

# SO-SFP-1000BASE-BX60D-35/53

SFP BIDI, 1.25 Gbps GigE, 1310/1550nm, SM, DDM, 24/22dB, 60km, LC

## OVERVIEW

The SO-SFP-1000Base-BX60D series is small form factor pluggable module for Gigabit Ethernet 1000BASE-BX and Fiber Channel single fiber applications by using 1310nm / 1550nm transmitter and 1550nm / 1310nm receiver. It is with the SFP 20-pin connector to allow hot plug capability. The transmitter section uses a distributed feedback laser and is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated A type / B type detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. The SO-SFP-1000Base-BX60D series are designed to be compliant with SFF-8472 Multi-source Agreement (MSA).

## PRODUCT FEATURES

- Up to 1.25Gbps data links
- A type: 1310nm FP Tx/1550nm Rx  
B type: 1550nm DFB Tx/1310nm Rx
- 60km with 9/125  $\mu$ m SMF
- Single 3.3V power supply and TTL logic interface
- Hot-Pluggable SFP footprint simplex LC connector interface
- Class 1 FDA and IEC60825-1 laser safety compliant
- Operating case temperature  
Standard: 0°C ~ +70°C  
Industrial: -40°C ~ +85°C
- Compliant with SFP MSA specification
- Compliant with Digital Diagnostic Monitor (DDM) interface SFF-8472

## APPLICATIONS

- Fibre Channel links
- Gigabit Ethernet
- Fast Ethernet
- WDM Gigabit Ethernet links
- Other optical links

## ORDERING INFORMATION

Part Number	Description
SO-SFP-1000Base-BX60D-35	SFP BIDI, 1.25 Gbps GigE, TX/RX=1310/1550nm, SM, DDM, 24dB, 60km, LC
SO-SFP-1000Base-BX60D-53	SFP BIDI, 1.25 Gbps GigE, TX/RX=1550/1310nm, SM, DDM, 22dB, 60km, LC
SO-SFP-1000Base-BX60D-35-I	SFP BIDI, 1.25 Gbps GigE, TX/RX=1310/1550nm, SM, DDM, 24dB, 60km, LC, ind. temp
SO-SFP-1000Base-BX60D-53-I	SFP BIDI, 1.25 Gbps GigE, TX/RX=1550/1310nm, SM, DDM, 22dB, 60km, LC, ind. temp

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## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC	-0.5	3.6	V
Operating Relative Humidity			95	%

## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit	
Case Operating Temperature	TA	SO-SFP-1000Base-BX60D-35/53	0		+70	°C
		SO-SFP-1000Base-BX60D-35/53	-40		+85	
		-I				
Power Supply Voltage	Vcc	3.15	3.3	3.45	V	
Power Supply Current	Icc			300	mA	
Data rate	GBE		1.25		Gbps	
	FC		1.063			
	FE		100			Mbps

## PERFORMANCE SPECIFICATIONS – ELECTRICAL TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
LVPECL Inputs(Differential)	V <sub>IN</sub>	400		2000	mVpp	AC coupled inputs
Input Impedance (Differential)	Z <sub>IN</sub>	85	100	115	ohms	R <sub>in</sub> > 100 kohms @ DC
TX Disable	Disable	2		Vcc	V	
	Enable	0		0.8		
TX FAULT	Fault	2		Vcc+0.3	V	
	Normal	0		0.5		

## PERFORMANCE SPECIFICATIONS – ELECTRICAL RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
LVPECL Outputs (Differential)	V <sub>out</sub>	400		2000	mVpp	AC coupled outputs
Output Impedance (Differential)	Z <sub>out</sub>	85	100	115	ohms	
Rx_LOS Output Voltage – High		2		Vcc+0.3	V	
Rx_LOS Output Voltage – Low		0		0.8	V	
MOD_DEF ( 2:0 )	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

## OPTICAL AND ELECTRICAL CHARACTERISTICS

## SO-SFP-1000Base-BX-MMD-35

Parameter	Symbol	Min	Typ	Max	Unit
9µm Core Diameter MMF	L		60		km
Data Rate		100	1250		Mbps

## OPTICAL AND ELECTRICAL CHARACTERISTICS TRANSMITTER

## SO-SFP-1000Base-BX-MMD-35

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda_c$	1290	1310	1330	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Output Power	$P_{out}$	0		+5	dBm
Extinction Ratio	ER	8.2			dB
Rise/Fall Time(20%~80%)	$t_r/t_f$			0.26	ns
Total Jitter	TJ			260	ps
Output Optical Eye		Compatible with IEEE 802.3z			
TX Disable Assert Time	$t_{off}$			10	us
Pout@TX Disable Asserted	$P_{out}$			-45	dBm

## OPTICAL AND ELECTRICAL CHARACTERISTICS RECEIVER

## SO-SFP-1000Base-BX-MMD-35

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda$	1530	1550	1570	nm
Receiver Sensitivity	$P_{min}$			-24	dBm
Receiver Overload	$P_{max}$	-3			dBm
LOS De-Assert	LOSD			-27	dBm
LOS Assert	LOSA	-45			dBm
LOS Hysteresis		0.5			dB

## OPTICAL AND ELECTRICAL CHARACTERISTICS

## SO-SFP-1000Base-BX-MMD-53

Parameter	Symbol	Min	Typ	Max	Unit
9µm Core Diameter MMF	L		60		km
Data Rate		100	1250		Mbps

## OPTICAL AND ELECTRICAL CHARACTERISTICS TRANSMITTER

## SO-SFP-1000Base-BX-MMD-53

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda_c$	1520	1550	1580	nm
Spectral Width (-20dB)	$\Delta\lambda$			1	nm
Average Output Power	$P_{out}$	-2		3	dBm
Extinction Ratio	$ER$	8.2			dB
Side Mode Suppression Ratio	$SMSR$	30			dB
Rise/Fall Time(20%~80%)	$t_r/t_f$			0.26	ns
Output Optical Eye		Compatible with IEEE 802.3ah-2004			
TX Disable Assert Time	$t_{off}$			10	us
Pout@TX Disable Asserted	$P_{out}$			-45	dBm

## OPTICAL AND ELECTRICAL CHARACTERISTICS RECEIVER

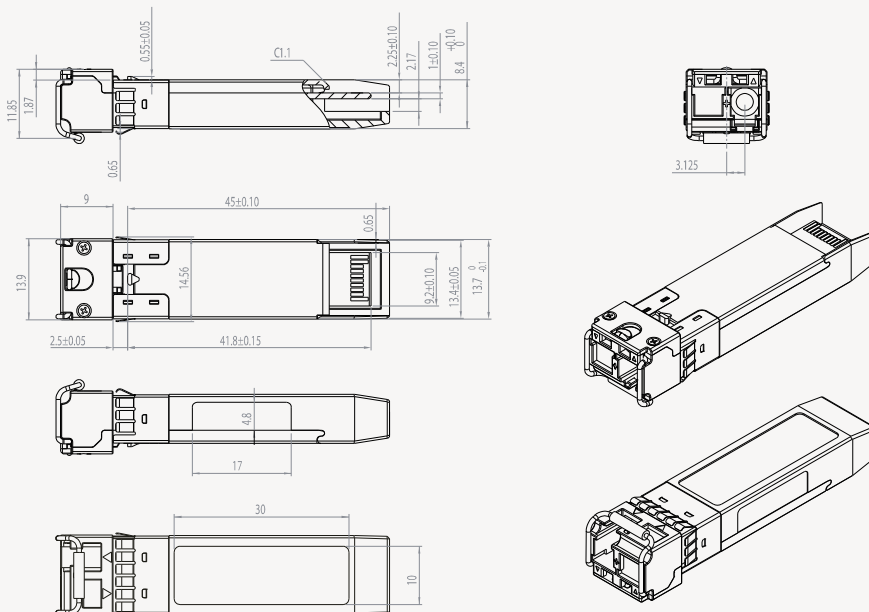
## SO-SFP-1000Base-BX-MMD-53

Parameter	Symbol	Min	Typ	Max	Unit
Centre Wavelength	$\lambda$	1290		1330	nm
Receiver Sensitivity )@1250Mbps	$P_{min}$			-24	dBm
Receiver Overload	$P_{max}$	-3			dBm
Return Loss		12			dB
Optical Path Penalty				1	dB
LOS De-Assert	$LOSD$			-25	dBm
LOS Assert	$LOSA$	-45			dBm
LOS Hysteresis		0.5			dB

## 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 (LVTTL). 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 (LVTTL). 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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