

# 1.25Gbps Singlemode Optical Transceiver Small Form Pluggable(SFP)

## Features

- LC duplex receptacle
- 1310nm or 1550nm laser transmitter with automatic power control
- Transmitter disable input
- Small form pluggable electrical interface
- PECL or TTL signal detect output
- Single 3.3V or 5V power supply
- AC or DC coupled PECL/LVPECL compatible data input and output
- Serial identification (EEPROM)



## Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	
<b>Transmitter</b>						
Data Rate (NRZ)	B	-	-	1.3	Gb/s	
Optical Output Power (avg.) (1) (3)		-	-	-		
TR13SM1-1L	$P_o$	-12	-	-6	dBm	
TR13SM1-2L	$P_o$	-6	-	0	dBm	
TR15SM1-2F	$P_o$	-3	-	2	dBm	
Extinction Ratio		-	-	-		
TR13SM1-1L		9	-	-	dB	
TR13SM1-2L		10	-	-	dB	
TR15SM1-2F		10	-	-	dB	
Optical Wavelength						
TR13SM1-1L	$\lambda$	1260	1310	1360	nm	
TR13SM1-2L	$\lambda$	1260	1310	1360	nm	
TR15SM1-2F	$\lambda$	1530	1550	1570	nm	
Spectral Width						
TR13SM1-1L	$\Delta\lambda$	-	1	4	nm	
TR13SM1-2L	$\Delta\lambda$	-	1	4	nm	
TR15SM1-2F	$\Delta\lambda$	-	0.1	1	nm	
Output Rise Time (10-90%)	$t_r$	-	0.4	0.5	ns	
Output Fall Time (10-90%)	$t_f$	-	0.4	0.5	ns	
Data Input (6)	DC Coupled	$V_{IL}$ $N_{IH}$	$V_{cc}-1.810$ $V_{cc}-1.165$	- -	$V_{cc}-1.475$ $V_{cc}-0.880$	V V
	AC Coupled (Differential)	$V_I$	0.25	-	1.6	V
Tx Fault Output	$V_{FOL}$	0	-	0.8	V	
	$V_{FOH}$	2	-	$V_{cc}$	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.	Typical	Max.	Unit	
<b>Receiver</b>						
Data Rate (NRZ)	B	-	-	1.3	Gb/s	
Optical Input (avg.) Sensitivity (1) (5)			-25	-		
-1	$P_{IN}$		-23	-21	dBm	
-2	$P_{IN}$	-	-25	-24	dBm	
Saturation	-	-3	0	-	dBm	
Optical Wavelength	$\lambda$	1100	-	1600	nm	
Output Rise Time (10-90%)	$t_r$	-	-	0.4	ns	
Output Fall Time (10-90%)	$t_f$	-	-	0.4	ns	
Data Output (6)	DC Coupled	$V_{OL}$	$V_{CC}-1.840$	-	$V_{CC}-1.62$	V
		$V_{OH}$	$V_{CC}-1.045$	-	$V_{CC}-0.88$	V
	AC Coupled (Differential)	$V_I$	0.6	-	1.8	V
LOS Asserted Power Level (avg)	$P_A$	-	-	-21	dBm	
LOS Deasserted Power Level (avg)	$P_D$	-30	-	-	dBm	
LOS Hysteresis	-	-	2	-	dB	
Supply Voltage	$V_{CC}$	3.10 4.75	3.3 5.0	3.50 5.25	V	
Supply Current	$I_{CC}$	-	-	100	mA	

Notes:

- (1) With 0.275 NA, 9/125 $\mu$ m fiber.
- (2) Driven with a differential signal.
- (3) Class 1 eye safe per FDA and IEC.
- (4) Eye mask diagram is compliant to IEEE 802.3z Eye Diagram.
- (5) 2<sup>7</sup>-1 PRBS, BER= 10<sup>-12</sup>.
- (6) Compatible with ECL, PECL and LVPECL 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

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## Ordering Information

Wavelength  
13 for 1310nm  
15 for 1550nm

L for FP Laser  
F for DFB Laser

Sensitivity: 1or2

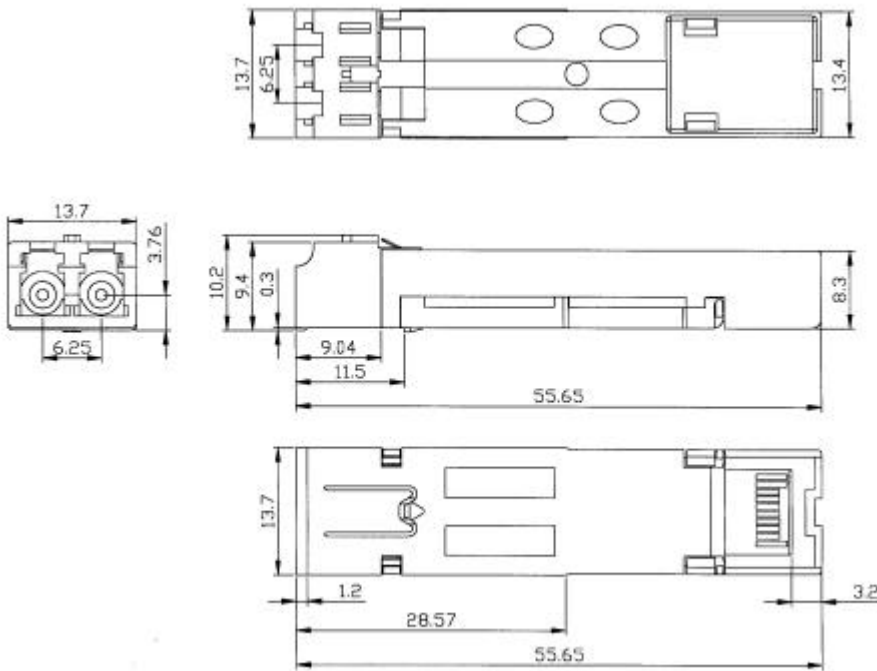
Grade : 1 or 2

Supply voltage  
5 for 5V  
3 for 3.3V

O.T: 1 or 2

No.	Tx	Rx	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

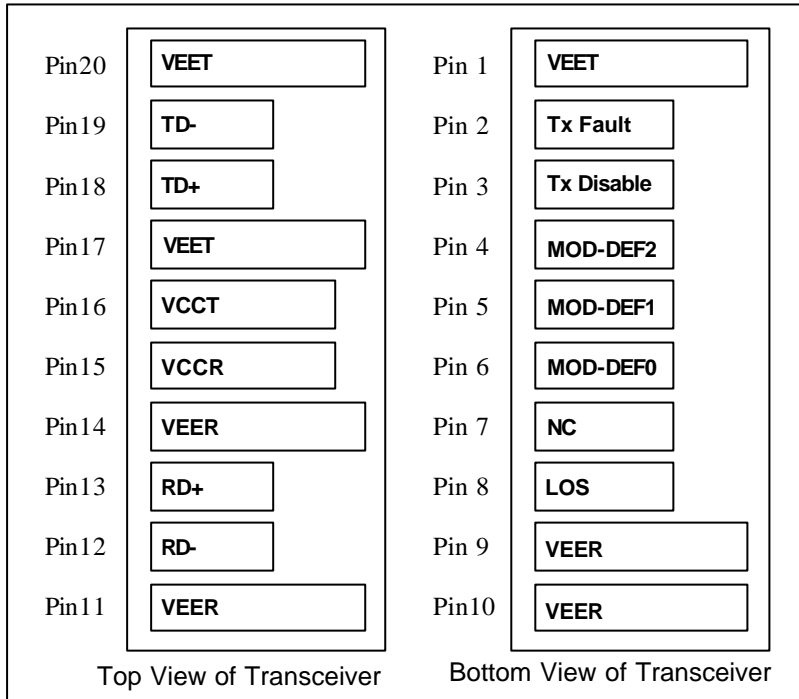
## Outline Drawing



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## SFP Transceiver Electrical Pad Layout



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## Pin Description

Pin No.	Symbol	Description
1	VEET	Transmitter Ground
2	Tx Fault	Transmitter Fault Indication Logic" 0" : Normal operation Logic" 1" : Indicate a laser fault of some kind
3	Tx Disable	Transmitter Disable Input Logic" 1" to disable the laser Input Logic" 0" to enable the laser
4	MOD-DEF2	The data line of two wire serial interface for serial ID
5	MOD-DEF1	The clock line of two wire serial interface for serial ID
6	MOD-DEF0	MOD-DEF0 is grounded by the module to indicate that the module is present
7	NC	Not connected
8	LOS	Los of Signal
9	VEER	Receiver Ground
10	VEER	Receiver Ground
11	VEER	Receiver Ground
12	RD-	Receiver Data Out ( Inverted )
13	RD+	Receiver Data Out
14	VEER	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET	Transmitter Ground
18	TD+	Transmitter Data In
19	TD-	Transmitter Data In ( Inverted )
20	VEET	Transmitter Ground

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## EEPROM Serial ID Memory Contents

Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII
0	03		32	20		64	00		96	20	
1	04		33	20		65	1A		97	20	
2	07		34	20		66	00		98	20	
3	00		35	20		67	00		99	20	
4	00		36	20		68			100	20	
5	00		37	20		69			101	20	
6	00		38	20		70			102	20	
7	00		39	20		71			103	20	
8	00		40	54	T	72			104	20	
9	00		41	52	R	73			105	20	
10	00		42	31	1	74			106	20	
11	00		43	33	3	75			107	20	
12	00		44	53	S	76		Note2	108	20	
13	00		45	4D	M	77			109	20	
14	00		46	31	3	78			110	20	
15	00		47	2D	-	79			111	20	
16	00		48	31	1	80			112	20	
17	00		49	4C	L	81			113	20	
18	00		50	4C	L	82			114	20	
19	00		51	43	C	83			115	20	
20	41	A	52	33	3	84			116	20	
21	50	P	53	39	P	85			117	20	
22	50	P	54	52	R	86			118	20	
23	4F	O	55	30	1	87			119	20	
24	49	I	56	50	C	88		Note3	120	20	
25	4E	N	57	20		89			121	20	
26	54	T	58	20		90			122	20	
27	45	E	59	20		91			123	20	
28	43	C	60	00		92	00		124	20	
29	48	H	61	00		93	00		125	20	
30	20		62	00		94	00		126	20	
31	20		63	Note1		95	Note1		127	20	

Notes:

1. Addresses 63 and 95 are check sums which may vary from module to module.
2. These addresses are reserved for serial number information.
3. These addresses are reserved for date code information.