

Single-mode 1.25Gbps 2X5 SFF Transceiver

Features

- LC duplex receptacle
- Standard 2 x 5 footprint
- 1310nm or 1550nm laser transmitter with automatic power control
- AC or DC coupled LVPECL/PECL compatible data input and output
- Transmitter disable input
- PECL or TTL signal detect output
- Single 3.3V or 5V power supply



Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	
Transmitter						
Data Rate (NRZ)	B	-	1250	-	Mb/s	
Optical Output Power (avg.) ^{(1) (2) (3)}						
-1	P _o	-11	-	-6	dBm	
-2	P _o	-5	-	0	dBm	
-3	P _o	-3	-	+2	dBm	
Extinction Ratio ⁽²⁾	ER	9	-	-	dB	
Optical Wavelength						
1310nm FP LD ⁽²⁾	λ_c	1270	1310	1355	nm	
1550nm DFB LD	λ_c	1530	1550	1570	nm	
Spectral Width						
1310nm FP LD (RMS) ⁽²⁾	$\Delta\lambda$	-	-	2.5	nm	
1550nm DFB LD (-20dB)	$\Delta\lambda$	-	-	1	nm	
Side Mode Suppression Ratio						
1550nm DFB LD	SMSR	30	-	-	dB	
Output Rise Time (20-80%) ⁽²⁾	t _r	-	-	0.26	ns	
Output Fall Time (20-80%) ⁽²⁾	t _f	-	-	0.26	ns	
Data Input ⁽⁷⁾	DC Coupled	V _{IL} V _{IH}	V _{CC} -1.810 V _{CC} -1.165	- -	V _{CC} -1.475 V _{CC} -0.880	V V
	AC Coupled (Differential)	V _I	0.25	-	1.6	V
Tx Disable Input	V _{DIL}	0	-	0.8	V	
	V _{DIH}	2	-	V _{CC}	V	
Supply Voltage	V _{CC}	3.10	3.3	3.50	V	
		4.75	5.0	5.25	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 Sensitivity (avg.) ^{(1) (2) (5)}						
-1		P _{IN}	-	-	-20	dBm
-2		P _{IN}	-	-	-23	dBm
Saturation		P _{SAT}	-3	-	-	dBm
Optical Wavelength		λ	1100	-	1600	nm
Output Rise Time (20-80%)		t _r	-	-	0.4	ns
Output Fall Time (20-80%)		t _f	-	-	0.4	ns
Data Output ⁽⁷⁾	DC Coupled	V _{OL} V _{OH}	V _{CC} -1.840 V _{CC} -1.045	- -	V _{CC} -1.62 V _{CC} -0.88	V V
	AC Coupled (Differential)	V _I	0.6	-	1.8	V
Signal Detect Asserted (avg.)		P _A	-	-	-20	dBm
Signal Detect Deasserted (avg.)		P _D	-35	-	-	dBm
Signal Detect Hysteresis		P _{HYS}	-	2	-	dB
Supply Voltage		V _{CC}	3.10 4.75	3.3 5.0	3.50 5.25	V V
Supply Current		I _{CC}	-	-	100	mA

Notes :

- (1) With 0.275 NA, 9/125μm fiber.
- (2) Compliant to IEEE802.3z Gigabit Ethernet 1000BASE-LX.
- (3) Class 1 eye safe per FDA and IEC.
- (4) Transmitter eye mask diagram is compliant to IEEE802.3z Eye Diagram.
- (5) 2⁷ -1 PRBS, BER= 10⁻¹².
- (6) The transmitter output should not be viewed directly.
- (7) Compatible with PECL and LVPECL logic levels.

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



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Ordering Information

SNS-T R □ □ S M 3 - □ □ L C □ A R □ □ □

Operating Temperature Range :

- 1 : 0°C ~ 70°C
- 2 : -40°C ~ 85°C

Data Coupling & SD Output Level :

Symbol	Tx Coupling	Rx Coupling	SD
C	AC	DC	PECL
D	AC	DC	TTL
E	AC	AC	PECL
F	AC	AC	TTL
G	DC	DC	PECL
H	DC	DC	TTL
I	DC	AC	PECL
J	DC	AC	TTL

Sensitivity Grade : (refer to Specifications)

- 1 : -1

Supply Voltage :

- 5 : 5V
- 3 : 3.3V

Laser Type :

- L : FP LD
- F : DFB LD

Tx Output Power Grade : (refer to Specifications)

- 1 : -1
- 2 : -2
- 3 : -3

Wavelength :

- 13 : 1310nm
- 15 : 1550nm

Part Number	Laser Type	Power Budget ⁽¹⁾	Recommended Maximum Reach ⁽²⁾	Compliant to Gigabit Ethernet ⁽⁴⁾
TR13SM3-1LLC□AR1□□	1310nm, FP	9dB	17Km	1000BASE-LX
TR13SM3-2LLC□AR2□□	1310nm, FP	18dB	42Km	-
TR15SM3-3FLC□AR2□□	1550nm, DFB	20dB	68Km	-

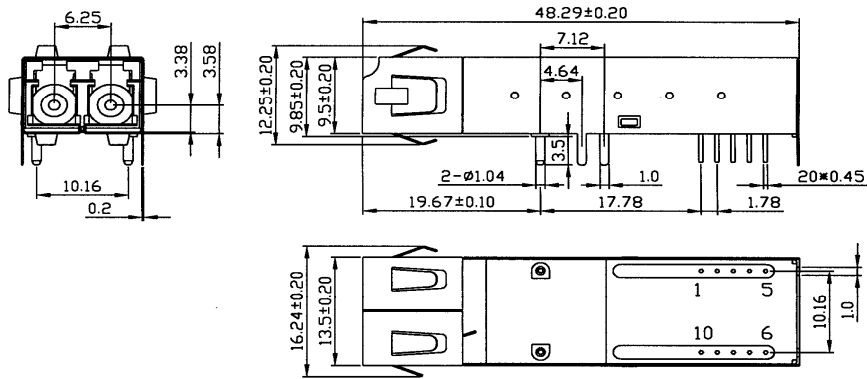
Notes :

- (1) Power Budget (min.) = TX Output Power (min.) - RX Sensitivity (min.)
- (2) Assuming connector loss 3dB; 1310nm fiber attenuation coefficient 0.35dB/Km; 1550nm fiber attenuation coefficient 0.25dB/Km.
- (3) The maximum reach value is recommended, not guaranteed. The exact transmission distance depends on fiber loss, connector loss and system penalty.
- (4) Gigabit Ethernet standard specification is defined in IEEE802.3z.

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Outline Drawing

2*5



UNIT : mm

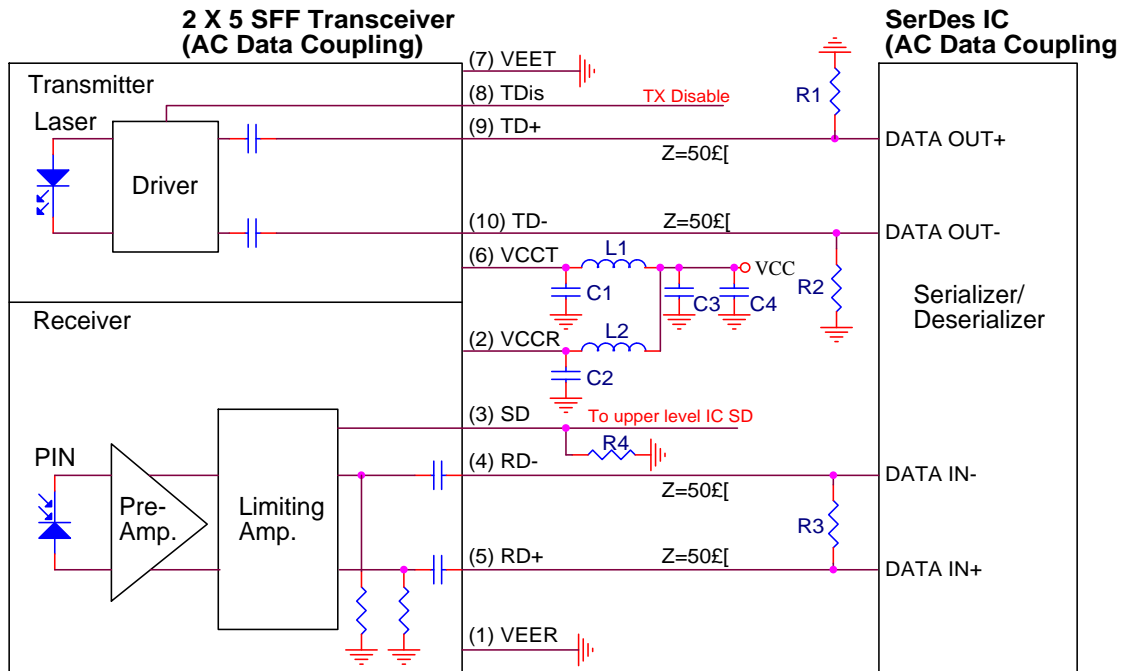
Pinout Description

Pin No.	Symbol	Description
1	V_{EER}	Receiver Ground
2	V_{CCR}	Receiver Power Supply (5V/3.3V)
3	SD	Receiver Signal Detect
4	RD-	Receiver Data Out (Inverted)
5	RD+	Receiver Data Out
6	V_{CCT}	Transmitter Power Supply (5V/3.3V)
7	V_{EET}	Transmitter Ground
8	TDiS	Input Logic Low Level to Switch Laser "ON" Input Logic High Level to Switch Laser "OFF"
9	TD+	Transmitter Data in
10	TD-	Transmitter Data In (Inverted)

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Application Notes

Recommended AC Coupling Interface Circuit :

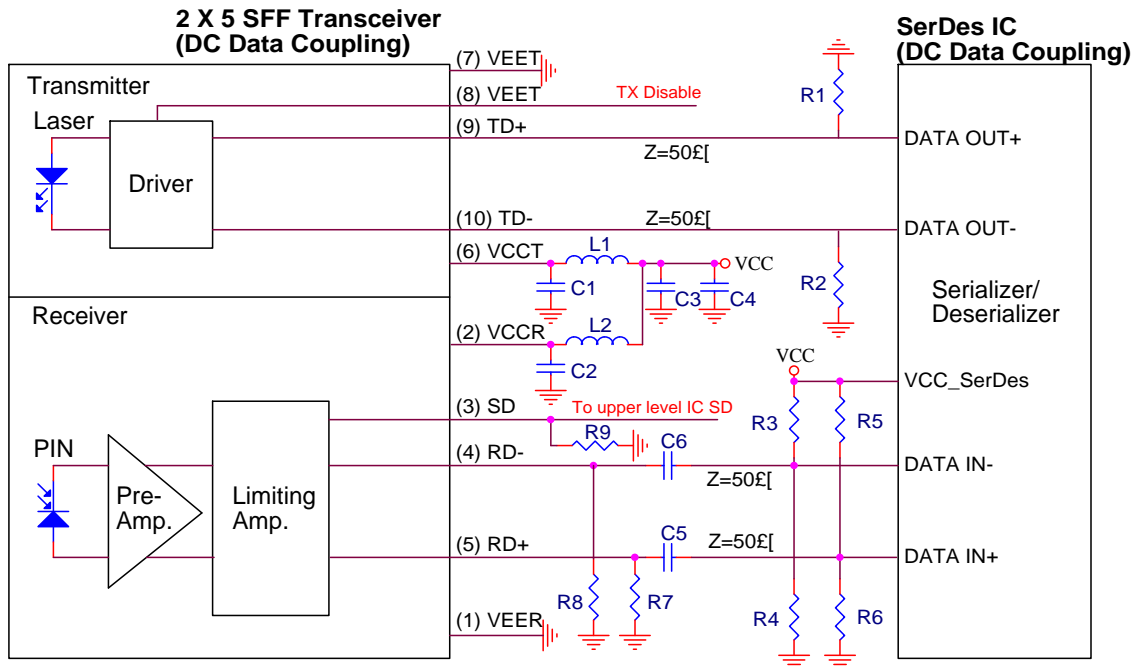


$L1=L2=1\text{EgH}$ or ferrite bead
 $C1=C2=C3=0.1\text{EgF}$
 $C4=10\text{EgF}$
 $R1, R2, R3$ depends on SerDes IC specification.
 (Consult the SerDes IC application information)
 $R4=510\Omega$

NOTE_iG
 1. Transmission line characteristic impedance $Z=50\Omega$.
 2. $R1, R2, R3$ as close to SerDes IC as possible.

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Recommended DC Coupling Interface Circuit :



$L1=L2=1\text{ngH}$ or ferrite bead
 $C1=C2=C3=C5=C6=0.1\text{ngF}$
 $C4=10\text{ngF}$
 $R1, R2, R3, R4, R5, R6$ depends on SerDes IC specification.
 (Consult the SerDes IC application information)
 $R7=R8=270\text{ng}$ (VCC=3.3V)
 $=510\text{ng}$ (VCC=5V)
 $R9=510\text{ng}$

NOTE;G

1. Transmission line characteristic impedance $Z=50\text{ng}$.
2. $R1, R2, R3, R4, R5, R6$ as close to SerDes IC as possibl
3. $R7, R8$ as close to 1X9 Transceiver as possible.