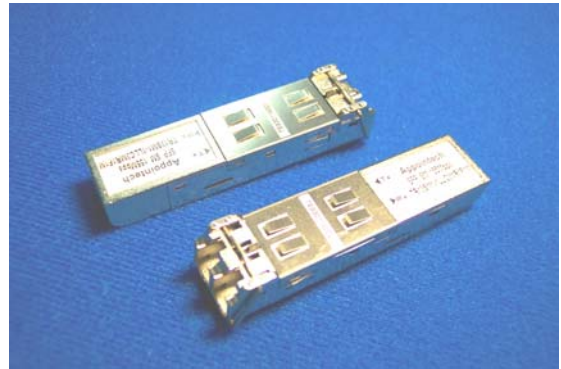


Multi-mode 1.25Gbps 780/850 Bi-Directional Single Fiber SFP Optical Transceiver with Digital Diagnostics

Features

- Compliant with SFP MSA and SFF-8472(Rev 9.3)
- Compliant with IEEE 802.3z Gigabit Ethernet 1000BASE-LX specification
- SFF-8472 Digital Diagnostic Monitoring Interface with real time monitors
 - Transmitter Output Power
 - Receiver Input Power
 - Laser Bias Current
 - Temperature
 - Supply Voltage
- Internal calibration for Digital Diagnostic Monitoring
- Alarms and warnings to indicate status of real time monitors
- Metal case & LC receptacle with bail de-latch
- Transmitter disable input and receiver loss of signal output
- Wide operating temperature range $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$
- Single 3.3V power supply
- AC coupled LVPECL compatible data input and output
- 2-wire serial EEPROM protocol



Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
Transmitter					
Data Rate (NRZ)	B	-	1250	-	Mb/s
Optical Output Power (avg.) ^{(1) (3)}					
-1	P _o	-9	-	-3	dBm
Extinction Ratio	ER	9	-	-	dB
Optical Wavelength					
TR78R85 (780nm FP LD)	λ_c	760	780	800	nm
TR85R78 (850nm VCSEL)	λ_c	820	850	880	nm
Spectral Width	$\Delta\lambda$		1.0	2.5	nm
Output Rise Time (10-90%)	t _r	-	0.4	0.8	ns
Output Fall Time (10-90%)	t _f	-	0.4	0.8	ns
Data Input ⁽⁶⁾	V _{IL} V _{IH}	V _{CC} -1.810 V _{CC} -1.165	- -	V _{CC} -1.475 V _{CC} -0.880	V
Tx Disable Input	V _{DIL} V _{DIH}	0 2	- -	0.8 V _{CC}	V
Supply Voltage	V _{CC}	4.75 3.10	5.0 3.3	5.25 3.50	V
Supply Current	I _{CC}	-	-	110	mA

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Parameter	Symbol	Min.	Typ.	Max.	Unit
Receiver					
Data Rate (NRZ)	B	-	1250	-	Mb/s
Optical Input (avg.) Sensitivity ⁽¹⁾⁽⁵⁾					
-1	P _{IN}	-	-	-14	dBm
Saturation	P _{SAT}	-3	0	-	dBm
Optical Wavelength					
TR78R85	λ	820	850	880	nm
TR85R78		760	780	800	
Output Rise Time (10-90%)	t _r	-	-	0.4	ns
Output Fall Time (10-90%)	t _f	-	-	0.4	ns
Data Output ⁽⁶⁾	V _{OL} V _{OH}	V _{CC} -1.840 V _{CC} -1.045	- -	V _{CC} -1.62 V _{CC} -0.88	V
Signal Detect Asserted (avg.)	P _A	-	-	-17	dBm
Signal Detect Deasserted (avg.)	P _D	-25	-	-	dBm
Hysteresis	P _{HYS}	-	2	-	dB
Supply Voltage	V _{CC}	4.75 3.10	5.0 3.3	5.25 3.50	V
Supply Current	I _{CC}	-	-	100	mA
Optical Return Loss	RL	50	-	-	dB
Optical Cross Talk	CT	20	-	-	dB

Notes :

- (1) With 62.5/125μm fiber.
- (2) Driven with a differential signal.
- (3) Class 1 eye safe per FDA and IEC.
- (4) Eye mask diagram is compliant to IEEE802.3z Eye Diagram
- (5) 2⁷ -1 PRBS, BER= 10⁻¹².
- (6) Compatible with LVPECL and PECL logic levels.
- (7) The transmitter output should not be viewed directly.

Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Operating Temperature	-1	0	70	°C
	-2	-40	85	°C
Storage Temperature		-40	100	°C
Lead Soldering Limits		-	240/10	°C /sec
Supply Voltage	5V	-0.2	7	V
	3.3V	-0.2	4	V

Digital Diagnostic Monitor Characteristics

Parameter	Min.	Unit
Transceiver Internal Temperature Accuracy	±3.0	°C
Transceiver Internal Supply Voltage Accuracy	±3	%
TX Laser Bias Current Accuracy	±1.0	%
TX Average Output Power Accuracy	±3.0	dB
RX Average Input Power Accuracy	±3.0	dB

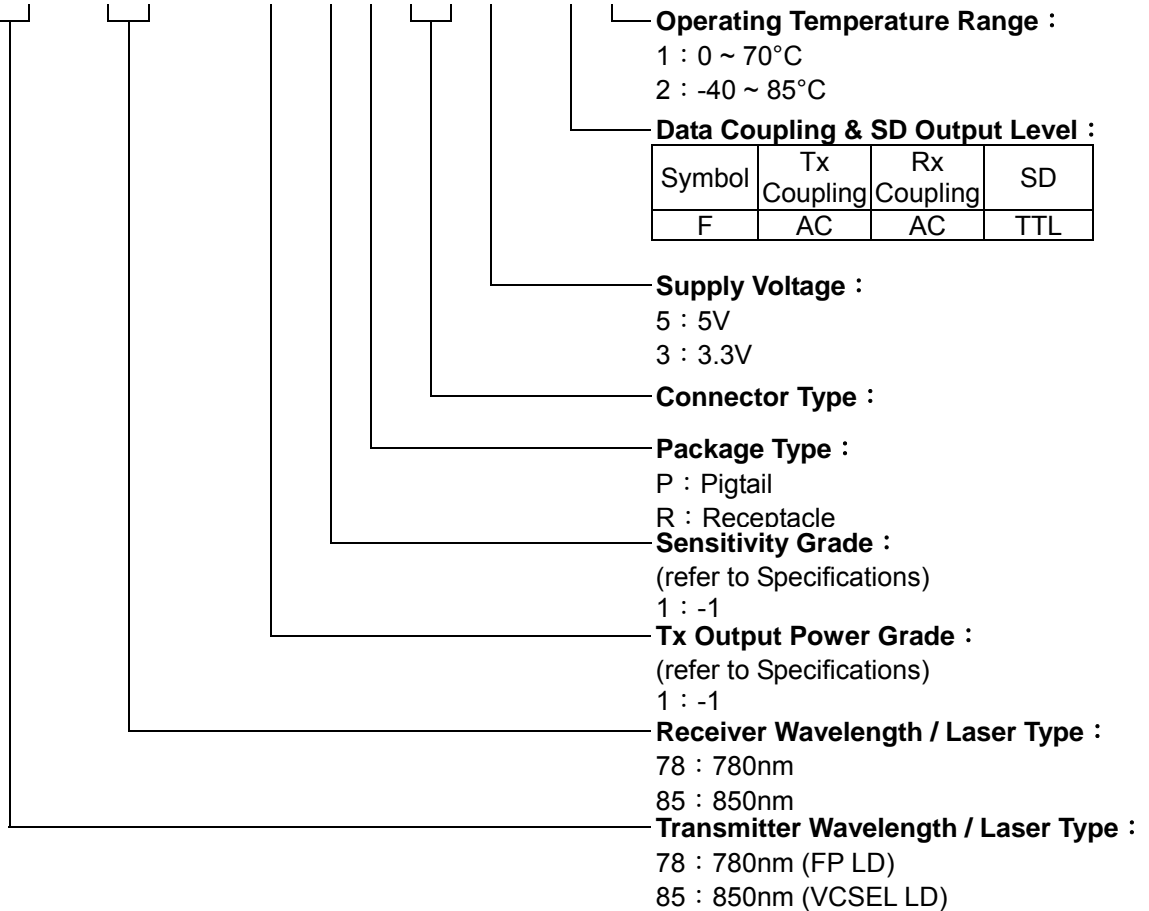
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Timing of Control and Status I/O

Parameter	Symbol	Min.	Max.	Unit	Condition
TX Disable Assert Time	t_off		10	μ s	Time from rising edge of TX Disable to when the optical output falls below 10% of nominal.
TX Disable Negate Time	t_on		1	ms	Time from falling edge of TX Disable to when the modulated optical output rises above 90% of nominal.
Time to initialize, including reset of TX_Fault	t_init		300	ms	From power on or negation of TX Fault using TX Disable.
TX Fault Assert Time	t_fault		100	μ s	Time from fault to TX fault on.
TX Disable to reset	t_reset	10		μ s	Time TX Disable must be held high to reset TX_fault.
LOS Assert Time	t_loss_on		100	μ s	Time from LOS state to RX LOS assert.
LOS Deassert Time	t_loss_off		100	μ s	Time from non-LOS state to RX LOS deassert.
Serial ID Clock Rate	f_serial_clock		100	kHz	

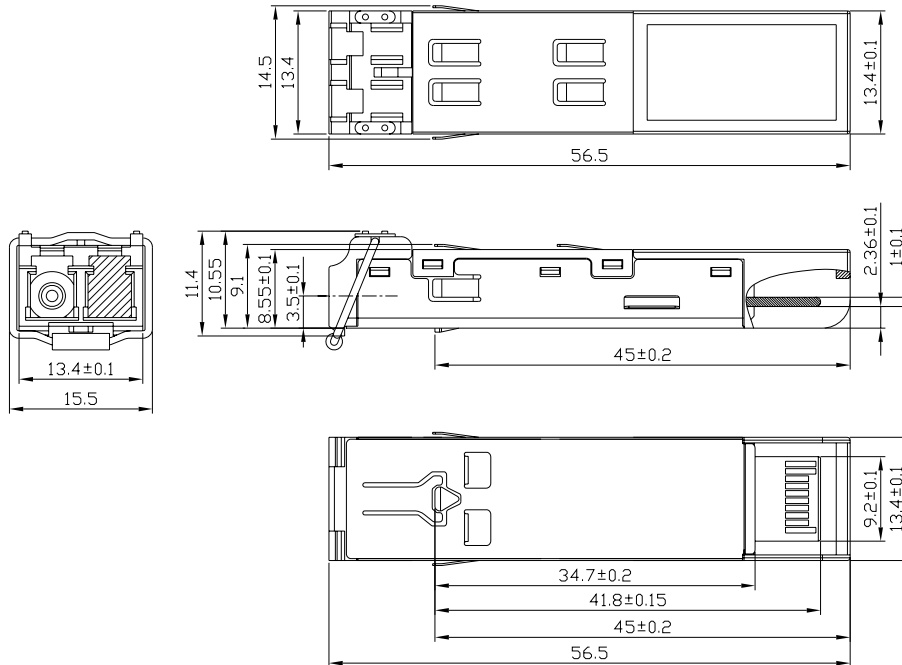
Ordering Information

T R □ □ R □ □ M 3 - □ - □ □ L C □ M F □ D



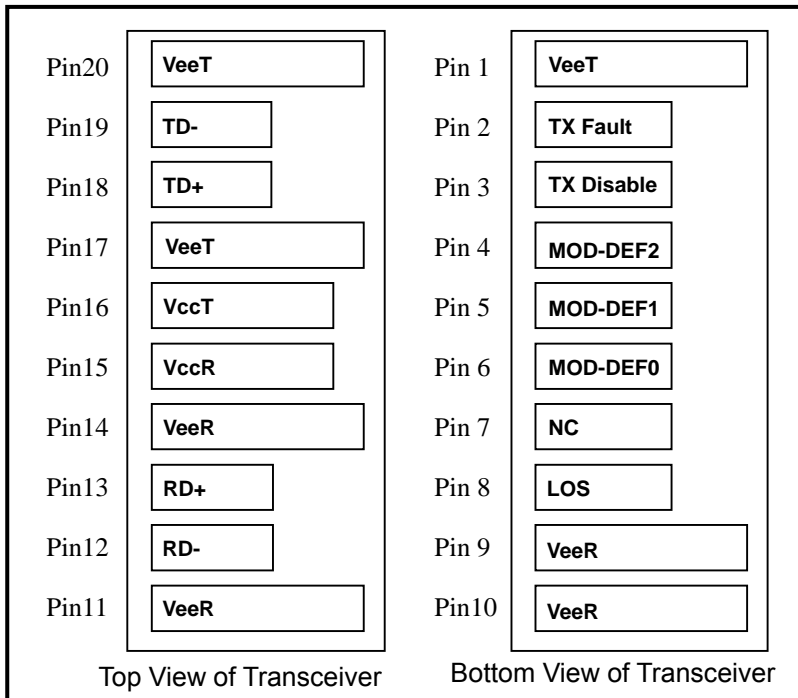
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Outline Drawing



UNIT : mm

SFP Transceiver Electrical Pad Layout



Multi-mode 1.25Gbps 780/850 Bi-Directional Single Fiber SFP Optical Transceiver with Digital Diagnostics

Pin Description

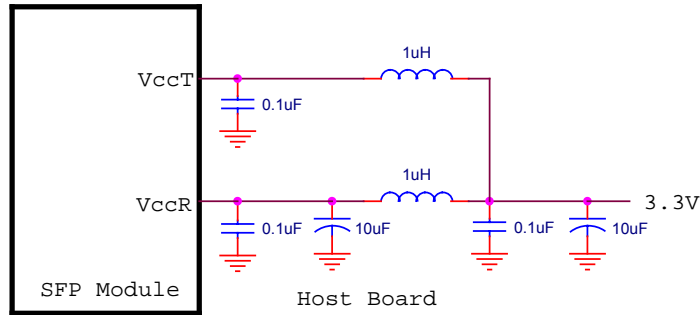
Pin No.	Symbol	Description
1	VeeT	Transmitter Ground
2	TX Fault	Transmitter Fault Indication Logic Low indicates normal operation. Logic High Indicates a laser fault of some kind. TX Fault is an open drain output, which should be pulled up with a 4.7K – 10K Ω resistor on the host board.
3	TX Disable	Transmitter Disable Its states are : Low (0 – 0.8V) : Transmitter on (>0.8, < 2.0V) : Undefined High (2.0 – 3.465V) : Transmitter Disabled Open : Transmitter Disabled It is pulled up within the module with a 4.7K – 10 K. Ω resistor.
4	MOD-DEF2	Module Definition 2 (SDA) The data line of two wire serial interface for serial ID. MOD-DEF2 should be pulled up with a 4.7K – 10K Ω resistor on the host board. The pull-up voltage shall be VccT or VccR.
5	MOD-DEF1	Module Definition 1 (SCL) The clock line of two wire serial interface for serial ID. MOD-DEF1 should be pulled up with a 4.7K – 10K Ω resistor on the host board. The pull-up voltage shall be VccT or VccR.
6	MOD-DEF0	Module Definition 0 (WP) MOD-DEF0 is grounded by the module to indicate that the module is present.
7	NC	Not connected
8	LOS	Loss of Signal Logic High indicates the received optical power is below the worst-case receiver sensitivity. Logic Low indicates normal operation. LOS is an open drain output, which should be pulled up with a 4.7K – 10K Ω resistor on the host board.
9	VeeR	Receiver Ground
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Inv. Received Data Out (Note 1)
13	RD+	Received Data Out (Note 1)
14	VeeR	Receiver Ground
15	VccR	Receiver Power Supply
16	VccT	Transmitter Power Supply
17	VeeT	Transmitter Ground
18	TD+	Transmitter Data In (Note 2)
19	TD-	Inv. Transmit Data In (Note 2)
20	VeeT	Transmitter Ground

Notes :

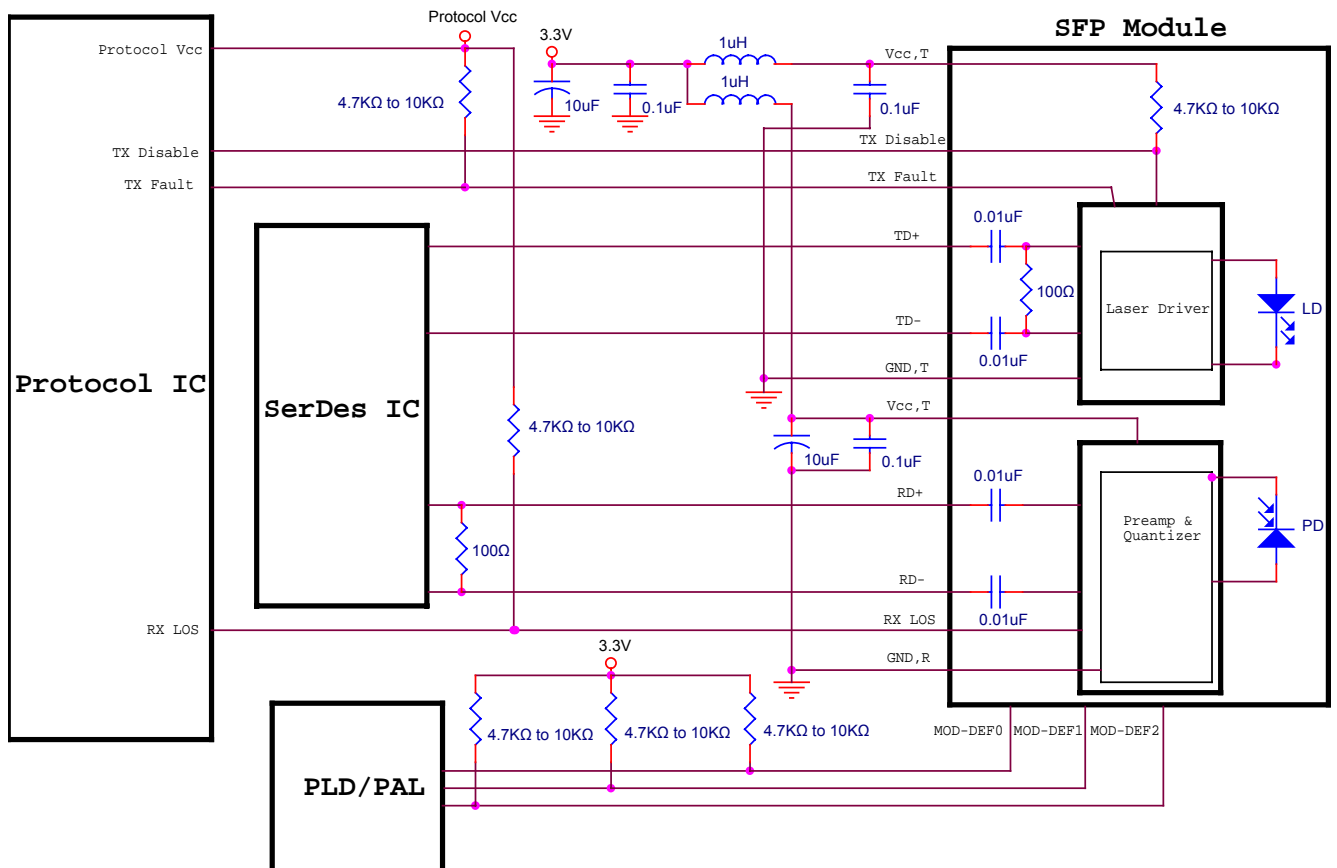
- RD+ and RD- are AC coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 2000 mV differential (185 – 1000 mV single ended) when properly terminated.
- TD+ and TD- are AC-coupled, differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500 – 2400 mV (250 – 1200 mV single-ended), though it is recommended that values between 500 and 1200 mV differential (250 – 600 mV single-ended) be used for best EMI performance.

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Recommended Host Board Supply Filtering Network



Example SFP Host Board Schematic



Appointech, Inc.
 6F-2, NO.192 Tung-Kuan Rd.,
 Hsinchu, Taiwan, R.O.C.
 TEL : 886-3-573-8478
 FAX : 886-3-573-8441
 E-mail : sales@appointech.com
 http://www.appointech.com

US Office :
HK Systems, Inc.
 Tel/Fax: 909-972-9638