

# SO-SFP-1000BASE-BX160D-xyyy

SFP BIDI, 1.25 Gbps GigE, TX/RX=1510/1570nm, DDM, 34dB, 160km, LC

## OVERVIEW

The SO-SFP-1000Base-BX160D-xyyy fiber optical SFP (Small Form Pluggable) transceivers are bi-directional single fiber transceivers. They include a CWDM DFB transmitter, a CWDM filter and an APD diode receiver. The modules operate at multiple data-rates up to 1.25 Gbps and supports protocols like Gigabit Ethernet 1000BASE, Fibre Channel 1G. The module has a duplex LC optical interface and all mechanical characteristics are compliant with the current SFP specification (SFF-8431 and SFF-8432). All SFP modules fulfill the content of the serial EEPROM described in the SFP MSA, Appendix B4, table 3.1, at base data fields (defined as addresses 0 to 63) and extended data fields (defined as addresses 64 to 95). The nominal transmitter output wavelength is stated at the reserved addresses 60-61 according to SFF document SFF-8472 rev 10.4, "Digital Diagnostics Monitoring Interface".

Wavelengths stated in the specification are measured in vacuum. All requirements in this specification are valid throughout the specified lifetime and operational environmental temperature range unless otherwise stated. The transceiver modules are compliant to RoHS-6/6.

## PRODUCT FEATURES

- Operating data-rate up to 1.25 Gbps
- Tx/Rx are compliant to ITU-T G.694.2
- APD receiver for extended reach
- Simplex LC connector
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Up to 160km on 9/125um SMF (G.652)
- Single power supply 3.3V
- RoHS6 Compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range: 0°C to 70°C.
- Extended -40°C to +85°C.
- Compliant with SFF-8472 (DDMI)

## ORDERING INFORMATION

Part Number	Description
SO-SFP-1000Base-BX160D-5157	SFP BIDI, 1.25 Gbps GigE, TX/RX=1510/1570nm, DDM, 34dB, 160km, LC
SO-SFP-1000Base-BX160D-5751	SFP BIDI, 1.25 Gbps GigE, TX/RX=1510/1570nm, DDM, 34dB, 160km, LC
SO-SFP-1000Base-BX160D-5157-I	SFP BIDI, 1.25 Gbps GigE, TX/RX=1510/1570nm, DDM, 34dB, 160km, LC, ind. temp
SO-SFP-1000Base-BX160D-5751-I	SFP BIDI, 1.25 Gbps GigE, TX/RX=1510/1570nm, DDM, 34dB, 160km, LC, ind. temp

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## APPLICATIONS

- 1G Fibre Channel FC100
- 1000Base-X Gigabit Ethernet

## GENERAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR	0.1		1.25	Gbps	
Bit Error Rate	BER			$10^{-12}$		
Operating Temperature	$T_{OP}$	0		70	°C	Case temperature
		-40		+85		Industrial temperature
Operating Relative Humidity				95	%	
Storage Temperature	$T_{STO}$	-40		85	°C	Ambient temperature
Supply Current	$I_s$		200	300	mA	For electrical power interface
Input Voltage	$V_{CC}$	3.15	3.3	3.45	V	
Maximum Voltage	$V_{MAX}$	-0.5		3.6	V	For electrical power interface

## OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	$P_{TX}$	0		+5	dBm	Average, coupled into 9/125um SMF
Extinction ratio	$E_r$	9			dB	
Optical Center Wavelength	$\lambda_c$		1510		nm	BX160D-5157
			1570		nm	BX160D-5151
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Rise/Fall Time	$t_r/t_f$			2	nsec	20% to 80%
Output Optical Eye	ANSI Fibre Channel and Gigabit Ethernet Compliant					
TX-DISABLE Assert Time	$t_{off}$			10	µsec	Average
Launch Power OFF	$P_{off}$			-45	dBm	Average

## OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Receiver Power	$P_{RX}$			-8	dBm	Average
Optical Center Wavelength	$\lambda_c$	1560		1580	nm	BX160D-5157
		1500		1520		BX160D-5151
Receiver Sensitivity	$R_{X\_SENS}$			-34	dBm	BER< $10^{-12}$ , PRBS 2 <sup>31</sup> -1
Loss of Signal-Asserted	$P_{LOS\_A}$	-45			dBm	
Loss of Signal-Deasserted	$P_{LOS\_D}$			-35	dBm	
Optical Return Loss	ORL	12			dB	
LOS Hysteresis		0.5			dB	

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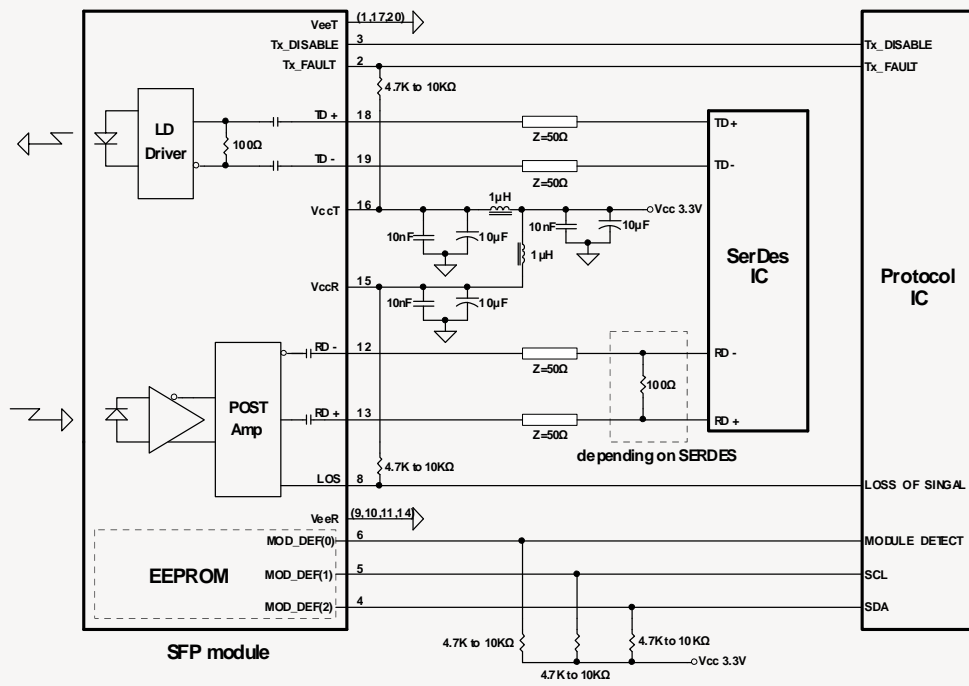
### ELECTRICAL CHARACTERISTICS – HIGH-SPEED SIGNAL INTERFACE (CML)

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential Input Impedance	$R_{IN}$	85	100	115	$\Omega$	
Differential data input swing	$V_{IN\_PP}$	400		2000	mVpp	Internally AC coupled
Differential Output Impedance	$R_{OUT}$	85	100	115	$\Omega$	
Differential data output swing	$V_{OUT\_PP}$	400		2000	mVpp	Internally AC coupled

### ELECTRICAL CHARACTERISTICS – LOW-SPEED SIGNAL INTERFACE (LVTTTL)

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input High Voltage		2.0		$V_{CC}+0.3$	V	TX-DIS, TX-FAULT
Input Low Voltage		GND		0.8	V	
Output High Voltage		2.4		$V_{CC}$	V	RX-LOS
Output Low Voltage		GND		0.5	V	

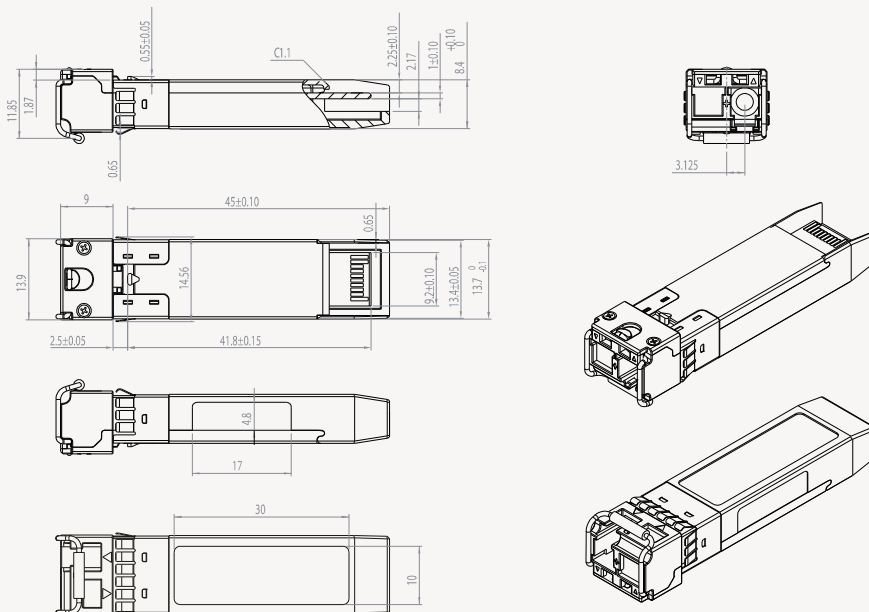
### FUNCTIONAL DIAGRAM OF TRANSCEIVER



## PIN ASSIGNMENT ACCORDING TO MSA

PIN	Signal Name	Description	PIN	Signal Name	Description
1	V <sub>EE</sub> T	Transmitter Signal Ground	11	V <sub>EE</sub> R	Receiver Signal Ground
2	TX_Fault	Transmitter Fault Indication. Logic "1" Output = Laser Fault. Logic "0" Output = Normal Operation	12	RD-	Inverse Receiver Data Out
3	TX_Disable	Logic "1" Input (or no connection) = Laser off, Logic "0" = Laser on.	13	RD+	Receiver Data Out
4	SDA	Modulation Definition 2 – Two wires serial ID Interface	14	V <sub>EE</sub> R	Receiver Signal Ground
5	SDL	Modulation Definition 1 – Two wires serial ID Interface	15	V <sub>CC</sub> R	Receiver Power – 3.3V±5%
6	MOD-ABS	Modulation Definition 0 – Ground in Module	16	V <sub>CC</sub> T	Transmitter Power – 3.3V±5%
7	RS0	RX Rate Select (LVTTTL). This pin has an internal 30k pull-down to ground. A signal on this pin will not affect module performance.	17	V <sub>EE</sub> T	Transmitter Signal Ground
8	RX_LOS	Loss of Signal Out (OC).	18	TD+	Transmitter Data In
9	RS1	TX Rate Select (LVTTTL). This pin has an internal 30k pull-down to ground. A signal on this pin will not affect module performance.	19	TD-	Inverse Transmitter Data In
10	V <sub>EE</sub> R	Receiver Signal Ground	20	V <sub>EE</sub> T	Transmitter Signal Ground

## MECHANICAL DIMENSIONS



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