



800G OSFP 2*FR4 Silicon Photonics Transceiver

APOPCDKCDF8A

800G OSFP 2*FR4 Silicon Photonics Transceiver

APOPCDKCDLF8A

ATOP's APOPCDKCDLF8A is an 800Gb/s OSFP optical module designed for 2km optical communication applications. On the transmitter side, the module converts 8 channels of 100Gb/s (PAM4) electrical input data to 8 channels of parallel optical signals, each capable of 100Gb/s operation for an aggregate data rate of 800Gb/s. On the receiver side, the module converts 8 channels of parallel optical signals of 100Gb/s each channel for an aggregate data rate of 800Gb/s into 8 channels of 100Gb/s (PAM4) electrical output data.

Product Features

- ✓ Compliant with OSFP MSA
- ✓ CMIS 5.0 compliance
- ✓ 53.125GBd PAM4 *8 channel 800GAUI-8 C2M Electrical interface
- ✓ 53.125GBd PAM4 *8 channel 800G-2*FR4 Optical interface
- ✓ Up to 2km reach on SMF
- ✓ Dual Duplex-LC Connector
- ✓ Single 3.3V power supply
- ✓ Power dissipation <16W
- ✓ Case temperature range of 0 to 70°C

Applications

- ✓ 2X400GBASE-FR4
- ✓ InfiniBand

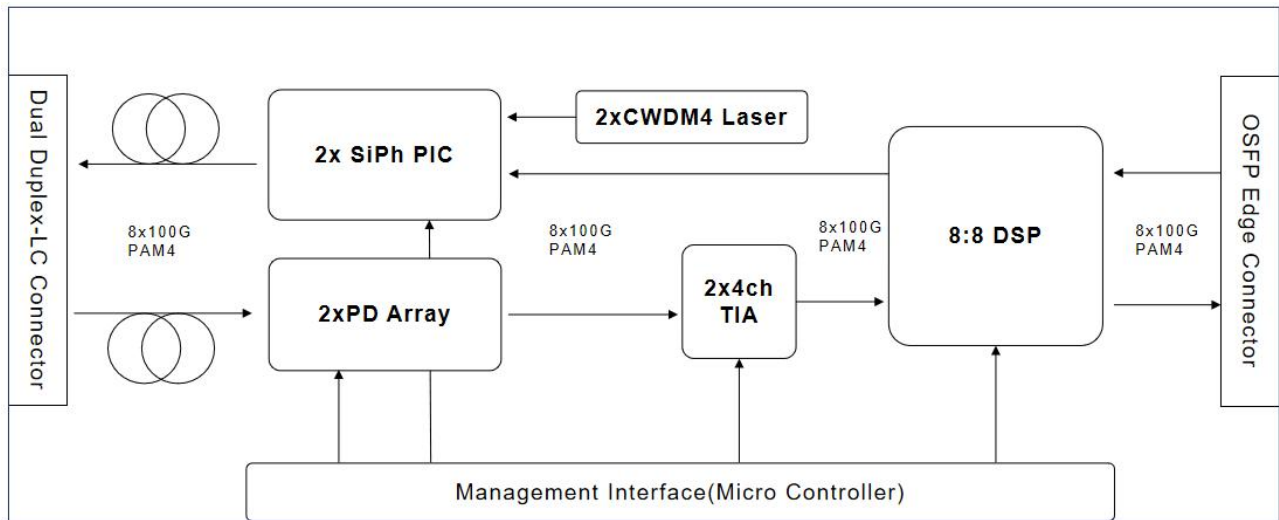
Product Selection

Part Number	Operating case temperature	DDMI	Package
APOPCDKCDLF8A	Commercial (0~70°C)	Yes	OSFP

Regulatory Compliance

- ESD compatible with MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM)
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and EN (IEC) 60825-1
- RoHS compliance

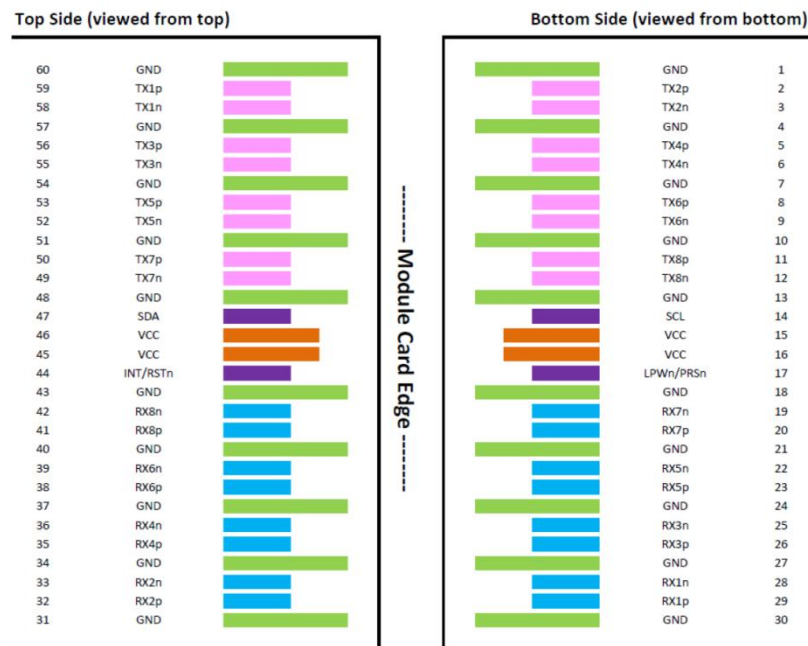
Transceiver Block Diagram



Pin Descriptions

Pin	Symbol	Description	Logic	Plug Sequence
1	GND		Ground	1
2	TX2p	Transmitter Data Non-Inverted	CML-I	3
3	TX2n	Transmitter Data Inverted	CML-I	3
4	GND		Ground	1
5	TX4p	Transmitter Data Non-Inverted	CML-I	3
6	TX4n	Transmitter Data Inverted	CML-I	3
7	GND		Ground	1
8	TX6p	Transmitter Data Non-Inverted	CML-I	3
9	TX6n	Transmitter Data Inverted	CML-I	3
10	GND		Ground	1
11	TX8p	Transmitter Data Non-Inverted	CML-I	3
12	TX8n	Transmitter Data Inverted	CML-I	3
13	GND		Ground	1
14	SCL	2-wire Serial interface clock	LVCMOS-I/O	3
15	VCC	+3.3V Power		2
16	VCC	+3.3V Power		2
17	LPWn/PRSn	Low-Power Mode / Module Present	Multi-Level	3
18	GND		Ground	1
19	RX7n	Receiver Data Inverted	CML-O	3
20	RX7p	Receiver Data Non-Inverted	CML-O	3
21	GND		Ground	1
22	RX5n	Receiver Data Inverted	CML-O	3
23	RX5p	Receiver Data Non-Inverted	CML-O	3
24	GND		Ground	1

25	RX3n	Receiver Data Inverted	CML-O	3
26	RX3p	Receiver Data Non-Inverted	CML-O	3
27	GND		Ground	1
28	RX1n	Receiver Data Inverted	CML-O	3
29	RX1p	Receiver Data Non-Inverted	CML-O	3
30	GND		Ground	1
31	GND		Ground	1
32	RX2p	Receiver Data Non-Inverted	CML-O	3
33	RX2n	Receiver Data Inverted	CML-O	3
34	GND		Ground	1
35	RX4p	Receiver Data Non-Inverted	CML-O	3
36	RX4n	Receiver Data Inverted	CML-O	3
37	GND		Ground	1
38	RX6p	Receiver Data Non-Inverted	CML-O	3
39	RX6n	Receiver Data Inverted	CML-O	3
40	GND		Ground	1
41	RX8p	Receiver Data Non-Inverted	CML-O	3
42	RX8n	Receiver Data Inverted	CML-O	3
43	GND		Ground	1
44	INT/RSTn	Module Interrupt / Module Reset	Multi-Level	3
45	VCC	+3.3V Power		2
46	VCC	+3.3V Power		2
47	SDA	2-wire Serial interface data	LVC MOS-I/O	3
48	GND		Ground	1
49	TX7n	Transmitter Data Inverted	CML-I	3
50	TX7p	Transmitter Data Non-Inverted	CML-I	3
51	GND		Ground	1
52	TX5n	Transmitter Data Inverted	CML-I	3
53	TX5p	Transmitter Data Non-Inverted	CML-I	3
54	GND		Ground	1
55	TX3n	Transmitter Data Inverted	CML-I	3
56	TX3p	Transmitter Data Non-Inverted	CML-I	3
57	GND		Ground	1
58	TX1n	Transmitter Data Inverted	CML-I	3
59	TX1p	Transmitter Data Non-Inverted	CML-I	3
60	GND		Ground	1



Pin-out of Connector Block on Host Board

OSFP Control Pins

Parameter	Function	Description
SCL	BiDir	2-wire serial clock signal. Requires pull-up resistor to 3.3V on host
SDA	BiDir	2-wire serial data signal. Requires pull-up resistor to 3.3V on host.
LPWn/PRSn	Input/output	Dual Function Signal • Low Power mode is an active-low input signal • Module Present is controlled by a pull-down resistor on the module which gets converted to an active-low output logic signal
INT/RSTn	Input/output	Dual Function Signal • Reset is an active-low input signal • Interrupt is an active-high output signal

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Storage Temperature	Tstg	-40		+85	°C	
Maximum Supply Voltage	VCC	-0.5		3.5	V	
Operating Relative Humidity	RH	0		85	%	Non-condensing

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Case Operating Temperature	T _c	0		+70	°C	
Power Supply Voltage	V _{cc}	3.135	3.3	+3.465	V	
Power Consumption				16	W	
Data Rate, each Lane			53.125		GBd	PAM4
Two Wire Serial Interface Clock Rate		100		1000	kHz	
Power Supply Noise Tolerance (10Hz - 10MHz)		66			mV	
Rx Differential Data Output Load			100		ohm	
Link Distance (SMF)				2	km	

Electrical Characteristics

Parameter	Test Point	Min	Typ	Max	Unit	Ref.
Module input (each Lane)						
Signaling Rate, each lane	TP1		53.125±100ppm		GBd	
DC common-mode voltage tolerance	TP1	-350		2850	mV	
Single-ended voltage tolerance range	TP1a	-0.4		3.3	V	
AC Common-Mode Voltage Tolerance						
Low-Frequency, VCMLF	TP1a	32			mV	
Full-Band, VCMLF		80				
Module stressed input tolerance	TP1a	IEEE 802.3ck D3.3 120G.3.4.3				
Differential Voltage pk-pk Tolerance	TP1a	750			mV	
Differential-mode to common-mode return loss, RL _{cd}	TP1	IEEE 802.3ck D3.3 Equation 120G-2				dB
Effective return loss, ERL	TP1	8.5			dB	
Differential termination mismatch	TP1			10	%	
Module output (each Lane)						
Signaling Rate, each lane	TP4		53.125±100ppm		GBd	
Peak-to-peak AC common- mode voltage						
Low-frequency, VCMLF	TP4			32	mV	
Full-band, VCMFB				80		
Differential peak-to-peak output voltage						
Short mode	TP4			600	mV	
Long mode				845		
Eye Height	TP4	15			mV	
Vertical Eye Closure, VEC	TP4			12	dB	
Common-Mode to Differential Return Loss, RL _{dc}	TP4	IEEE 802.3ck Equation 120G-1				dB
Effective return loss, ERL	TP4	8.5			dB	
Differential termination mismatch	TP4			10	%	
Transition time (20% to 80%)	TP4	8.5			ps	
DC common-mode output voltage	TP4	-350		2850	mV	

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation Format		PAM4				
Optical Wavelength	L0	1264.5	1271	1277.5	nm	
	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
	L3	1324.5	1331	1337.5	nm	
Side-mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power				10.4	dBm	
Average Launch Power, each lane		-3.2		4.4	dBm	
Outer Optical Modulation Amplitude(OMA _{outer}), each Lane						
For TDECQ < 1.4 dB		-0.2		3.7	dBm	
For 1.4 ≤ TDECQ ≤ 3.4 dB		-1.6+ TDECQ				
Difference in Launch Power between any Two Lanes (OMA _{outer})				3.9	dB	
Transmitter and Dispersion Eye Closure for PAM4, each Lane	TDECQ			3.4	dB	
Transmitter Eye Closure for PAM4, each Lane	TECQ			3.4	dB	
TDECQ-TECQ				2.5	dB	
Over/under-shoot				22	%	
Transmitter power excursion				1.8	dBm	
Extinction Ratio, each Lane	ER	3.5			dB	
Transmitter transition time				17	ps	
Average launch power of OFF transmitter, each lane				-16	dBm	
RIN _{17.1OMA}				-136	dB/Hz	
Optical return loss tolerance				17.1	dB	
Transmitter reflectance				-26	dB	
Receiver						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation Format		PAM4				
Optical Wavelength	L0	1264.5	1271	1277.5	nm	
	L1	1284.5	1291	1297.5	nm	
	L2	1304.5	1311	1317.5	nm	
	L3	1324.5	1331	1337.5	nm	
Damage threshold, each lane		5.4			dBm	
Average power at receiver, each lane		-7.2		4.4	dBm	
Receive power(OMA _{outer}), each lane				3.7	dBm	
Difference in Receiver Power between any Two Lanes (OMA _{outer})				4.1	dBm	
Receiver reflectance				-26	dB	
Receiver Sensitivity(OMA _{outer}), each Lane						
For TECQ < 1.4 dB				-4.6	dBm	
For 1.4 ≤ TECQ ≤ 3.4 dB				-6+TECQ		
Stressed receiver Sensitivity (OMA _{outer}) , each lane				-2.6	dBm	

Conditions of Stress Receiver Sensitivity Test

Stressed Eye Closure for PAM4 (SECQ), Lane under Test	3.4	dB
OMAouter of each aggressor lane	1.4	dB

Digital Diagnostic Monitoring Interface

Five transceiver parameter values are monitored. The following table defines the Monitory parameter's accuracy.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Temperature monitor absolute error	DMI_Temp	-3		3	°C	
Supply voltage monitor absolute error	DMI_VCC	-3		3	%	
Bias current monitor absolute error	DMI_I Bias	-10		10	%	
Tx power monitor absolute error	DMI_TX	-3		3	dB	
Rx power monitor absolute error	DMI_RX	-3		3	dB	



let's make it personal

atoptechnology.com