SFP-1/10G-BX-D1

Combo BiDi SFP+ Tx1330/1550 Rx1270/1310 1G/10G DDM 20km LC

Features

- Single fiber bi-directional data links up to 20 km
- Selectable 10G and 1G Mode by Hardware or Software
- SFP+ BiDi package with LC connector
- Single 3.3 V power supply
- 10G, 1330 nm DFB LD & RX 1270 nm PIN PD
- 1.25G, 1550 nm DFB LD & 1310 nm PIN PD
- Support 20 km transmission distance with SMF
- Compliant with 10G Ethernet and 1G Ethernet standard
- CML compatible data input & output interfaces
- Low power dissipation < 1 W
- Support Digital diagnostic monitor interface
- RoHS-6 compliance
- Supported case temperature ranges, Commercial 0 °C to 70 °C

Applications

- Seamless upgrade from 1G to 10G Ethernet
- Multi-rate BiDi for FTTH/FTTx

Standards

- Complies with SFP+ MSA (SFF-8431)
- Complies with ITU-T G.9807.1
- Complies with SFF-8472
- Complies with FCC 47 CFR Part 15, Class B
- Complies with FDA 21 CFR 1040.10 and 1040.11, Class I

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Absolute Maximum Ratings						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Note**
Storage Temperature	Ts	-40		85	℃	
Power Supply Voltage	Vcc	0		3.6	V	
Relative Humidity	RH	15		85	%	Non-condensing

Recommended Operating Conditions and Power Supply Requirements

Electrical and optical characteristics below are defined under this operating environment, unless otherwise specified.

Recommended Operating Conditions						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Note**
Operating Case Temperature	Top	0		70	℃	Commercial
Power Supply Voltage	Vcc	3.13	3.30	3.47	V	
Power Supply Current	ICC		200	280	mA	
Operating Humidity	OH	5		95	%	
Link Distance with G.652				20	Km	

Electrical Characteristics

Electrical Characteristics						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Note**
TX Input Differential Impedance	ZIN		100		Ω	
Data Input Swing Differentia	VIN	200		1600	mV	2x (DINP_high-DINP_low)

Data Output Swing Differential	VOUT	300		850		2x (DOP_high – DOP_low)
Burst Disable		2.0		VCC	V	
Burst Enable		0		0.8	V	
Tx_Fault, TX_SD, LOS, Low		0		0.4	V	
Tx_Fault, TX_SD, LOS, High		VCC -0.2		VCC	V	

Optical Characteristics

Transmitter Optical Specification						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Note**
10G						
Average Launch Optical Power	Pout	-6		-0.5	dBm	
Extinction Ratio	ER	3.5			dB	
Centre Wavelength	λc	1320	1330	1340	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Mode	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Launch power of OFF transmitter	P-off			-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Tx Jitter	Tj					
1G						
Average Launch Optical Power	Pout	-9		-3	dBm	
Extinction Ratio	ER	10			dB	
Centre Wavelength	λc	1540	1550	1560	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Mode	SMSR	30			dB	
Transmitter and Dispersion Penalty	TDP			-30	dBm	
Average Launch power of OFF transmitter	P-off					
Receiver Optical Characteristics						
Parameter	**Symbol**	**Min.**	**Typical**	**Max.**	**Unit**	**Note**
10G						
Optical Center Wavelength	λc	1260	1270	1280	nm	
Sensitivity	SEN			-15	dBm	
Receiver Overload	OL	0			dBm	
Receiver Reflectance				-12	dB	
Optical Return Loss Tolerance				-15	dB	
LOS Assert	LOS_A			-15	dBm	
LOS De-Assert	LOS_D	-30			dBm	
LOS Hysteresis		0.5	2.5	5.0	dB	
1G						
Optical Center Wavelength	λc	1300	1310	1320	nm	
Sensitivity (EOL, over temperature)	SEN			-23	dBm	
Receiver Overload	OL	0			dBm	
Receiver Reflectance				-12	dB	
Optical Return Loss Tolerance				-15	dB	
LOS Assert	LOS_A			-23	dBm	
LOS De-Assert	LOS_D	-38			dBm	
LOS Hysteresis		0.5	2.5	5	dB	

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Digital Diagnostic Monitoring Interface				
Parameter	**Range**	**Accuracy**	**Calibration**	**Note**
Temperature	0 to70 °C	±3 °C	Internal	
Voltage	3 to 3.6 V	±3%	Internal	
Bias Current	0 to 131 mA	±10%	Internal	
TX Power(XGSPON)	4 to 9 dBm	±2 dB	Internal	
TX Power(GPON)	0 to 5 dBm	±2 dB	Internal	
RX Power monitor	29 to -8 dBm	±2 dB	Internal	

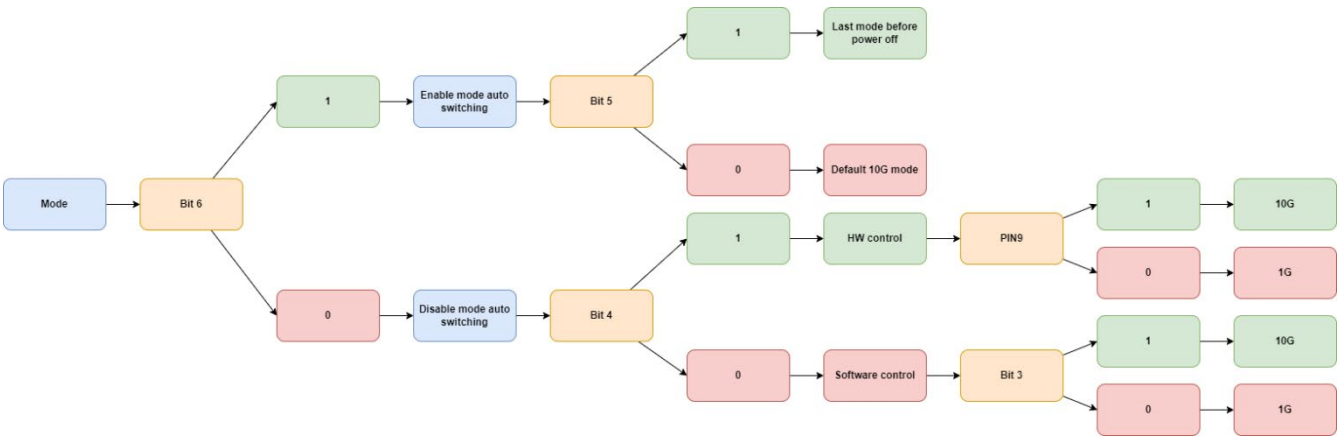
Mode Select

There are three ways of selection modes of 10G and 1G, Auto Switching, by Hardware or by Software.

Byte #118 of page A2 assigns three bits controlling which mode select shall be used and other functions.
-If bit 6 is set, mode select is in Auto Switching mode which means mode is determined by signal input (see auto switching table.)
-If bit 6 is unset, Auto Switching mode is disabled and Bit 4 now decides which mode selects shall be used Hardware or Software.

-If bit 4 is set then Pin #9 on physical SFP connector selects mode (Hardware mode):
If Pin #9 is set to high then 10G mode is selected.
If Pin #9 is set to low then 1G mode is selected.

- If bit 4 is unset then bit 3 selects mode (Software mode):
If Bit 3 is set 10G mode is selected.
If Bit 3 is unset 1G mode is selected.



Auto Switching Table

RX LOS 10G	RX LOS 1G	Mode
0	1	10G mode
1	0	1G mode
1	1	Hold current sate
0	0	

Warnings

- Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended.
- Follow guidelines according to proper ESD procedures.
- Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.