DDMI)																																																																																																																																																

\*Please contact us for the released types.

# PT4-M3-4D53Q

## Transmitter Electro-Optical Interface (T<sub>C</sub> = -10°C~85°C, V<sub>cc</sub>T, R=3.1V<V<sub>cc</sub><3.5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter Differential Input Voltage	TD +/-	<b>400</b>		<b>2000</b>	mVp-p	A
Optical Output Power	P <sub>O</sub>	<b>-9</b>		<b>-3</b>	dBm	A
Optical Extinction Ratio	E <sub>R</sub>	<b>9</b>			dB	A
Center Wavelength	λ <sub>C</sub>	<b>830</b>	<b>850</b>	<b>860</b>	nm	A
Spectral Width (rms)	Δλ			<b>0.85</b>	nm	A
Optical Rise / Fall Time	t <sub>r</sub> / t <sub>f</sub>			<b>260</b>	ps	A,B
Tx_Fault - High	V <sub>Fault_H</sub>	<b>2</b>		V <sub>CC</sub>	V	A
Tx_Fault - Low	V <sub>Fault_L</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.5	V	A
Tx_Disable - High	V <sub>Disable_H</sub>	<b>2</b>		V <sub>CC</sub>	V	A
Tx_Disable - Low	V <sub>Disable_L</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	A

**Notes:**

A. All of data is measured at 1250Mbps, PRBS 2<sup>7</sup>-1, NRZ.

B: 20%~80%

## Receiver Electro-Optical Interface (T<sub>C</sub> = -10°C ~85°C, V<sub>cc</sub>T, R=3.1V<V<sub>cc</sub><3.5V)

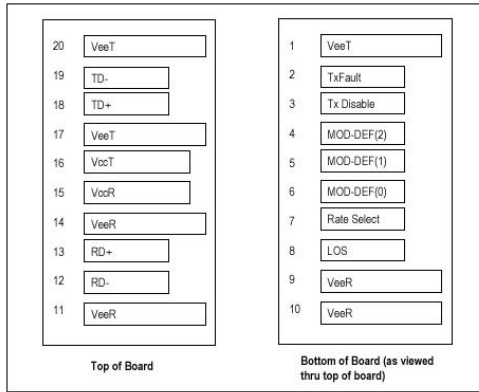
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Receiver Differential Output Voltage	RD +/-	<b>600</b>	<b>800</b>		mV <sub>p-p</sub>	
Receiver Overload	P <sub>IN</sub> MAX	<b>0</b>			dBm	A,B
Receiver Sensitivity	P <sub>IN</sub> MIN	<b>-3</b>		<b>-18</b>	dBm	
Operating Center Wavelength	λ <sub>C</sub>	<b>770</b>		<b>860</b>	nm	
Receiver LOS Assert Level	P <sub>RX_LOS A</sub>	<b>-35</b>			dBm	B
Receiver LOS Deassert Level	P <sub>RX_LOS D</sub>			<b>-18</b>	dBm	B
Receiver Loss of Signal Hysteresis		<b>0.5</b>	<b>2</b>		dB	B

**Notes:**

A. With BER better than or equal to 1×10<sup>-12</sup>

B. measured in the center of the eye opening with 2<sup>7</sup> -1 PRBS, NRZ

### Pin Description



SFP Transceiver Electric Pad Layout

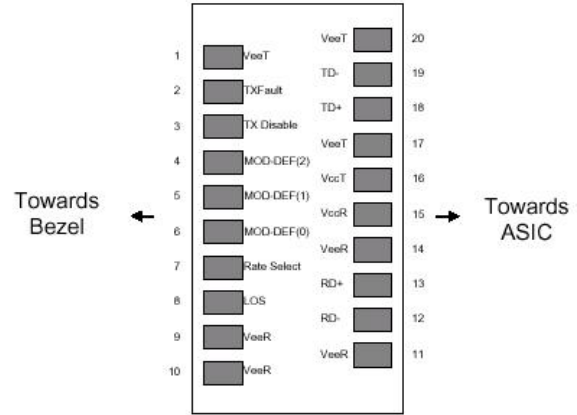


Diagram of Host Board Connector Block Pin Numbers and Names



RoHS Compliant

## PT4-M3-4D53Q

[www.palconnusa.com](http://www.palconnusa.com)

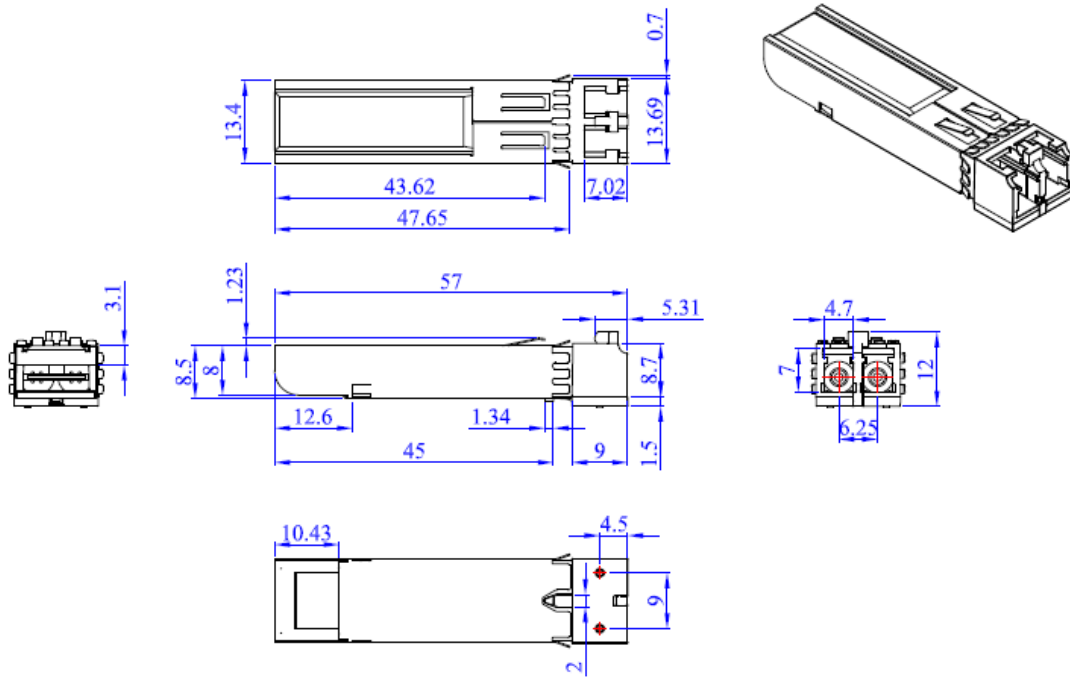
Pin No.	Pin Name	Function	Plug Seq.	Notes
1	V <sub>ee</sub> T	Transmitter Ground	1	1
2	TX Fault	Transmitter Fault Indication	3	2
3	TX Disable	Transmitter Disable	3	3
4	MOD_DEF 2	Module Definition 2	3	4
5	MOD_DEF 1	Module Definition 1	3	4
6	MOD_DEF 0	Module Definition 0	3	4
7	Rate Select	Select between full or reduced receiver bandwidth	3	5
8	LOS	Loss of Signal	3	6
9	V <sub>ee</sub> R	Receiver Ground	1	1
10	V <sub>ee</sub> R	Receiver Ground	1	1
11	V <sub>ee</sub> R	Receiver Ground	1	1
12	RD -	Inv. Receiver Data Out	3	
13	RD +	Receiver Data Out	3	
14	V <sub>ee</sub> R	Receiver Ground	1	1
15	V <sub>cc</sub> R	Receiver Power	2	
16	V <sub>cc</sub> T	Transmitter Power	2	
17	V <sub>ee</sub> T	Transmitter Ground	1	1
18	TD +	Transmitter Data In	3	
19	TD -	Inv. Transmitter Data In	3	
20	V <sub>ee</sub> T	Transmitter Ground	1	1

### Note:

- 1, Circuit ground is internally isolated from chassis ground
- 2, Open-Collector outputs, asserted when LD and/or APC function fail.
- 3, Disable when high voltage (>2.0V or Open)
- 4, Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V.  
MOD\_DEF(0) pulls line low to indicate module is plugged in.
- 5, Low=1.25G/1.0625G, High= 2.125G
- 6, LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 5.5V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## PT4-M3-4D53Q

### Mechanical Dimensions (Units in mm)



### Application Circuit

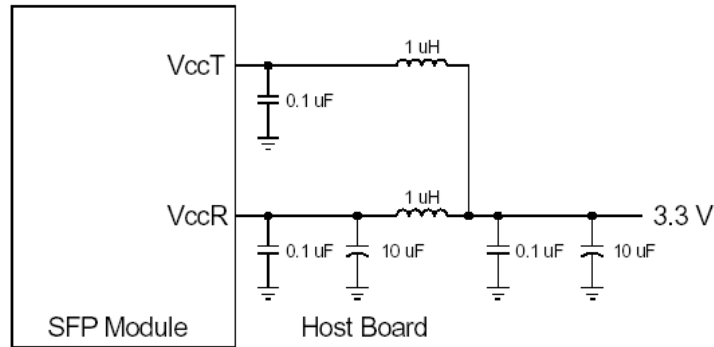


Figure 2A. Recommended Host Board Supply Filtering Network

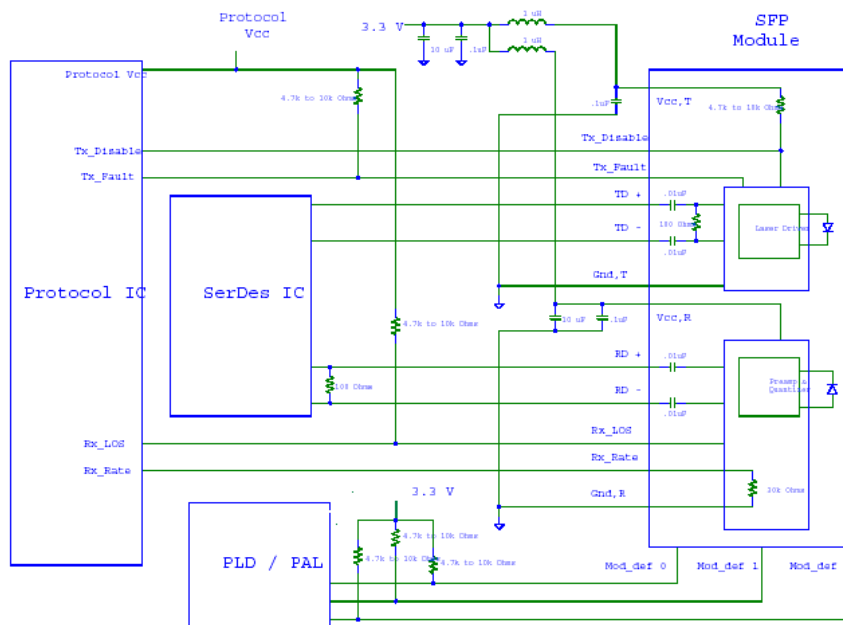


Figure 2B. Example SFP Host Board Schematic