

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	XXXXXXXXXX

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 _s	-40		85	°C
Supply voltage	V _{CC}	0		4	V
Operating Relative Humidity	RH	0		85	%

Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V _{CC}	3.1	3.3	3.5	V
Operating Case temperature (TSD-S1KH1-A1G)	T _c	0	--	70	°C
Operating Case temperature (TSD-S6KH1-A1G)		-20	--	85	
Total Current (Transmitter + Receiver)	I _{CC}	--	200	300	mA
Data Rate		1.0625	--	4.25	Gbps

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

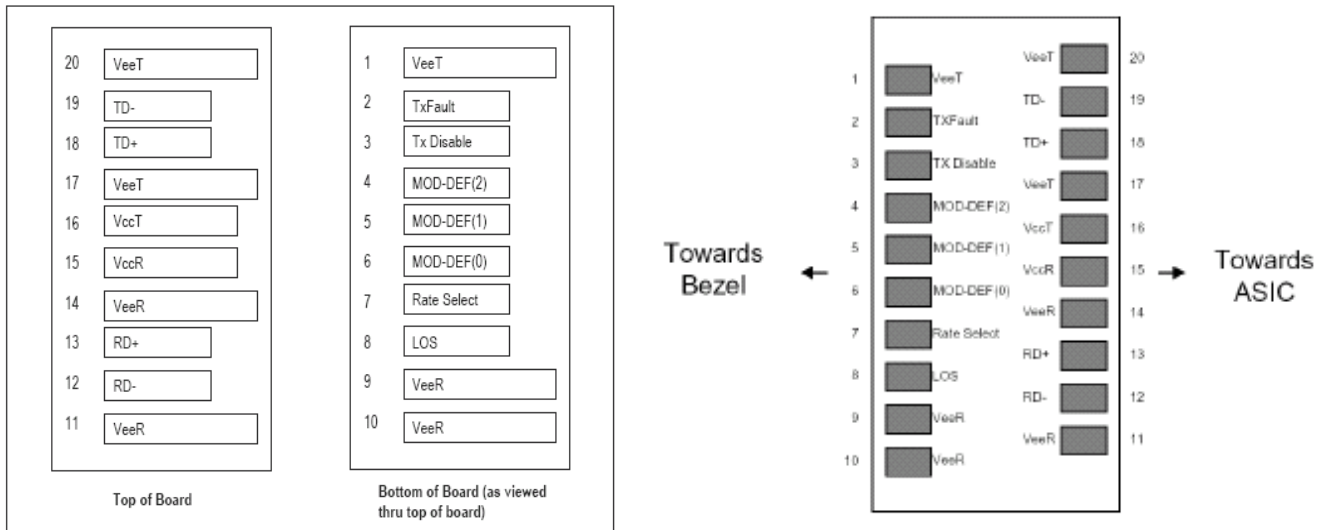
Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Transmitter Differential Input	TD +/-	400	--	2000	mVp-p
Optical Output Power	P_O	-9	--	-1	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	λ_C	830	850	870	nm
Spectral Width (RMS)	$\Delta\lambda$	--	--	0.85	nm
Optical Rise/Fall time (20-80%)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

Note: All of data is measured at 4250Mbps, PRBS 2^{7-1} , NRZ.

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

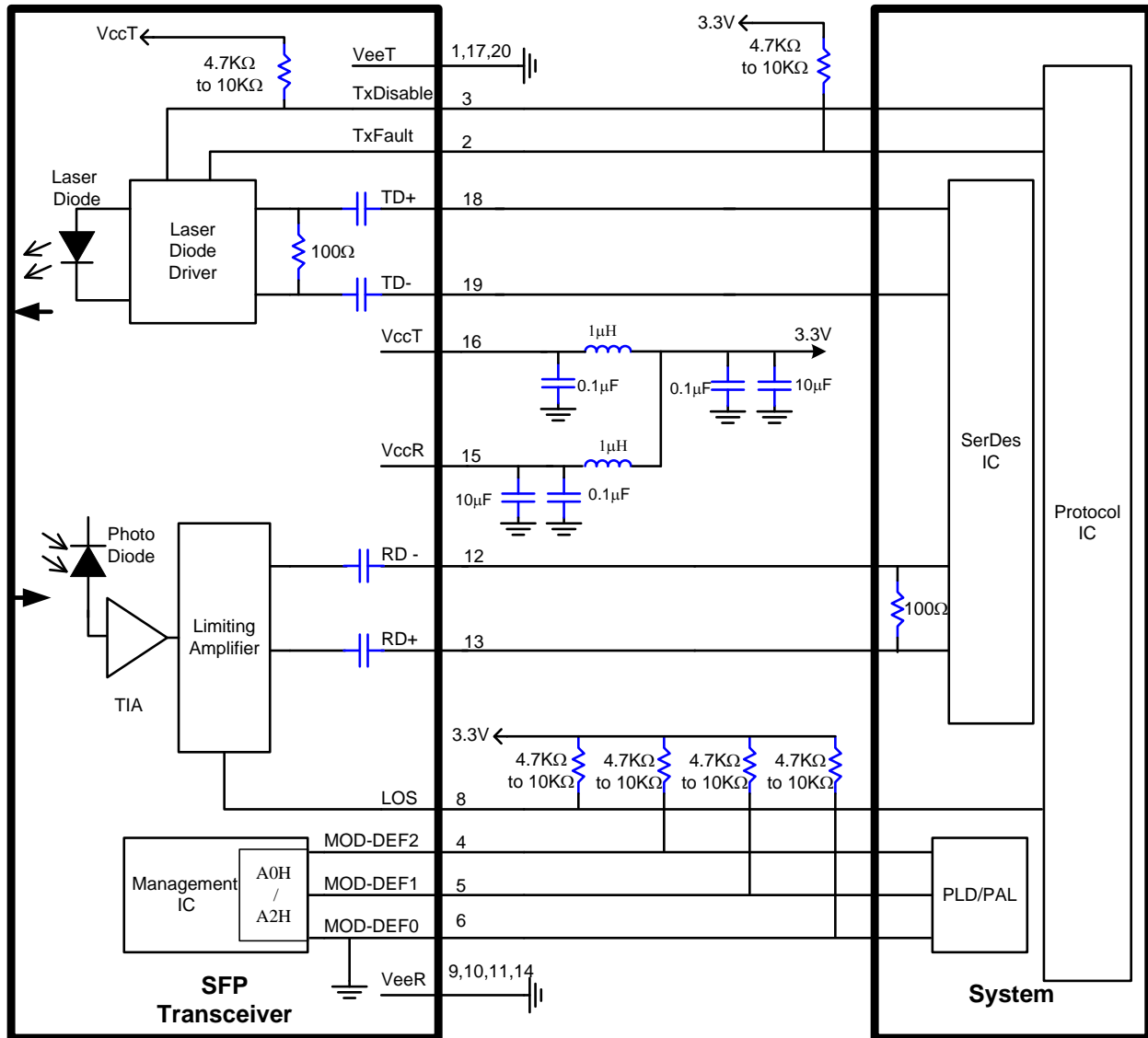
Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Receiver Differential Output Voltage	RD +/-	600	800	--	mVp-p
Receiver Overload	P_{INMAX}	0	--	--	dBm
Receiver Sensitivity @ 4.25Gbps (PRBS= 2^{7-1} ; BER $\leq 10^{-10}$)	P_{INMIN}	--	-18	-16	dBm
Receiver Sensitivity @ 2.125Gbps (PRBS= 2^{7-1} ; BER $\leq 10^{-10}$)	P_{INMIN}	--	-20	-18	dBm
Receiver Sensitivity @ 1.25Gbps (PRBS= 2^{7-1} ; BER $\leq 10^{-10}$)	P_{INMIN}	--	-20	-20	dBm
Operating Center Wavelength	λ_C	770	--	860	nm
Receiver LOS Assert Level	$P_{RX_LOS_A}$	-30	--	--	dBm
Receiver LOS Deassert Level	$P_{RX_LOS_D}$	--	--	-17	dBm
Receiver Loss of Signal Hysteresis	$P_A - P_D$	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



Content in 2-Wire Address A0H

Address	HEX	Name of Field	Description
00	03	Identifier	SFP
01	04	Extended Identifier	SFP
02	07	Connector type	LC
03	00	Infiniband Compliance Codes	Not compliant
04	00	SONET Compliance Codes	Not compliant
05	00	SONET Compliance Codes	Not compliant
06	01	Ethernet Compliance Codes	1000BASE-SX
07	20	Fiber Channel link length	Intermediate distance
08	40	Fiber Channel transmitter technology	Shortwave laser w/o OFC(SN)
09	0C	Fiber Channel transmission media	Multimode M5/M6
10	15	Fiber Channel speed	400,200,100Mbytes/sec
11	01	Encoding codes:	8B/10B
12	2B	Nominal Bit Rate (units of 100Mbps)	4250Mbps
13	00	Rate identifier	Unspecified
14	00	Link length supported for 9um fiber	N/A (units of km)
15	00	Link length supported for 9um fiber	N/A (units of 100m)
16	0F	Link length supported for 50um,OM2	150 m(units of 10m)
17	07	Link length supported for 62.5um,OM1	70m(units of 10m)
18	00	Link length supported for copper	N/A (units of 1m)
19	00	Link length supported for 50um,OM3	N/A (units of 10m)
20 ~ 35	46,4F,52,4D,45,52,49,43 ,41,4F,45,20,20,20,20,20	Vendor Name	FORMERICA OE
36	00	Unallocated	
37 ~ 39	00,00,00	Vendor OUI	Unspecified
40 ~ 55	54,53,44,2D,53,31(36),4B,48,31, 2D,41,31,47,20,20,20	Part Number	TSD-S1(6)KH1-A1G
56 ~ 59	00,00,00,00	Vendor Revision number	Unspecified
60 ~ 61	03,52	Laser Wavelength	850nm
62	00	Unallocated	
63		CC_BASE:	Check sum of byte 0 ~ 62
64	00	Options	
65	3A	Options	
66	00	Bit Rate, max.	Unspecified
67	00	Bit Rate, min.	Unspecified
68 ~ 83	Serial Number	Serial Number	
84 ~ 89	Yy/mm/dd	Date Code	
90 ~ 91	20,20	Vendor specific lot code	Unspecified
92	68	Diagnostic Monitoring Type	DDMI
93	F0	Enhanced Options (soft)	
94	01	SFF-8472 Compliance	
95		CC_EXT	Check sum of byte 64 ~ 94
96~127		Vendor specific	

Content in 2-Wire Address A2H

Add	Bytes	Name	Hex	Real Value
00-01	2	Temp High Alarm*	5F00	95°C
02-03	2	Temp Low Alarm*	E000	-32°C
04-05	2	Temp High Warning*	5A00	90°C
06-07	2	Temp Low Warning*	E700	-25°C
08-09	2	Voltage High Alarm	8DCC	3.63V
10-11	2	Voltage Low Alarm	7404	2.97V
12-13	2	Voltage High Warning	8B10	3.56V
14-15	2	Voltage Low Warning	76C0	3.040V
16-17	2	Bias High Alarm	1964	13mA
18-19	2	Bias Low Alarm	03E8	2mA
20-21	2	Bias High Warning	1770	12mA
22-23	2	Bias Low Warning	05DC	3mA
24-25	2	TX Power High Alarm	1F04	-1dBm
26-27	2	TX Power Low Alarm	04EC	-9dBm
28-29	2	TX Power High Warning	18A6	-2dBm
30-31	2	TX Power Low Warning	0582	-8.51dBm
32-33	2	RX Power High Alarm	2710	0dBm
34-35	2	RX Power Low Alarm	00FA	-16dBm
36-37	2	RX Power High Warning	1F04	-1dBm
38-39	2	RX Power Low Warning	0140	-14.95dBm
40-55	16	Reserved	00	-
56-59	4	RX_PWR(4)	00000000	0
60-63	4	RX_PWR(3)	00000000	0
64-67	4	RX_PWR(2)	00000000	0
68-71	4	RX_PWR(1)	3F800000	1
72-75	4	RX_PWR(0)	00000000	0
76-77	2	TX_I(Slope)	0100	1
78-79	2	TX_I(Offset)	0000	0
80-81	2	TX_PWR(Slope)	0100	1
82-83	2	TX_PWR(Offset)	0000	0
84-85	2	T(Slope)	0100	1
86-87	2	T(Offset)	0000	0
88-89	2	V(Slope)	0100	1
90-91	2	V(Offset)	0000	0
92-94	3	Reserved	00	-
95	1	Checksum		-

Mechanical Outlines

(Unit : mm)

