

## Features :

- Support 10GBASE-LR/10GBASE-LW/10G Fiber Channel application
- Compliant to SFP+ Electrical MSA SFF-8431
- Compliant to SFP+ Mechanical MSA SFF-8432
- Multi rate of up to 11.3Gbps
- Transmission distance up to 10km and 40KM
- +3.3V single power supply
- Low power consumption
- Operating case temp : 0~+70°C
- RoHS 6/6 compliant

## Absolute Maximum Ratings

Table 1- Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V <sub>CC3</sub>	-0.5	-	+3.6	V	
Storage Temperature	T <sub>s</sub>	0	-	+70	°C	
Operating Humidity	RH	+5	-	+95	%	

## Recommended Operating Conditions

Table 2- Recommended operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T <sub>C</sub>	0	-	+70	°C	
Power Supply Voltage	V <sub>CC</sub>	3.14	3.3	3.47	V	
Power Supply Current	I <sub>CC</sub>	-	-	300	mA	
Power Dissipation	P <sub>d</sub>	-	-	1.0	W	
Bit Rate	BR	-	10.3125	-	Gbps	

## Electrical Characteristics

Table 3- Electrical Characteristics

**SFP+ 10G Bi-Di 60KM**  
**SOSP-2399-60**

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
<b>Transmitter</b>						
Differential Data Input Swing	$V_{in,P-P}$	120	-	850	mV <sub>PP</sub>	
Input Differential Impedance	$Z_{IN}$	80	100	120	$\Omega$	
Tx_Fault	Normal Operation	$V_{OL}$	0	-	0.8	V
	Transmitter Fault	$V_{OH}$	2.0	-	$V_{CC}$	V
Tx_Disable	Normal Operation	$V_{IL}$	0	-	0.8	V
	Laser Disable	$V_{IH}$	2.0	-	$V_{CC}+0.3$	V
<b>Receiver</b>						
Differential Date Output	$V_{out}$	100	-	800	mV	
Output Differential Impedance	$Z_D$	80	100	120	$\Omega$	
Output Rise Time(20-80%)	$T_R$	24	-	-	ps	
Output Fall Time (20-80%)	$T_F$	24	-	-	ps	
Rx_LOS	Normal Operation	$V_{OL}$	0	-	0.8	V
	Lose Signal	$V_{oH}$	2.0	-	$V_{CC}$	V

## Optical Characteristics

Table 4-Optical Characteristics  
SOSP-2399-60 (10G 1270TX 1330RX 10-60KM)  
SOSP-3299-60 (10G 1330TX 1270RX 10-60KM)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
<b>Optical transmitter Characteristics</b>						
Bit Rate	BR	Gbps	9.953	10.3125	11.3	
Center Wavelength Range	$\lambda_c$	nm	1250	1270	1290	SOBP-2396-10L
			1310	1330	1350	SOBP-3296-10L
Average Launch power Tx_off	$P_{off}$	dBm	-	-	-45	
Launch Optical Power	$P_0$	dBm	-7.5	-	0	1
Extinction Ratio	ER	dB	3.5	-	-	
Jitter P-P	JP	ps	-	-	27	
Jitter RMS	JR	ps	-	-	5	

**SFP+ 10G Bi-Di 60KM**  
**SOSPB-2399-60**

Optical Rise/Fall time	Tr/tf	ps	-	-	100	
Eye Diagram	Compliant With IEEE 802.3-2005					
<b>Optical receiver Characteristics</b>						
Bit Rate	BR	Gbps	9.953	10.3125	11.3	
Receiver Sensitivity	RS	dBm	-	-	-14	2
Overload Input Optical Power	P <sub>IN</sub>	dBm	0	-	-	2
Center Wavelength Range	$\lambda_c$	nm	1310	1330	1350	SOBP-2396-10L
			1250	1270	1290	SOBP-3296-10L
LOS	LOS <sub>D</sub>	dBm	-	-	-15	
	LOS <sub>A</sub>		-24.5	-	-	
LOS Hysteresis		dB	0.5	-	-	

**SOSPB-2399-40 (10G 1270TX 1330RX 20-40KM)**  
**SOSPB-3299-40 (10G 1330TX 1270RX 20-40KM)**

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
<b>Optical transmitter Characteristics</b>						
Bit Rate	BR	Gbps	9.953	10.3125	11.3	
Center Wavelength Range	$\lambda_c$	nm	1250	1270	1290	SOBP-2396-40L
			1310	1330	1350	SOBP-3296-40L
Average Launch power Tx <sub>off</sub>	P <sub>off</sub>	dBm	-	-	-45	
Launch Optical Power	P <sub>0</sub>	dBm	1	-	6.5	1
Extinction Ratio	ER	dB	3.8	-	-	
Jitter P-P	JP	ps	-	-	27	
Jitter RMS	JR	ps	-	-	5	
Optical Rise/Fall time	Tr/tf	ps	-	-	100	
Eye Diagram	Compliant With IEEE 802.3-2005					
<b>Optical receiver Characteristics</b>						
Bit Rate	BR	Gbps	9.953	10.3125	11.3	
Receiver Sensitivity	RS	dBm	-	-	-14	2
Overload Input Optical Power	P <sub>IN</sub>	dBm	0	-	-	2
Center Wavelength Range	$\lambda_c$	nm	1310	1330	1350	SOBP-2396-40L
			1250	1270	1290	SOBP-3296-40L

## SFP+ 10G Bi-Di 60KM SOSPB-2399-60

LOS	LOS <sub>D</sub>	dBm	-	-	-15	
	LOS <sub>A</sub>		-24.5	-	-	
LOS Hysteresis		dB	0.5	-	-	

Note:

1. Coupled into 9/125 SMF.
2. Measured with PRBS 2<sup>31</sup>-1 test pattern @10.3125Gbps.BER=10E-12

### Recommended interface Circuit

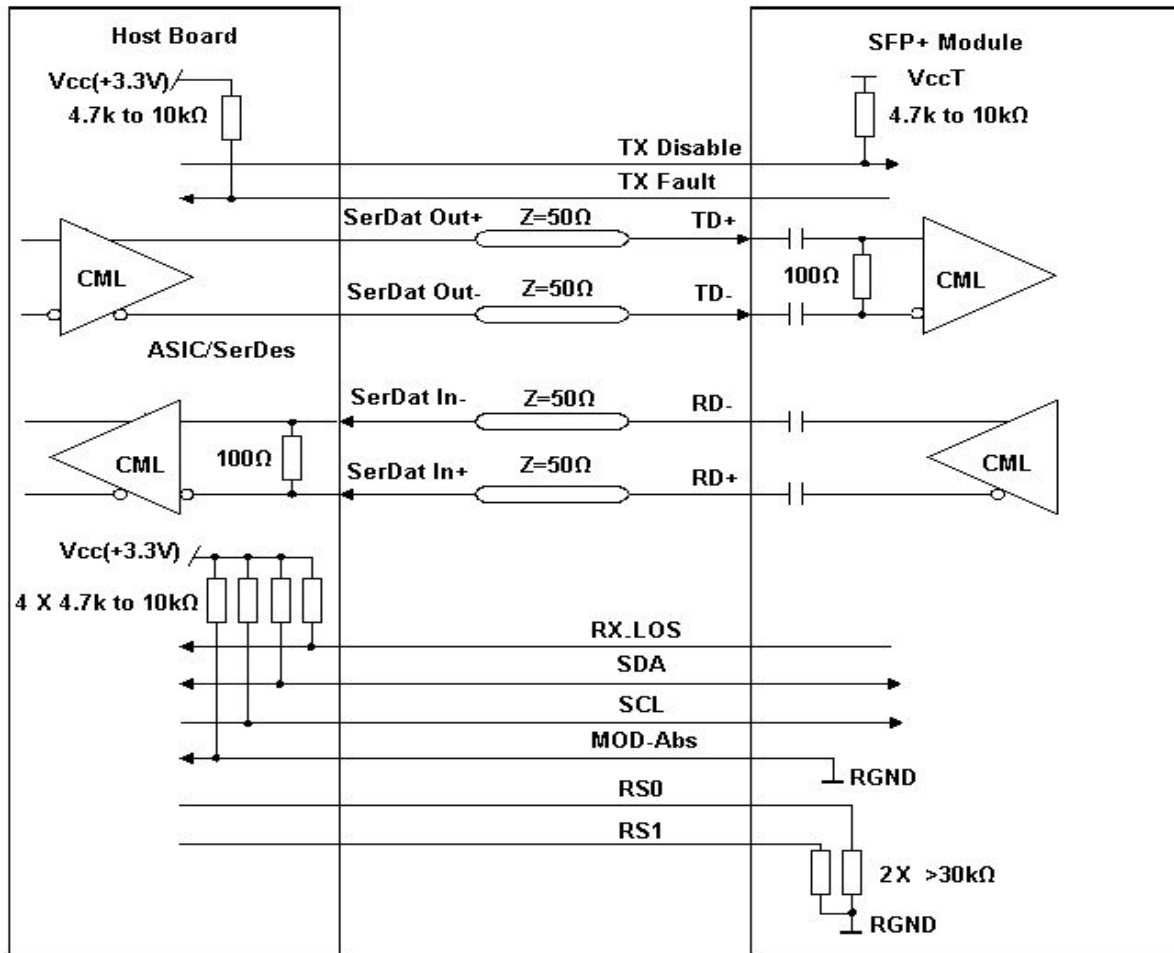


Figure 1, Recommended Interface Circuit

## Recommended Host Board Power Supply Circuit

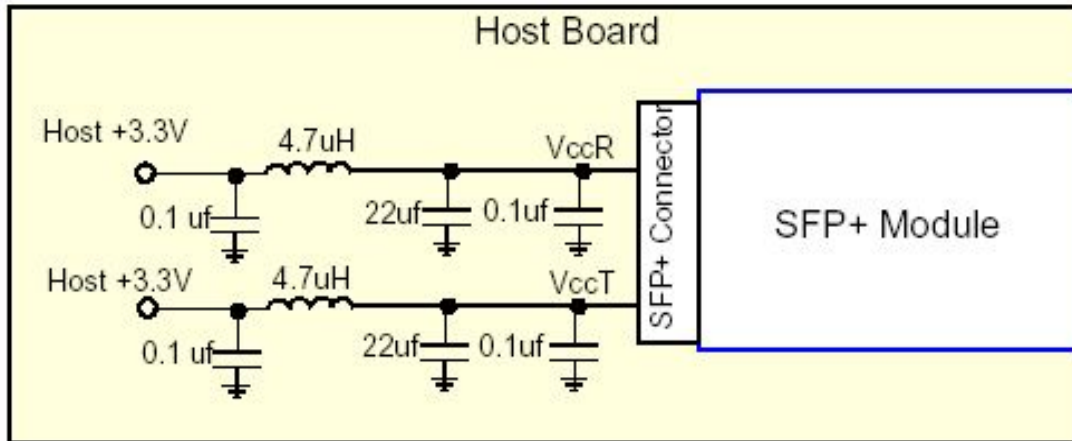


Figure 2, Recommended Host Board Power Supply Circuit

## Pin arrangement

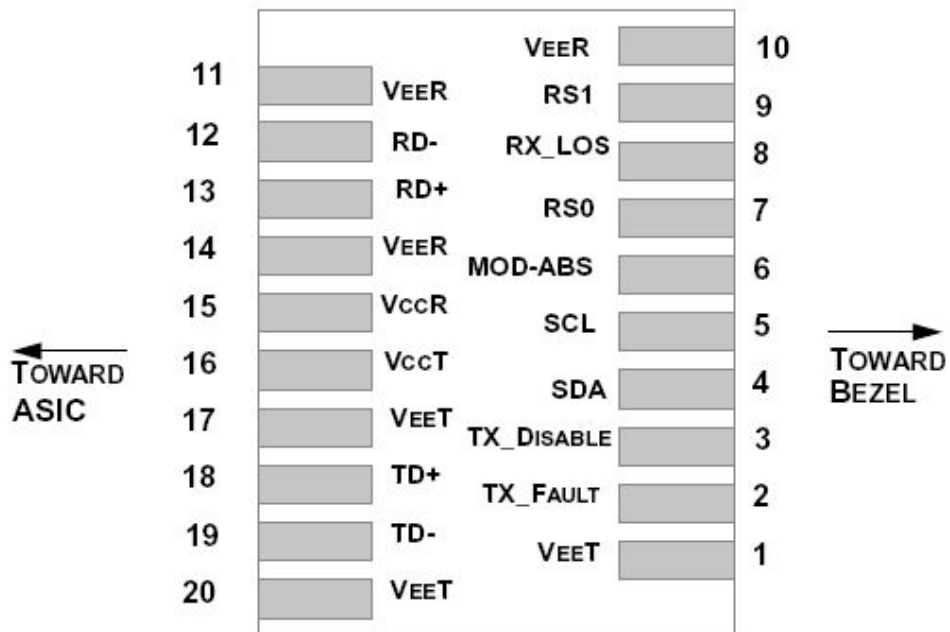


Figure 3, Pin View

**Table 5-Pin Function Definitions**

Pin	Symbol	Name/Description	Notes
1	VEET	Module Transmitter Ground	1
2	TX_FAULT	Module Transmitter Fault	2
3	TX_DISABLE	Transmitter Disable; Turns off transmitter laser output	3
4	SDA	2-Wire Serial Interface Data Line (MOD-DEF2)	
5	SCL	2-Wire Serial Interface Clock (MOD-DEF1)	
6	MOD_ABS	Module Absent, connected to V <sub>EE</sub> T or V <sub>EE</sub> R in the	2
7	RS0	Rate Select 0, optionally controls SFP+ module receiver as the following when HIGH input Bit Rate>4.25 Gbps	
8	RX_LOS	Receiver Loss of Signal Indication (in FC designated as RX_LOS, in SONET designated as LOS,	2
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter as the following when HIGH input Bit Rate>4.25 Gbps and when LOW input Bit Rate ≤4.25 Gbps.	
10	V <sub>EE</sub> R	Module Receiver Ground	1
11	V <sub>EE</sub> R	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Non-Inverted Data Output	
14	V <sub>EE</sub> R	Module Receiver Ground	1
15	V <sub>CC</sub> R	Module Receiver 3.3 V Supply	
16	V <sub>CC</sub> T	Module Transmitter 3.3 V Supply	
17	V <sub>EE</sub> T	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	V <sub>EE</sub> T	Module Transmitter Ground	1

**Note:**

1. The module ground pins are isolated from the module case.
2. The pins shall be pulled up with 4.7K-10Kohms to a voltage between 3.14V and 3.46V on host board.
3. The pin is pulled up to VCCT with a 4.7K-10KΩ resistor in the module.

## Digital Diagnostic Memory Map

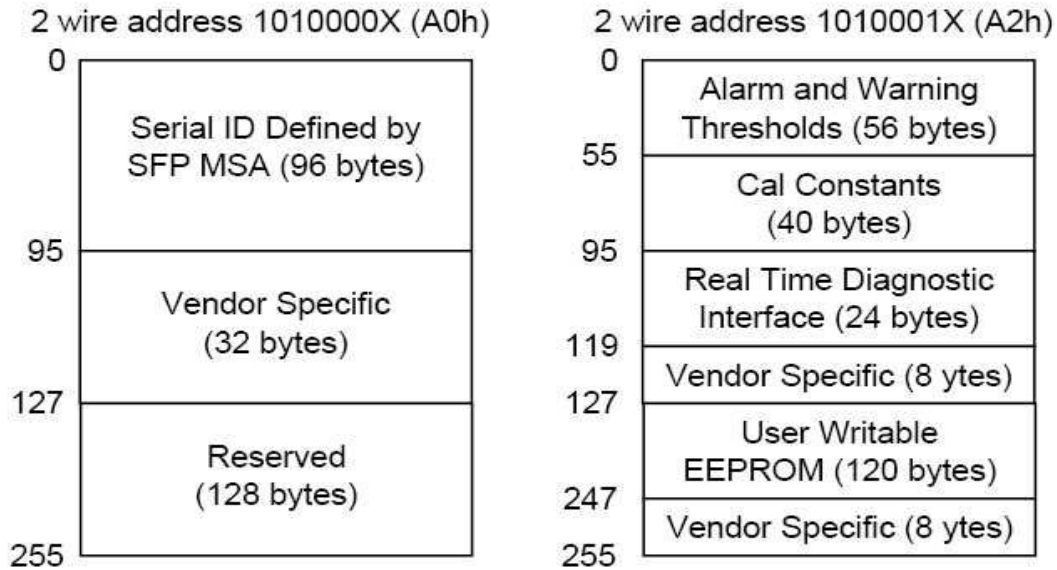


Figure 4, Memory Map

## Mechanical Diagram

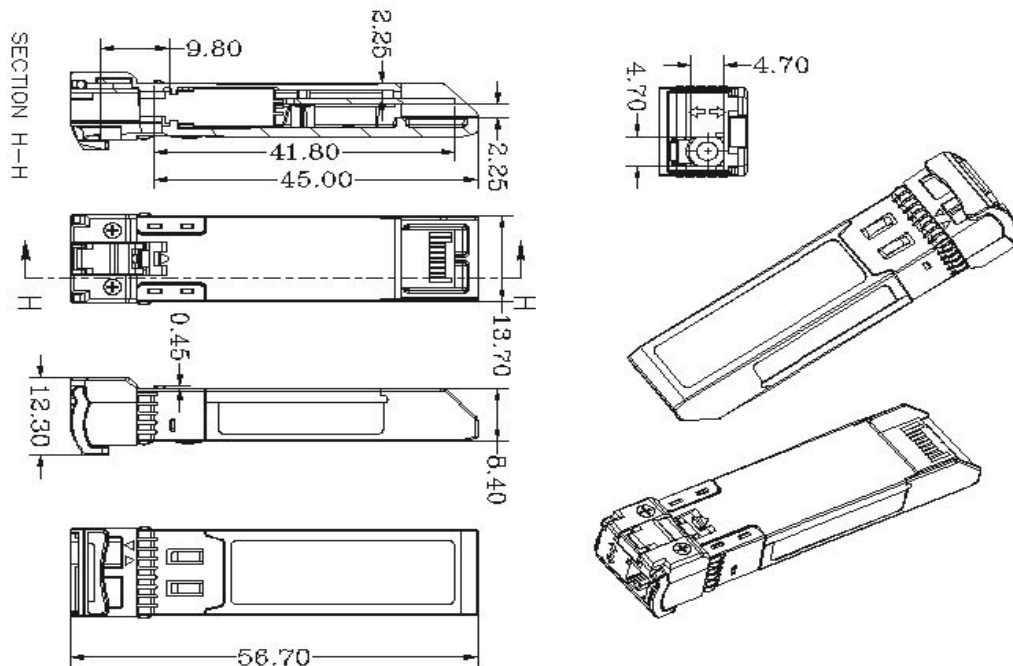


Figure 5, Mechanical Diagram

## Order Information

Table 6-Order Information

Part No.	Bit Rate (Gbps)	Laser TX(nm)	Laser RX(nm)	Fiber Type	Distance	Connector
SOSPB-2399-60	10.3125	1270	1330	SMF	20-40KM	Simplex LC Receptacle
SOSPB-3299-60	10.3125	1330	1270	SMF	20-40KM	Simplex LC Receptacle

### ● Notice

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