

NXM32-FC-LW

SFP28G 1310nm 10km Singlemode

Features

- SFP28 Form Factor
- 28,05 Gb/s bitrate
- Up to 10 km over Singlemode
- LC connector
- 1310 nm, DFB laser, PIN photodiode
- Up to 1,5W power consumption
- +0/+70°C temperature range
- Built in digital diagnostic monitoring



Applications

- 32GBase Fibre Channel
- Access and Enterprise

Optical specifications

Optical budget : 6.4 dB

Transmitter & Receiver optical Specifications

Parameter	Min	Max	Unit
Tx Power	-5	2	dBm
Rx Sensitivity	-11.4	2	dBm

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Maximum Supply Voltage	Vcc	-0.5	4.0	V
Storage Temperature	TS	-40	85	°C
Operating Case Temperature	Tc	0	70	°C
Operating Humidity (Non-Condensing)	RH	5	85	%
Maximum Bitrate	B _{max}	8.5	28.05	Gbps
Bit Error Rate	BER		10 ⁻¹² 10 ⁻⁶	

Electrical Characteristics (T_A, VCC = 3.15 to 3.46 Volts)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.15		3.46	V	
Power Supply Current	Icc			400	mA	1
Power Consumption	P _{DISS}			1.5	W	
Transmitter						
Differential data input swing	28.05Gbps	V _{in,pp}	250		900	mV
	14.025Gbps & 8.5Gbps	V _{in,pp}	180		700	mV
Input differential impedance	Z _{in}		100		Ω	2
Inner Eye Height	EH6	50			mV	3
Transmit Disable Voltage	V _D	2		Vcc	V	4
Transmit Enable Voltage	V _{EN}	V _{ee}		V _{ee} +0.8	V	
Receiver						
Single ended data output swing	V _{out, pp}	185		425	mV	5
Output differential impedance	Z _{in}		100		Ω	
LOS Fault	V _{LOS} fault	2		V _{cHOST}	V	6
LOS Normal	V _{LOS} norm	V _{ee}		V _{ee} +0.8	V	6
Power Supply Rejection	PSR	100			mVpp	7

Notes:

1. With established link, the total power dissipation shall not exceed 1.3W.
2. Connected directly to TX data input pins. AC coupling from pins into CDR, BER contour 10^{-6} , per FC-PI 6 and FC-MSQS-2.
3. Inner eye height (EH6) for high loss case
4. Or open circuit.
5. Into 100 ohms differential termination.
6. LOS is an open collector output. Should be pulled up with 4.7k – 10kohms on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.
7. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Optical Power (average)	28.05Gbps/14.025Gbps	P _{OUT}	-5		+2.0	dBm
	8.5Gbps	P _{OUT}	-8.4		+2.0	dBm
Optical Modulation amplitude (OMA)	28.05Gbps	OMA	631 (-2.0)		(+3)	μW(dBm)
	14.025Gbps	OMA	631 (-2.0)		(+3)	μW(dBm)
	8.5Gbps	OMA	290 (-5.4)		(+3)	μW(dBm)
Optical Extinction Ratio	28.05Gbps	ER	4			dB
	14.025Gbps/8.5Gbps	ER	3.5			dB
Optical Wavelength		λ	1295		1325	nm
Spectral Width (-20dB)		σ			1	nm
Side Mode Suppression Ratio			30			dB
Transmitter Dispersion Penalty	28.05Gbps	TDP			2.7	dB
	14.025Gbps	TDP			4.4	dB
	8.5Gbps	TDP			3.2	dB
Relative Intensity Noise	28.05Gbps/14.025Gbps	RIN			-130	dB/Hz
	8.5Gbps	RIN			-128	dB/Hz
Receiver						
Average Receiver Power		RxMAX			2	dBm
Unstressed Receiver Sensitivity (OMA)	28.05Gbps	RxSENS			-11.4	dBm
	14.025Gbps	RxSENS			-12.0	dBm
	8.5Gbps	RxSENS			-13.8	dBm
Optical Return Loss	28.05Gbps		26			dB
	14.025Gbps/8.5Gbps		12			dB
LOS De-Assert		LOS _D			-17	dBm
LOS Assert		LOS _A	-30			dBm
LOS Hysteresis			0.5			dB

Notes:

1. Class 1 Laser Safety limit per FDA/CDRH, and EN (IEC) 60825 laser safety standards.
2. 3200-SM-LC-L OMA in dBm shall also exceed -5.0 TDP.
3. For 32GFC with FEC, receiver sensitivity is defined at 10^{-6} BER level, not 10^{-12} BER level.

Pin Descriptions

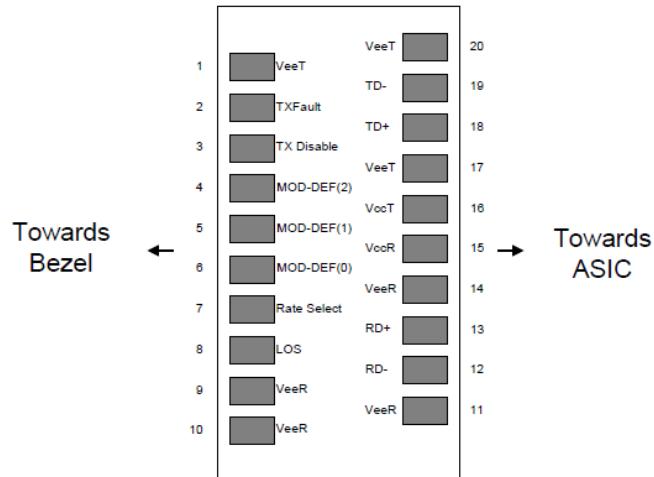
Pin	Symbol	Name/Descriptions	Ref.
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.	2
3	TDIS	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line (MOD-DEF2)	4
5	SCA	2-wire Serial Interface Clock (MOD-DEF1)	4
6	MOD_ABS	Module Absent, connected to V_{EET} or V_{EER}	4
7	RS0	Rx Rate Select: Open or Low = 8.5 or 14.025 Gb/s Fibre Channel (Low Bandwidth) High = 28.05 Gb/s Fibre Channel (High Bandwidth)	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	Tx Rate Select: Open or Low = 8.5 or 14.025 Gb/s Fibre Channel (Low Bandwidth) High = 28.05 Gb/s Fibre Channel (High Bandwidth)	5
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to $V_{cc} + 0.3V$. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on $T_{DIS} > 2.0V$ or open, enabled on $T_{DIS} < 0.8V$.
4. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5. Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 12.1c. Rx Rate Select is set at Bit 3, Byte 110, Address A2h. Tx Rate Select is set at Bit 3, Byte 118, Address A2h. Note: writing a

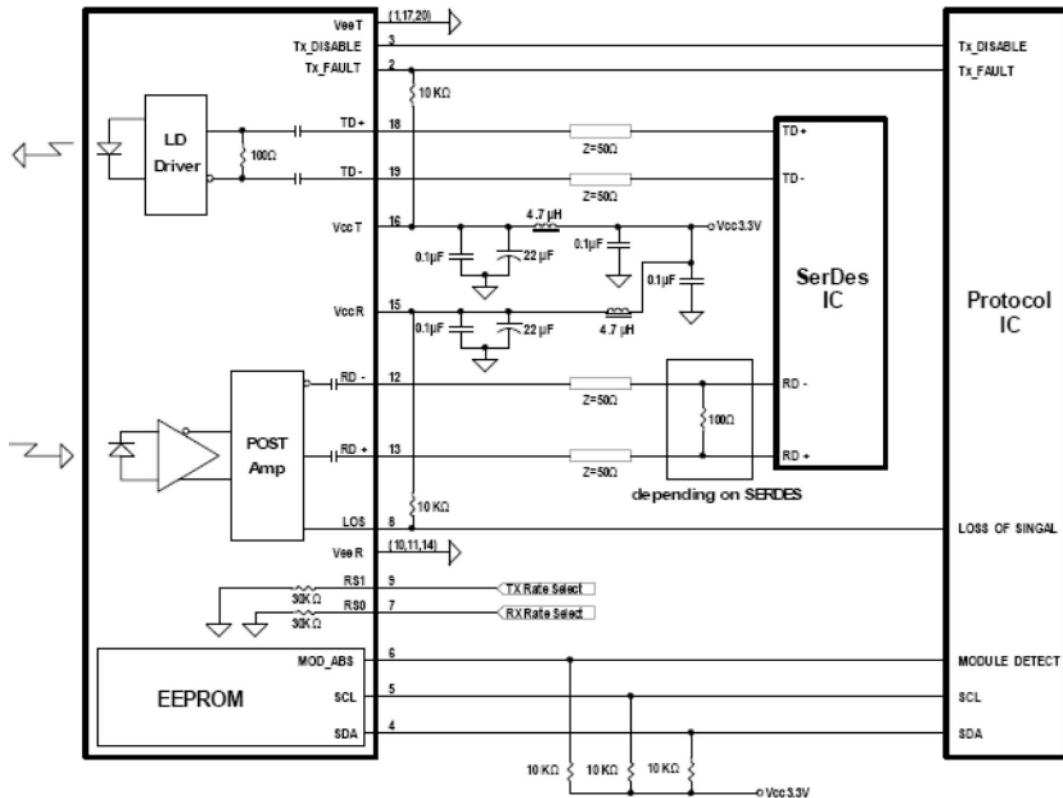
"1" selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.

6. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.



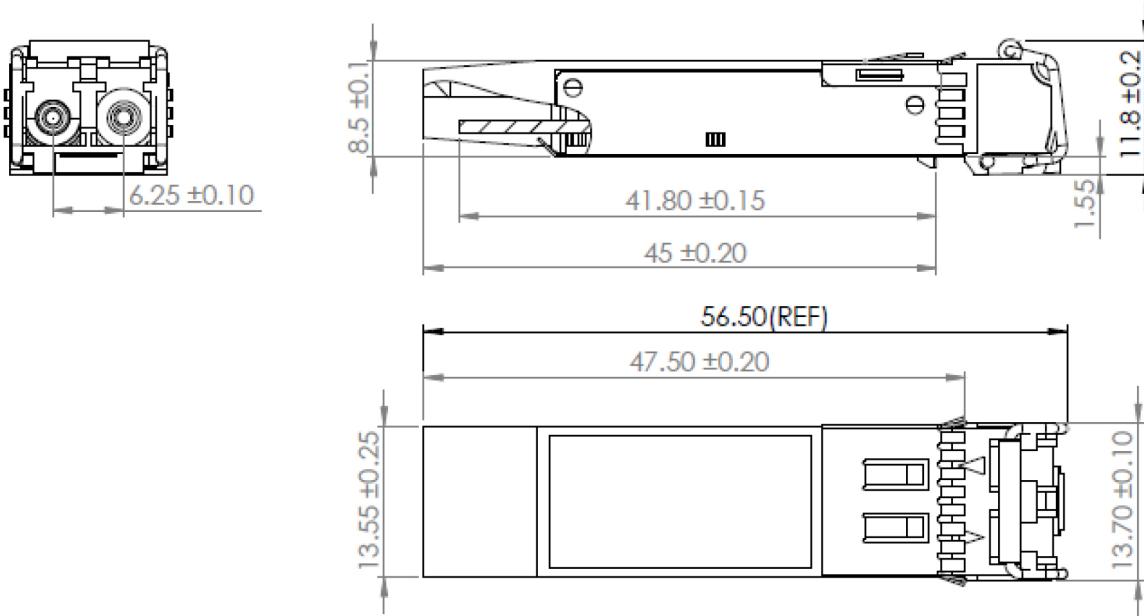
Pin-out of connector Block on Host board

Recommended Circuit Schematic



Mechanical Specifications

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X (A0h)		2 wire address 1010001X (A2h)	
0	Serial ID Defined by SFP MSA (96 bytes)	0	Alarm and Warning Thresholds (56 bytes)
95	Vendor Specific (32 bytes)	55	Cal Constants (40 bytes)
127	Reserved, SFF8079 (128 bytes)	95	Real Time Diagnostic Interface (24 bytes)
255		119	Vendor Specific (8 bytes)
		127	User Writable EEPROM (120 bytes)
		247	Vendor Specific (8 bytes)
		255	