

**Specification**  
**Small Form Factor Pluggable**

Duplex LC Receptacle – SFP

**Optical Transceivers**


4250Mbit/s



**Ordering Information**

**TSD-SxKH1-A1G**

Voltage / Temperature  
 1 : 3.3V / +0°C ~ +70°C  
 6 : 3.3V / -20 °C ~ +85°C

Model Name	Voltage	Category	Device type	Interface	SD/LOS	Temperature	Latch Color
TSD-S1KH1-A1G	3.3V	With DDMI	VCSEL / PIN	AC / AC Coupling	LVTTTL	+0°C ~+70°C	Black
TSD-S6KH1-A1G						-20°C ~+85°C	

Media	Wavelength	Fiber Core Dimension	Distance	Note
Multi-Mode Fiber	850nm	50/125 μ m	550m	@1.0625Gbps
			300m	@2.125Gbps
			150m	@4.25Gbps
		62.5/125 μ m	300m	@1.0625Gbps
			150m	@2.125Gbps
			70m	@4.25Gbps

## Features

- ROHS Compliant
- Digital Diagnostic are Internal Calibrated
- Temperature Optional : +0°C~+70°C or -20°C~+85°C
- 850nm VCSEL
- Hot Pluggable
- Metal enclosure, low EMI
- Single + 3.3 V Power Supply
- Low Power Consumption

## Applications

- Metro Access Rings
- Point – to – Point networking
- 4/2/1x Fiber Channel
- Gigabit Ethernet
- Suitable for Fast Ethernet and OC-12

## Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Storage temperature	T <sub>s</sub>	-40		85	°C
Supply voltage	V <sub>cc</sub>	0		4	V
Operating Relative Humidity	RH	0		85	%

## Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V <sub>cc</sub>	3.1	3.3	3.5	V
Operating Case temperature ( TSD-S1KH1-A1G )	T <sub>c</sub>	0	--	70	°C
Operating Case temperature ( TSD-S6KH1-A1G )		-20	--	85	
Total Current ( Transmitter + Receiver )	I <sub>cc</sub>	--	200	300	mA
Data Rate		1.0625	--	4.25	Gbps

**Transmitter Specifications** (  $V_{cc}=3.1V\sim 3.5V$  ;  $T_{op}=0^{\circ}C\sim 70^{\circ}C$  /  $T_{op}=-20^{\circ}C\sim 85^{\circ}C$  )

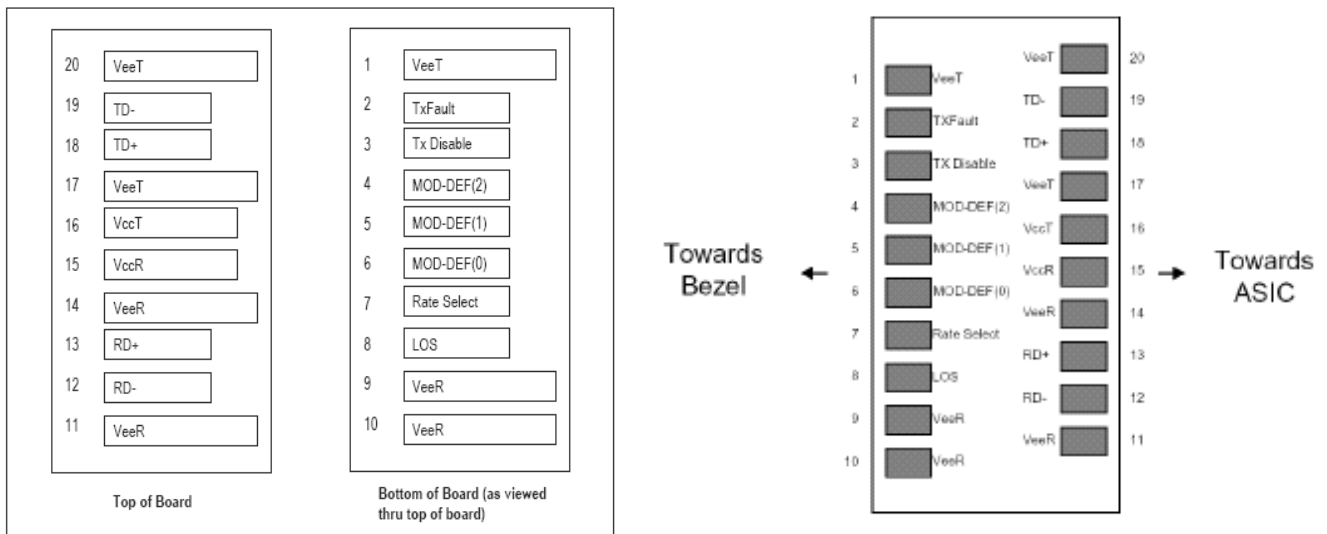
Parameter	Symbol	Min	Typ	Max	Unit
<b>Optical Characteristics</b>					
Transmitter Differential Input	TD +/-	400	--	2000	mVp-p
Optical Output Power	$P_O$	-9	--	-1	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	$\lambda_C$	830	850	870	nm
Spectral Width (RMS)	$\Delta\lambda$	--	--	0.85	nm
Optical Rise/Fall time (20-80%)	$T_r / T_f$	--	--	90	ps
<b>Electrical Characteristics</b>					
Tx_Fault_High	$V_{Fault\_H}$	2.0	--	$V_{cc}$	V
Tx_Fault_Low	$V_{Fault\_L}$	Vee	--	Vee+0.5	V
Tx_Disable_High	$V_{Disable\_H}$	2.0	--	$V_{cc}$	V
Tx_Disable_Low	$V_{Disable\_L}$	Vee	--	Vee +0.8	V

Note: All of data is measured at 4250Mbps, PRBS 2<sup>7-1</sup>, NRZ.

**Receiver Specifications** (  $V_{cc}=3.1V\sim 3.5V$  ;  $T_{op}= 0^{\circ}C\sim 70^{\circ}C$  /  $T_{op}= -20^{\circ}C\sim 85^{\circ}C$  )

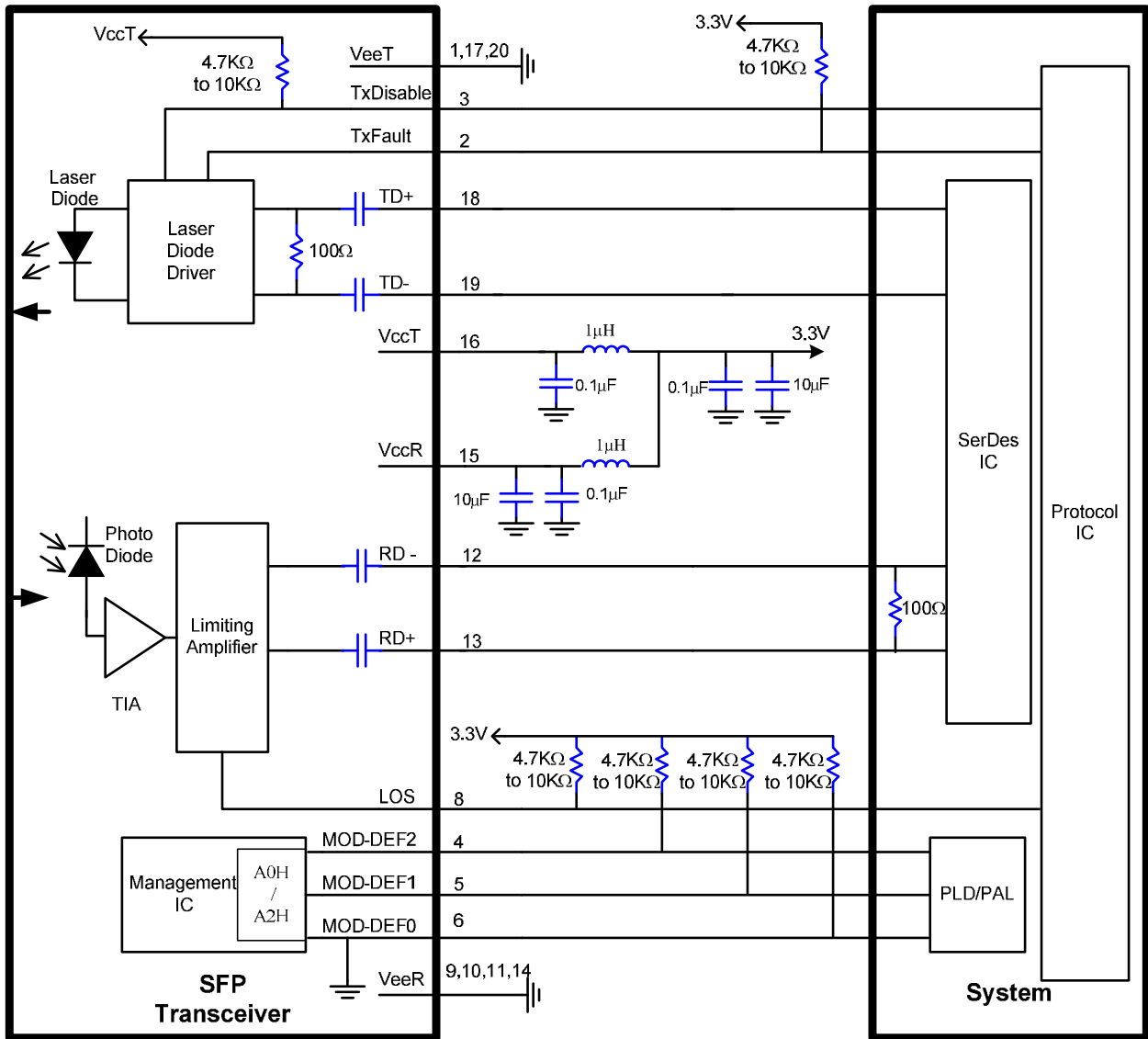
Parameter	Symbol	Min	Typ	Max	Unit
<b>Optical Characteristics</b>					
Receiver Differential Output Voltage	RD +/-	600	800	--	mVp-p
Receiver Overload	P <sub>IN</sub> MAX	0	--	--	dBm
Receiver Sensitivity @ 4.25Gbps ( PRBS=2 <sup>7</sup> -1 ; BER ≤ 10 <sup>-10</sup> )	P <sub>IN</sub> MIN	--	-18	-16	dBm
Receiver Sensitivity @ 2.125Gbps ( PRBS=2 <sup>7</sup> -1 ; BER ≤ 10 <sup>-10</sup> )	P <sub>IN</sub> MIN	--	-20	-18	dBm
Receiver Sensitivity @ 1.25Gbps ( PRBS=2 <sup>7</sup> -1 ; BER ≤ 10 <sup>-10</sup> )	P <sub>IN</sub> MIN	--	-20	-20	dBm
Operating Center Wavelength	λ <sub>c</sub>	770	--	860	nm
Receiver LOS Assert Level	P <sub>RX_LOS_A</sub>	-30	--	--	dBm
Receiver LOS Deassert Level	P <sub>RX_LOS_D</sub>	--	--	-17	dBm
Receiver Loss of Signal Hysteresis	P <sub>A</sub> - P <sub>D</sub>	0.5	2	--	dB

Pin Definition and Descriptions



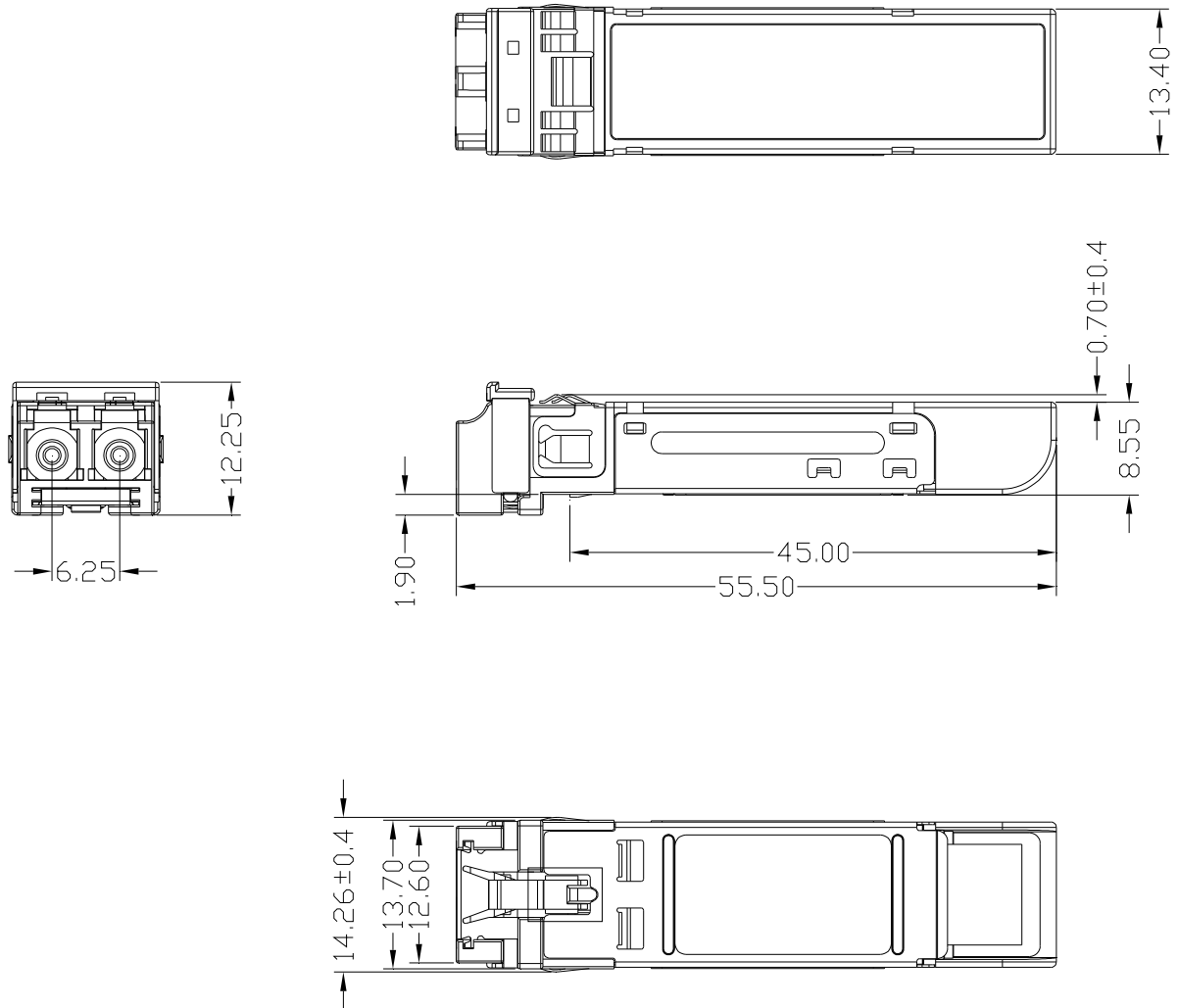
Pin	Name	Input/Output Level	Description
1	VeeT	Input	Transmitter ground
2	TXFault	Output/LVTTL	Laser failure indication. High level indicates "laser failure". Externally pulled up
3	TXDisable	Input/LVTTL	Transmitter disable, High signal/open disables TX laser output. Low level enables TX output, internally pulled up.
4	MOD-DEF(2)	Input/output	Module definition 2, SDA, Data line for I2C bus. Externally pulled up
5	MOD-DEF(1)	Input	Module definition 1, SCL, Clock for I2C bus. Externally pulled up
6	MOD-DEF(0)	Output	Module definition 0, Module present. Ground inside module.
7	Rate Select	-	No connection.
8	LOS	Output/LVTTL	Receiver loss of signal indication. Low signal indicates optical signal is present at RX input. Should be Externally pulled up.
9	VeeR	Input	Receiver ground
10	VeeR	Input	Receiver ground
11	VeeR	Input	Receiver ground
12	RD -	Output/LVPECL	Inverted receiver data output (AC coupled)
13	RD +	Output/LVPECL	Non-inverted receiver data output (AC coupled)
14	VeeR	Input	Receiver ground
15	VccR	Input	Receiver power supply
16	VccT	Input	Transmitter power supply
17	VeeT	Input	Transmitter ground
18	TD +	Input/LVPECL	non-inverted transmitter data input (AC coupled)
19	TD -	Input/LVPECL	Inverted transmitter data input (AC coupled)
20	VeeT	Input	Transmitter ground

Recommended Circuit Diagram



### Mechanical Outlines

( Unit : mm )



### ESD

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

## Contact Information

### Formerica OptoElectronics Inc.

5F-11, No.38, Taiyuan St., Zhubei City,  
Hsinchu County 30265, Taiwan

Tel: +886-3-5600286

Fax: +886-3-5600239

### San Diego, CA

Tel: 1-949-466-8069

[inquiry@formericaoe.com](mailto:inquiry@formericaoe.com)

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