Specification

Small Form Factor Pluggable

Duplex LC Receptacle – SFP

Optical Transceivers

1000BASE-LHX
1250Mbit/s

Ordering Information

T S P - S x C B 1 - K 1 1

Voltage / Temperature
1 : 3.3V / +0℃~ +70℃
2 : 3.3V / -40 ℃~ +85℃

Model Name	Voltage	Category	Device type	Interface	SD/LOS	Temperature	Distance	Latch Color
TSP-S1CB1-K11	3.3V	W/O DDMI	DFB / PIN	AC / AC Coupling	LVTTL	+0°C~+70°C	40km	Blue
TSP-S2CB1-K11						-40°C~+85°C		

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Features

- **ROHS Compliant**
- **Standard Small Form Factor Pluggable Package – SFP MSA Compliant**
- **Gigabit Ethernet Standard (IEEE802.3Z 1000BASE) Compliant**
- **Fibre Channel Standard (100-SM-LC-L) Compliant**
- **Laser Class 1 Product – IEC60825-1 Compliant**
- **Standard Duplex LC Receptacle Optical Interface**
- **Single + 3.3 V Power Supply**
- **Differential LVPECL Data Input and Output**
- **LVTTL Loss of Signal**
- **Serial ID through I^2C Interface**
- **Low Power Consumption**

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	-	5		95	%
Input voltage	V_{IN}	0		V_{CC}	V

Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	3.1	3.3	3.5	V
Operating Case temperature (TSP-S1CB1-K11)	Tc	0	-	70	ºC
Operating Case temperature (TSP-S2CB1-K11)		-40		85	
Total Current (Transmitter + Receiver)	Icc	-	-	300	mA

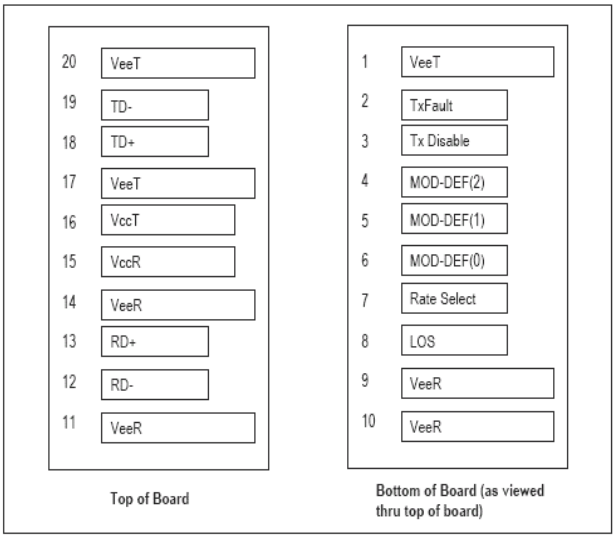
Transmitter Specifications (V_{CC}=3.1V~3.5V ; Tc= 0°C~70°C / Tc= -40°C~85°C)

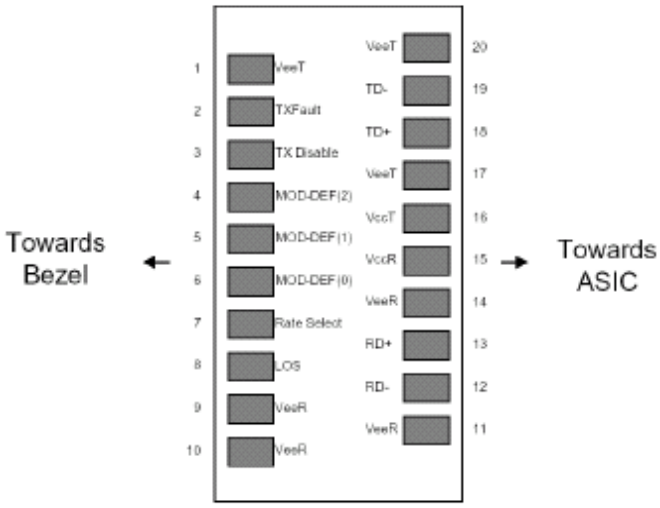
Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Output Optical Power	P_{out}	-3	--	+2	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	λ_C	1270	1310	1355	nm
Spectral Width (RMS)	σ	--	--	1	nm
Side Mode Suppression Ratio	SMSR	30		--	dB
Rise/Fall time (20-80%)	$T_{r,f}$	--	--	260	ps
Relative Intensity Noise	RIN	--	--	-120	dB/Hz
Output Eye	Compliant with IEEE 802.3z				
Max. P_{out} TX-DISABLE Asserted	P_{OFF}	--	--	-45	dBm
Electrical Characteristics					
Differential Input Voltage	V_{DIFF}	0.4	--	2.0	V
Tx_Disable_Input_High	V_{DISH}	2.0	--	V_{CC}+0.3	V
Tx_Disable_Input_Low	V_{DISL}	0	--	0.8	V
Tx_Fault_Output_High	V_{FH}	2.0	--	V_{CC}+0.3	V
Tx_Fault_Output_Low	V_{FL}	0	--	0.8	V

Receiver Specifications (V_{CC}=3.1V~3.5V ; Tc= 0°C~70°C / Tc= -40°C~85°C)

Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Optical Input Power-maximum	P_{SATIN}	-3	--	--	dBm
Receiver Sensitivity (PRBS=2^7-1 ; BER≦10^{-12})	P_{SEN}	--	--	-23	dBm
Operating Center Wavelength	λ_c	1260		1610	nm
Optical Return Loss	ORL	12	--	--	dB
Loss of Signal – De-asserted	P_{LD}	--	--	-23	dBm
Loss of Signal - Asserted	P_{LA}	-45	--	--	dBm
Loss of Signal - Hysteresis	P_{LH}	0.5		6	dB
Electrical Characteristics					
Differential Output Voltage	V_{DIFF}	0.4	--	2.0	V
Receiver Loss of Signal Output Voltage -Low	V_{LOSH}	0	--	0.8	V
Receiver Loss of Signal Output Voltage -High	V_{LOSL}	2	--	V_{CC}+0.3	V

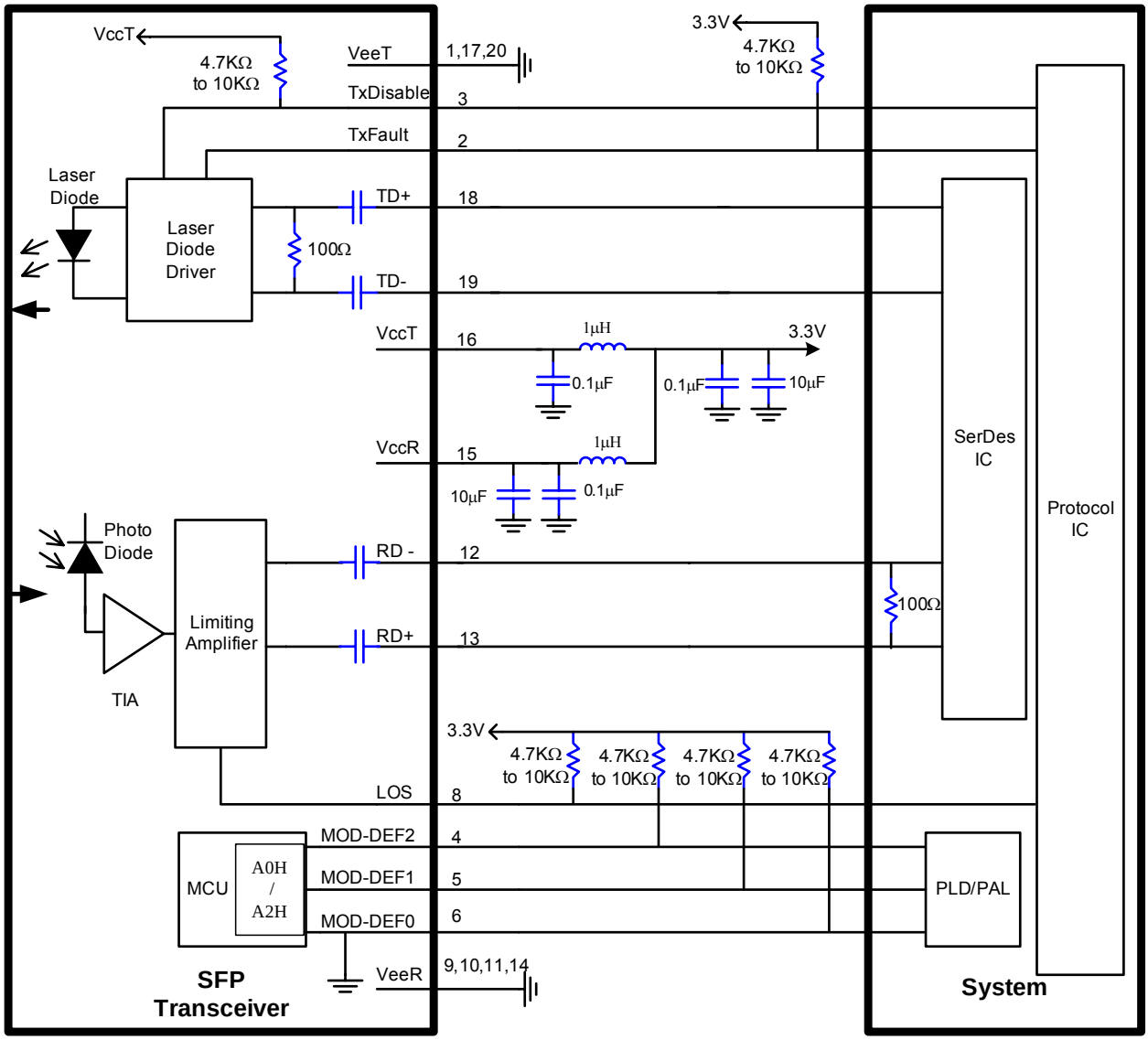
Pin Definition and Descriptions





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/LVTTL	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	02	Ethernet Compliance Codes	1000BASE-LX
07	12	Fiber Channel link length	LC / Long Distance
08	00	Fiber Channel transmitter technology	N/A
09	01	Fiber Channel transmission media	Single Mode
10	01	Fiber Channel speed	100 MBytes/sec
11	01	Encoding codes:	8B/10B
12	0D	Nominal Bit Rate (units of 100Mbps)	1300Mbps
13	00	Rate identifier	Unspecified
14	28	Link length supported for 9um fiber	40 (units of km)
15	FF	Link length supported for 9um fiber	400 (units of 100m)
16	00	Link length supported for 50um,OM2	N/A (units of 10m)
17	00	Link length supported for 62.5um,OM1	N/A(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	FORMERICAOE
36	00	Unallocated	
37 ~ 39	00,00,00	Vendor OUI	Unspecified
40 ~ 55	54,53,50,2D,53,31(32),43,42,31, 2D,4B,31,31,20,20,20	Part Number	TSP-S1(2)CB1-K11
56 ~ 59	00,00,00,00	Vendor Revision number	Unspecified
60 ~ 61	05,1E	Laser Wavelength	1310nm
62	00	Unallocated	
63		CC_BASE:	Check sum of byte 0 ~ 62
64	00	Options	
65	1A	Options	TX-DIS, TX_FAULT, RX-LOS
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	00	Diagnostic Monitoring Type	W/O DDMI
93	00	Enhanced Options (soft)	Unallocated
94	00	SFF-8472 Compliance	Not Included
95		CC_EXT	Check sum of byte 64 ~ 94
96~127		Vendor specific	

Mechanical Outlines

(Unit : mm)