Specification

Small Form Factor Pluggable

Simplex LC Receptacle – SFP BIDI

OLT - Bidirectional Optical Transceivers

STM-1 / OC-3 / 100BASE-BX10-D
155.52Mbit/s



Ordering Information

T B D - S x A C 1 - G 1 1

Category
BD : DDMI Product

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
TBD-S1AC1-G11	3.3V	With DDMI	FP / PIN	AC / AC Coupling	LVTTL	+0°C~+70°C	20km	Blue
TBD-S2AC1-G11						-40°C~+85°C		

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Features

- **ROHS Compliant**
- **Standard Small Form Factor Pluggable Package – SFP MSA Compliant**
- **Digital Diagnostic SFF-8472 Rev.10.2 Compliant**
- **SONET/SDH Standard Compliant**
- **IEEE802.3AH 100BASE-BX10-D Compliant**
- **Laser Class 1 Product – IEC60825-1 Compliant**
- **Standard Simplex LC Receptacle Optical Interface**
- **Single Fiber and Full Duplex Solution – Integrated WDM Filter**
- **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 (TBD-S1AC1-G11)	Tc	0	--	70	ºC
Operating Case temperature (TBD-S2AC1-G11)		-40	--	85	
Total Current (Transmitter + Receiver)	Icc	--	--	250	mA

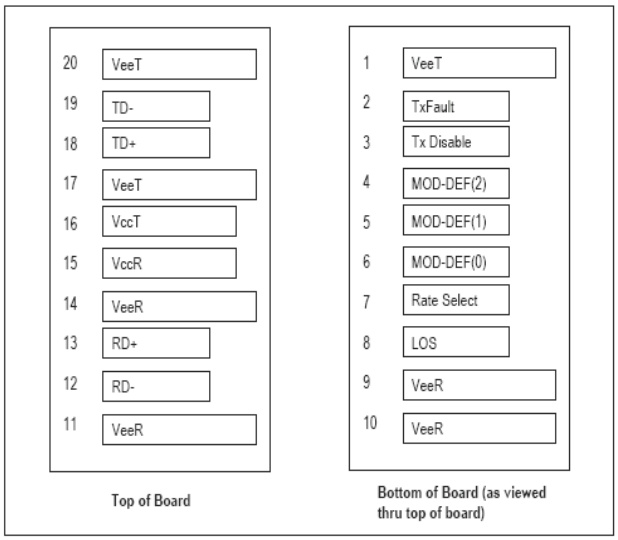
Transmitter Specifications (V_{CC}=3.1V~3.5V；Tc= 0°C~70°C / Tc= -40°C~85°C)

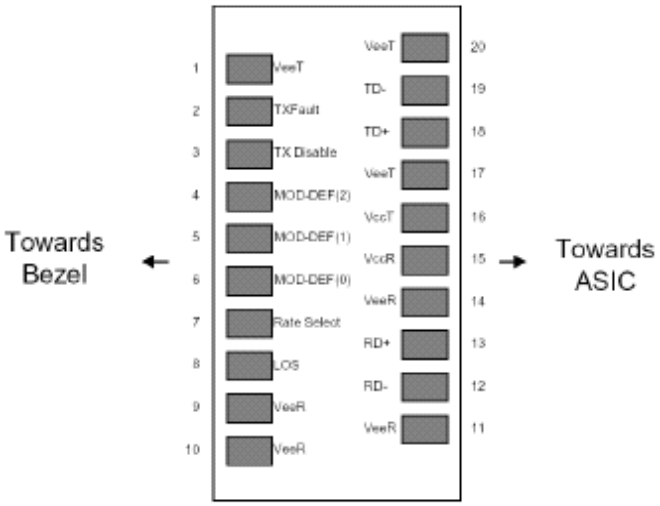
Parameter	Symbol	Min	Typ	Max	Unit
Optical Characteristics					
Output Optical Power	P_{out}	-14	--	-8	dBm
Extinction Ratio	ER	9	--	--	dB
Center Wavelength	λ_C	1480	--	1580	nm
Spectral Width (RMS)	σ	--	--	4.6	nm
Rise/Fall time (10-90%)	$T_{r,f}$	--	--	2	ns
Output Eye	Compliant with ITU-T G.957				
Max. 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^{23}-1；BER≦10^{-10})	P_{SAN}	--	--	-32	dBm
Operating Center Wavelength	λ_c	1260	--	1360	nm
Optical Return Loss	ORL	14	--	--	dB
Loss of Signal – De-asserted	P_{LD}	--	--	-32	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_{LOSL}	0	--	0.8	V
Receiver Loss of Signal Output Voltage -High	V_{LOSH}	2	--	V_{CC}+0.3	V

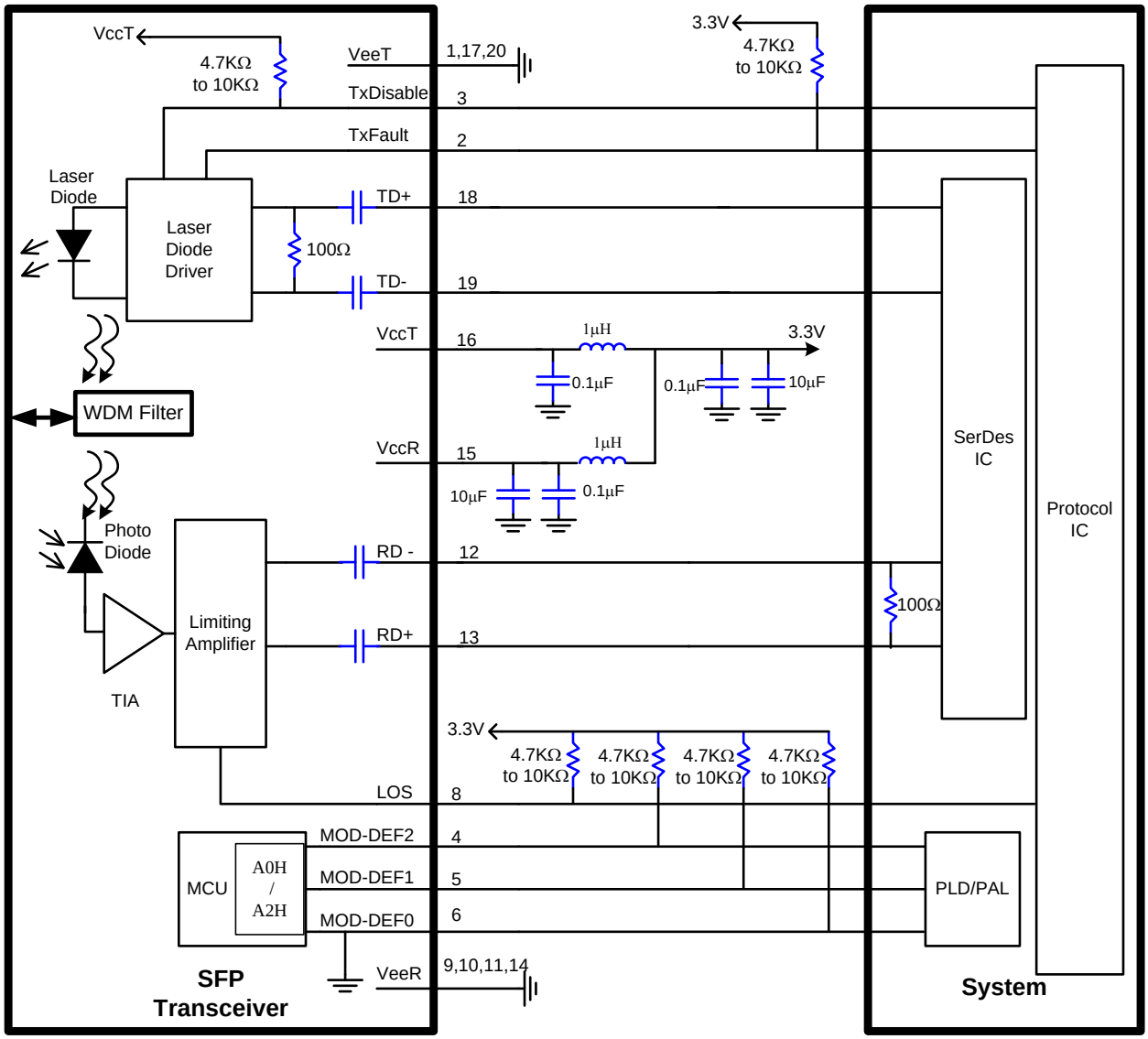
Pin Definition and Descriptions





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/CML	Inverted receiver data output (AC coupled)
13	RD +	Output/CML	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	08	SONET Compliance Codes	SONET IR-2 compliant
05	02	SONET Compliance Codes	OC-3, single mode, inter. reach
06	00	Ethernet Compliance Codes	Not compliant
07	00	Fiber Channel link length	Not compliant
08	00	Fiber Channel transmitter technology	Not compliant
09	00	Fiber Channel transmission media	Not compliant
10	00	Fiber Channel speed	Not compliant
11	03	Encoding codes:	NRZ
12	02	Nominal Bit Rate (units of 100Mbps)	200Mbps
13	00	Rate identifier	Unspecified
14	14	Link length supported for 9um fiber	20 (units of km)
15	C8	Link length supported for 9um fiber	200 (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	54,42,44,2D,53,31(32),41,43,31, 2D,47,31,31,20,20,20	Part Number	TBD-S1(2)AC1-G11
56 ~ 59	00,00,00,00	Vendor Revision number	Unspecified
60 ~ 61	06,0E	Laser Wavelength	1550nm
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	68	Diagnostic Monitoring Type	Internal calibration
93	B0	Enhanced Options (soft)	All flags, TX_FAULT, RX-LOS
94	03	SFF-8472 Compliance	Rev10.2
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*	5500 (6400)	85℃ (100℃)
02-03	2	Temp Low Alarm*	0000 (D800)	0℃ (-40℃)
04-05	2	Temp High Warning*	5000 (5F00)	80℃ (95℃)
06-07	2	Temp Low Warning*	0A00 (E200)	10℃ (-30℃)
08-09	2	Voltage High Alarm	8CA0	3.6V
10-11	2	Voltage Low Alarm	7530	3.0V
12-13	2	Voltage High Warning	88B8	3.5V
14-15	2	Voltage Low Warning	7918	3.1V
16-17	2	Bias High Alarm	AFC8	90mA
18-19	2	Bias Low Alarm	09C4	5mA
20-21	2	Bias High Warning	9C40	80mA
22-23	2	Bias Low Warning	0DAC	7mA
24-25	2	TX Power High Alarm	0C5A	-5dBm
26-27	2	TX Power Low Alarm	00C8	-17dBm
28-29	2	TX Power High Warning	07CB	-7dBm
30-31	2	TX Power Low Warning	013C	-15dBm
32-33	2	RX Power High Alarm	03E8	-10dBm
34-35	2	RX Power Low Alarm	0004	-34dBm
36-37	2	RX Power High Warning	0277	-12dBm
38-39	2	RX Power Low Warning	0006	-32dBm
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		-

Note *: ( ) for TBD-S2AC1-G11.

Mechanical Outlines

(Unit : mm)

