

# Alpha Bridge AQSFP-F-10-AK Datasheet

### Features

- 4 independent full-duplex channels
- Up to 11.2Gb/s data rate per channel
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- QSFP+ MSA compliant
- Up to 100m transmission
- Operating case temperature: 0 to 70°C
- Single 3.3V power supply
- Maximum power consumption 1.5W each terminal
- RoHS-6 compliant

### Application

- 10/40G Ethernet
- Infiniband SDR/DDR/QDR
- 2/4/8G Fiber Channel



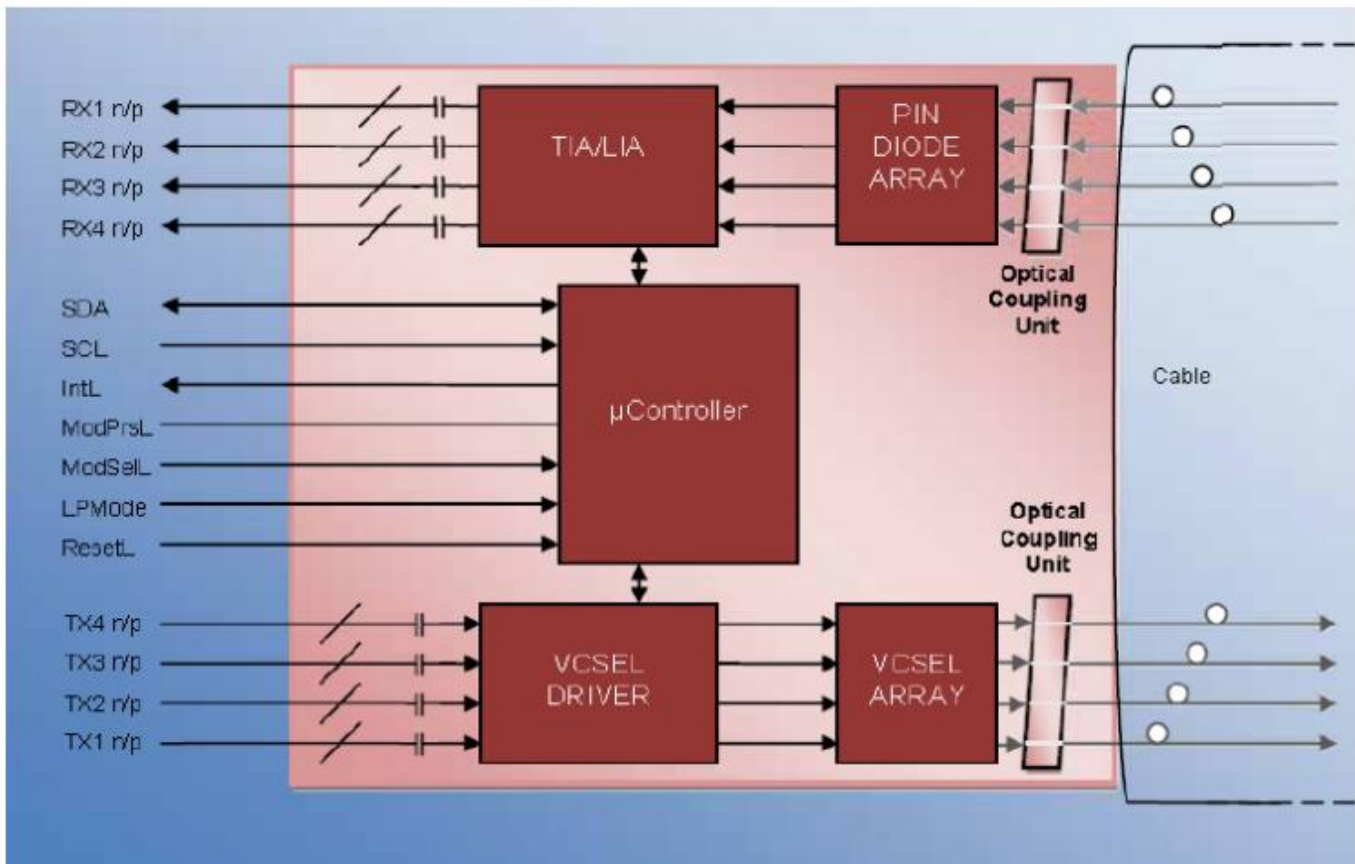
### Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	<i>T<sub>S</sub></i>	-40	85	°C	
Operating Case Temperature	<i>T<sub>op</sub></i>	0	70	°C	
Power Supply Voltage	<i>V<sub>cc</sub></i>	-0.5	3.6	V	
Relative Humidity (non-condensation)	<i>RH</i>	0	85	%	

### Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Units	Note
Operating Case Temperature	<i>T<sub>op</sub></i>	0		70	°C	
Power Supply Voltage	<i>V<sub>cc</sub></i>	3.135	3.3	3.465	V	
Data Rate, each Lane			10.3125	11.2	Gb/s	
Control Input Voltage High		2		<i>V<sub>cc</sub></i>	V	
Control Input Voltage Low		0		0.8	V	

AOC Block Diagram



**Block Diagram of One of the QSFP+ End Modules**

Electrical Characteristics-Transmitter (each Lane)

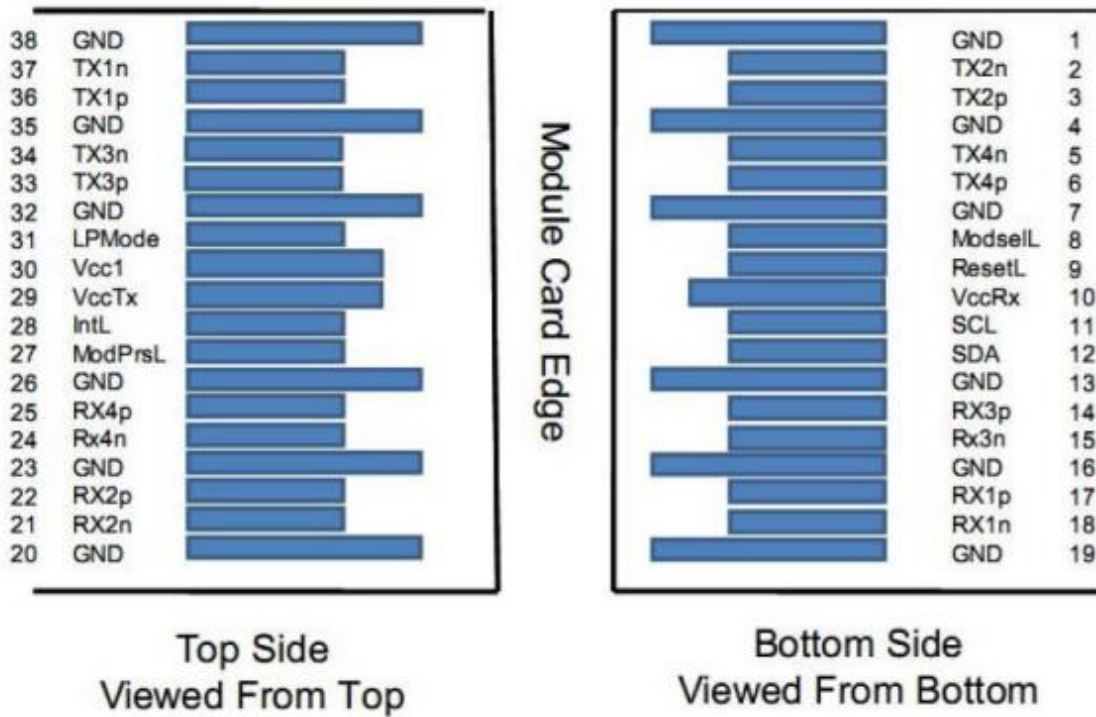
Parameter	Symbol	Min	Typical	Max	Units	Notes
Power Consumption, each Terminal				1.5	W	
Supply Current, each Terminal	I <sub>cc</sub>			450	mA	
Transceiver Power-on Initialization Time				2000	ms	
Single Ended Input Voltage Tolerance		-0.3		4	V	
AC Common Mode Input Voltage Tolerance		15			mV	RMS
Differential Input Voltage Swing Threshold		50			mV <sub>pp</sub>	LOSA Threshold
Differential Input Voltage Swing	V <sub>in,pp</sub>	180		1200	mV <sub>pp</sub>	
Differential Input Impedance	Z <sub>in</sub>	90	100	110	Ohm	
Differential Input S-parameter	SDD11	$< -12 + 2 \times \text{SQRT}(f)$ , with f in GHz.			dB	0.01-4.1GHz
		$< -6.3 + 13 \times \log_{10}(f/5.5)$ , with f in GHz			dB	4.1-11.1GHz
Reflected Differential to Common Mode Conversion	SCD11			-10	dB	0.01- 11.1GHz
Total Jitter				0.4	UI	
Deterministic Jitter				0.15	UI	

Electrical Characteristics-Receiver (each Lane)

Parameter	Symbol	Min	Typical	Max	Units	Notes
Single Ended Output Voltage		-0.3		4	V	
AC Common Mode Output Voltage				7.5	mV	RMS
Differential Output Voltage Swing	Vout,pp	600		800	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	
Differential Output S- parameter	SDD22	$< -12 + 2 \times \text{SQRT}(f)$ , with f in GHz			dB	0.01-4.1GHz
		$< -6.3 + 13 \times \log_{10}(f/5.5)$ , with f in GHz			dB	4.1-11.1GHz
Common Mode Output Reflection Coefficient	SDD22	$< -7 + 1.6 \times f$ , with f in GHz			dB	0.01-2.5GHz
				-3	dB	2.5-11.1GHz
Total Jitter				0.38	UI	In the case the specs of Tx jitters are met
Deterministic Jitter				0.64	UI	

Pin Assignment

QSFP Module Pad Layout (Top View)



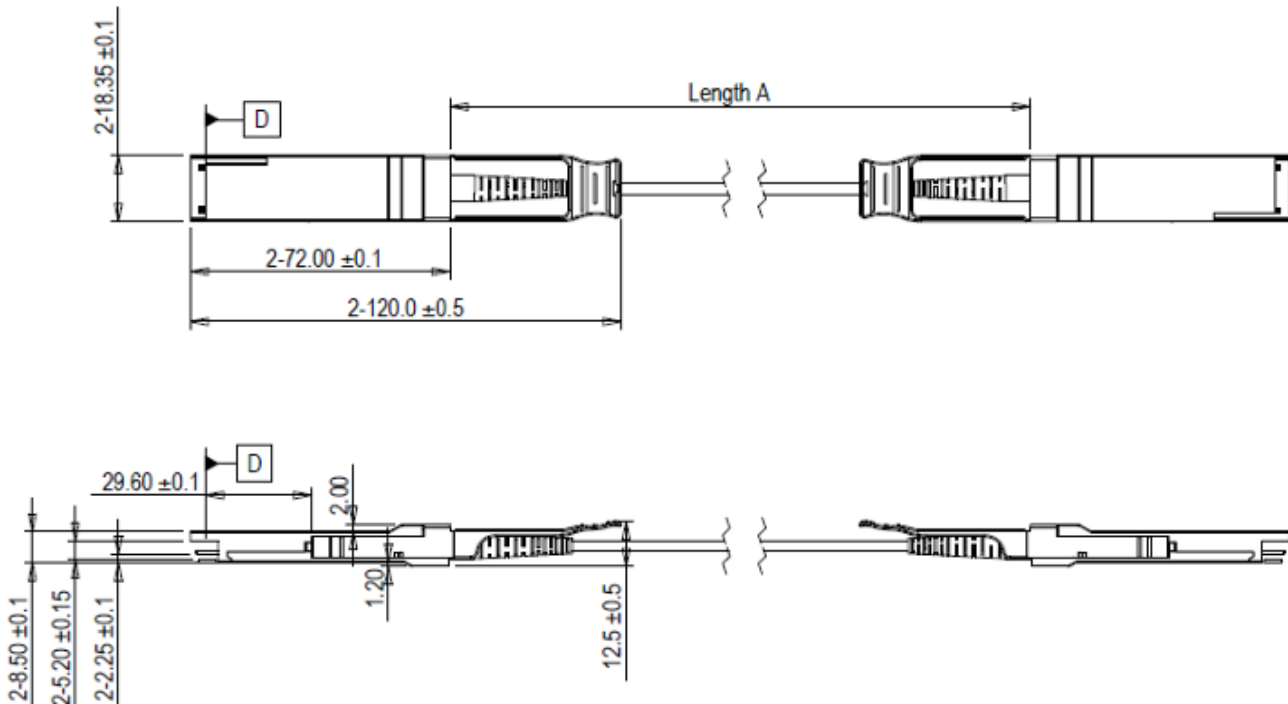
## Pin Definition

Pin	Logic	Symbol	Description	Notes
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-inverted Data Input	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-inverted Data Input	
7		GND	Ground	1
8	LVTTTL-I	ModSelL	Module Select	
9	LVTTTL-I	ResetL	Module Reset	
10		VccRx	+3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTTL-O	ModPrsL	Module Present	
28	LVTTTL-O	IntL	Interrupt	
29		VccTx	+3.3V Power Supply Transmitter	2
30		Vcc1	+3.3V Power Supply	2
31	LVTTTL-1	LPMODE	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Input	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	

37	CML-I	Tx1n	Transmitter Inverted Data Input	
38		GND	Ground	1

- Note:
- GND is the symbol for signal and supply (power) common for QSFP+ modules. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
  - VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 3 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP+ transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

**Dimensions**



**Ordering Information**

Part Number	Model Number	Length (M)	Voltage	Temperature
<b>AQSFP-F-10-AK</b>	Active Optical Cable	3	3.3V	0 °C to 70 °C

Note: All information contained in this document is subject to change without notice.