

Features

- Up to 2.488Gbps data rate
- 1310nm uncooled DFB laser and APD photodiode for 40km transmission
- MSA compliant SFF 2x10 package with duplex LC receptacle
- Class 1 laser product
- Very low EMI and excellent ESD protection
- Single 3.3V power supply
- Operating case temperature: 0 to +70°C

Application

- SDH STM-16,I-16, S-16.1, L-16.1,L-16.2
- SONET OC-48 SR, IR1, LR1,LR2
- Other optical links

Standard

- Compliant with SFF MSA
- Compliant with ITU-T G.957 and G.958
- Compliant with Telcordia GR-253-CORE
- Compliant with FCC 47 CFR Part 15,Class B
- Compliant with FDA 21 CFR 1040.10 and 1040.11,Class I

Description.

Szstar 2.448Gbps SFF 2x10 transceiver is high performance, cost effective modules that can provide fully compliant links of SDH/SONET at a data rate of 2.488Gbps for 40km transmission.

The transceiver consists of two sections: The transmitter section incorporates a FP or uncooled DFB laser. And the receiver section consists of a PIN or APD photodiode integrated with a trans-impedance preamplifier (TIA) . All modules satisfy class I laser safety requirements.

The optical output can be disabled by a TTL logic high-level input of TDis. Signal Detect (SD) output is provided to indicate the presence of an input optical signal of receiver. Laser bias current, laser output power and receiver optical power can be measured by analog monitor function.

Regulatory Compliant

Table 1-Regulatory compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) To the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1 (>500V)
Electrostatic Discharge (ESD) To the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compliant with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compliant with standards
Immunity	IEC 6100-4-3	Compliant with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN(IEC)60825-1.2	Compliant with Class I Laser Product

Performance Specifications

Stress in excess of the maximum absolute ratings can cause permanent damage to the module

Table 2-Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	95	%
Supply Voltage	Vcc	-0.5	+3.6	V
Lead Soldering Temperature/Time	-	-	260/10	°C/S

Table 3-Operating Environment

Parameter	Symbol	Min	Typical	Max.	Unit
Power Supply Voltage	Vcc	+3.13	3.3	3.47	V
Operating Case Temperature	Tc-	0	-	+70	°C
Power Supply Current	Icc-	-	-	300	mA
Data Rate	2.488-	-	2.448	-	Gbps

Table 4-Optical and Electrical Characteristics (1310nm 40km)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Transmitter						
Center Wavelength	λ_c	1280	-	1335	nm	
Spectral Width	$\Delta\lambda$	-	-	1	nm	
Average Output Power	P _{out}	-2		+3	dBm	1
Extinction Ratio	EX	8.2	-	-	dB	
Jitter Generation (RMS)				0.01	UI	
Jitter Generation (pk-pk)				0.1	UI	
Data Input Swing Differential	V _{IN}	400		2000	mA	3
Input Differential Impedence	Z _{IN}	85	100	115	Ω	
TX Disable	Disable		2.0	V _{cc}	V	
	Enable		0	0.8	V	
Output Optical Eye	Compliant with Telcordia GR-253-CORE and ITU-T G.957					2
Side Mode Suppression Ratio	SMSR	30			dB	
Data Input Swing Differential	V _{in}	400		2000	mV	3
Input Differential Impedance	Z _{in}	85	100	115	Ω	
Receiver Specifications						
Center wavelength	λ_c	1260		1580	nm	
Receiver Sensitivity			-	-27	dBm	4
Receiver Overload		-9-			dBm	
Optical Path Penalty			-	1	dB	5
Reflection		-	-	-27	dB	
SD De-Assert	SDD	-45	-	-	dBm	
SD Assert	SDA		-	-29-	dBm	
SD Hysteresis		0.3-		4.5	dB	
Data Output Swing Differential	V _{OUT}	400		1200	mV	6
SD	High		2.0	V _{cc}	V	
	Low		0	0.8	V	

Note:

1. The optical power is launched into SMF.
2. Measure with a PRBS $2^{23} - 1$ test pattern @2.488Gbps
3. PECL/CML input, internally AC coupled and terminated.
4. Measured with a PRBS $2^{23} - 1$ test pattern @2.448Gbps, worst-case extinction ratio, $BER \leq 1 \times 10^{-10}$
5. Measured with a PRBS $2^{23} - 1$ test pattern @2.448Gbps, over 40km G.625 SMF, $BER \leq 1 \times 10^{-10}$
6. CML output, internally AC couple.

Recommended Interface Circuit

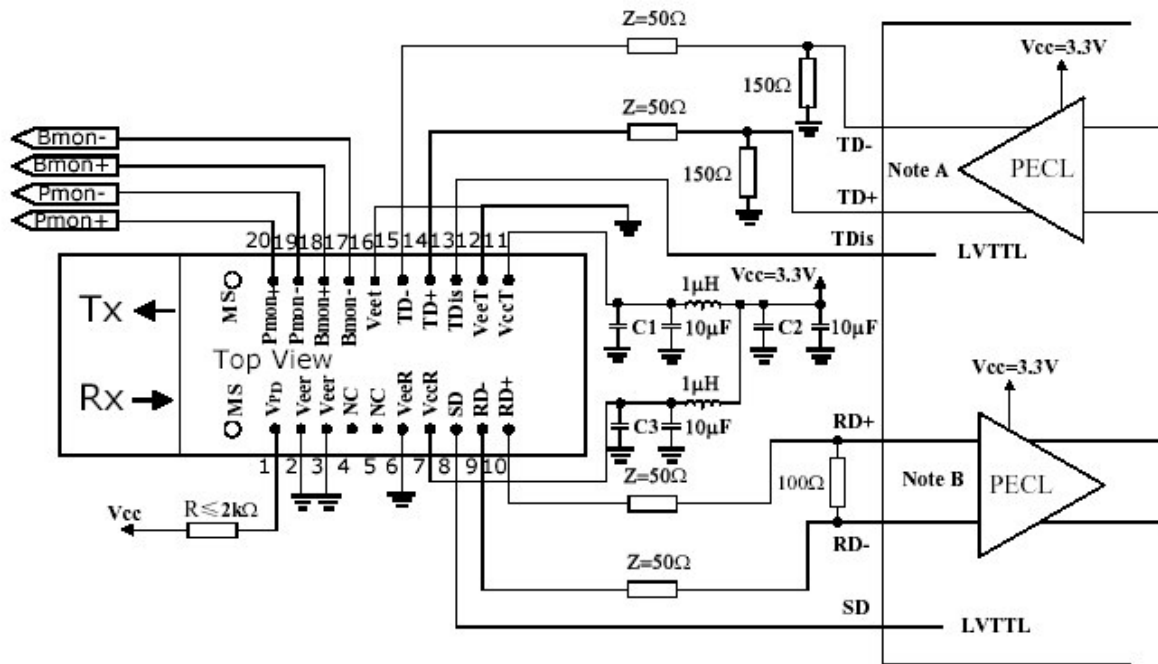


Figure 1, Recommended Interfacing/Termination Scheme (PECL)

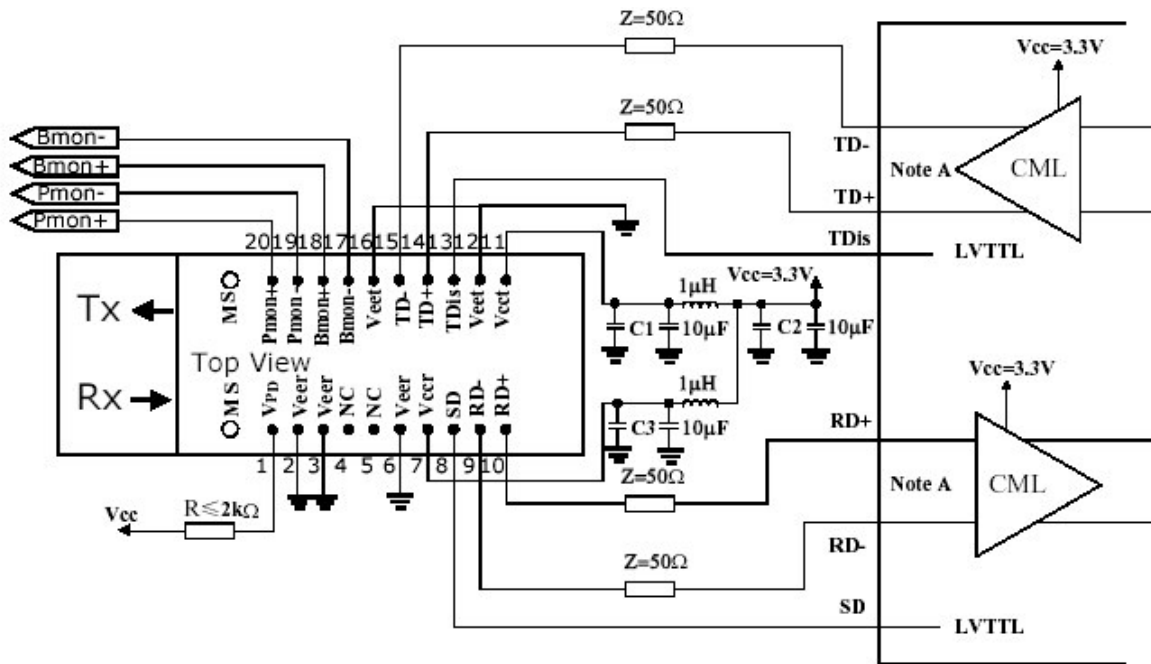


Figure 2, Recommended Interfacing/Termination Scheme (CML)

Pin Definitions

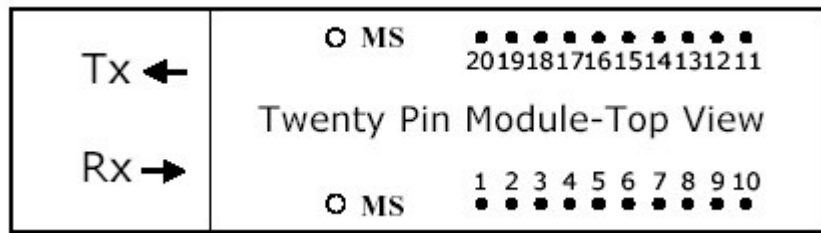


Figure 3, Pin View

Pin Function Definitions

Pin#	Pin Name	Description	Notes
	MS	Mounting Studs	
1	V _{PD}	Photo-detector Bias	Note 1
2	V _{EER}	Receiver Signal Ground	
3	V _{EER}	Receiver Signal Ground	
4	NC	No Use Connection	Not
5	NC	No Use Connection	Not
6	V _{EER}	Receiver Signal Ground	
7	V _{CCR}	Receiver Power Supply	
8	SD	Signal Detect	Note 2
9	RD+	Receiver Data Out Bar	Note 3
10	RD-	Receiver Data Out	Note 3
11	V _{cct}	Transmitter Power Supply	
12	Veet	Transmitter Signal Ground	
13	TDis	Transmitter Disable	Note 4
14	TD+	Transmitter Data In	Note 5
15	TD-	Transmitter Data In Bar	Note 5
16	Veet	Transmitter Signal Ground	
17	Bmon(-)	Laser Diode Bias Current Monitor-Negation End	Note 6
18	Bmon(+)	Laser Diode Bias Current Monitor-Positive End	Note 6
19	Pmon(-)	Laser Diode Optical Power Monitor-Negation End	Note 7
20	Pmon(+)	Laser Diode Optical Power Monitor-Positive End	Note 7

Note:

1. This pin can be used to monitor the photo-detector bias current. It is current sinking output and the current is same as the photo-detector current. This pin should be connected to Vcc through a resistor ($R_s \leq 2K\Omega$), The figure 4 below shows the equivalent circuit.
2. TTL output. Normal operation: logic 1 output ; fault condition :logic 0 output.
3. CML output. Internally AC-coupled.
4. TTL input. Transmitter output disable: $(V_{cct}-1.3v) < V < V_{cct}$; transmitter output enable: $V_{eet} < V < (V_{eet}+0.8V)$ or open circuit.
5. PECL/MCL input. Internally AC-coupled and terminated with 100Ω resistors differentially.
6. The laser bias current is accessible as a DC-voltage developed across pins 17 and 18. Dividing the voltage by 10Ω will yield the value of the laser bias current. The stand-off resistors should be $3k\Omega$. The voltage should range up to a maximum of 0.70 volts. The figure 4 below shows the equivalent circuit.
7. The backface diode monitor current is accessible as a voltage proportional to the photocurrent through a 200Ω resistor between pins 19 and 20. The stand-off resistor should be $3k\Omega$. At a 50% duty cycle, this voltage can range between 0.01 and 0.20 volts. The figure 4 below shows the equivalent circuit.

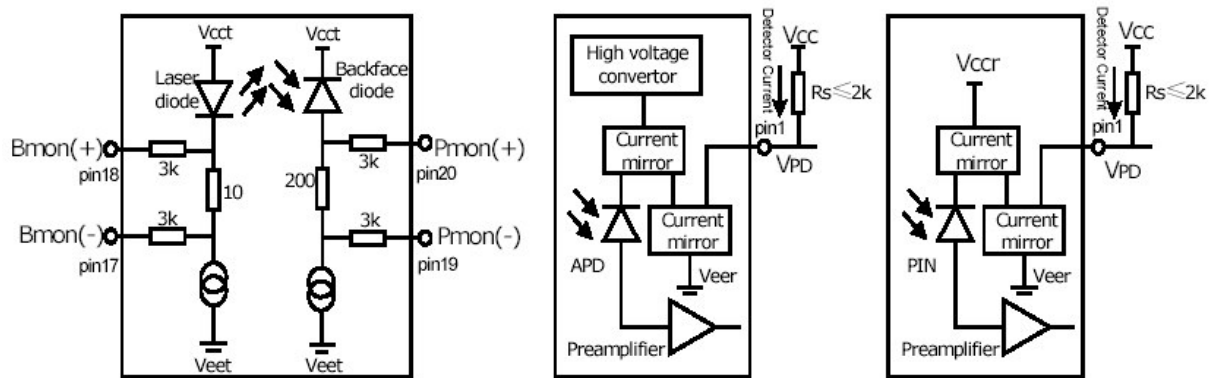
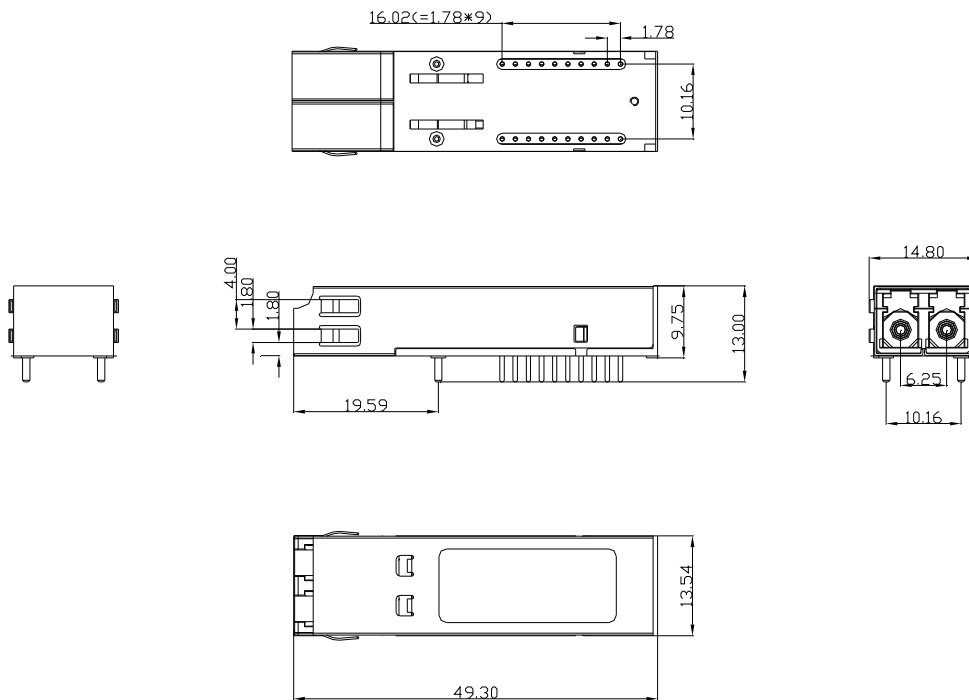


Figure 4: Analog monitoring circuit connections

Mechanical Design Diagram



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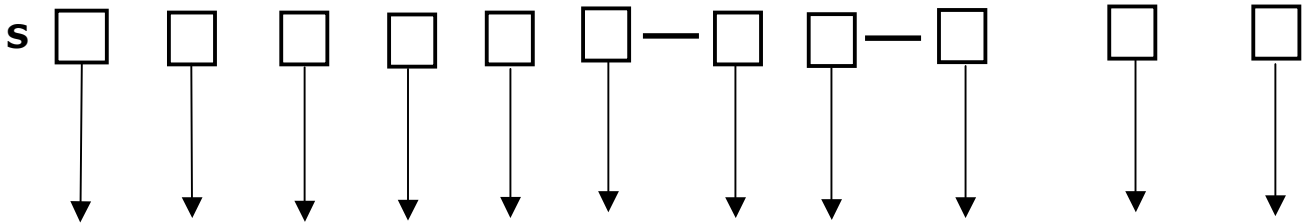
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Ordering Information



Classification:
C: CWDM
W: BIDI

Wavelength: LD Type: Data Pack Output Power: Operate
 3:1310 nm 1: FP rata : 1:1*9(TR) Power: 3:3.3V Temperature:
 5:1550nm 2:DFB 1:Ulrr02:2*9(TR) Show in 5:5V 1: 0~70℃
 8:850nm 3:VCSEL Low 1:2*5(FF) the 2:-45~+85℃
 ...Client 4:LED 2:52M 2:2*10(FF Table 7
 Especial 3:155M)
 Requirement 4:633M
 . 5:1.25G
 6:2.5G

Signal Optical
 Detect: Interface
 P: PECL type:
 T: TTL 1:FC/PC
 2:FC/APC
 3:SC/PC
 4:SC/APC
 5:LC/PC
 6:ST

Code	1	2	3	4	Unit
Power range					
Specification					
***-3*-	-15~-8	-5~0	-	0~5	dBm
***-4*-	-15~-8	-3~+2	-	1~5	
***-5*-	-10~-3	-3~+2	0~5	-	
***-6*-	-10~-3	-5~0	-2~+3	-	