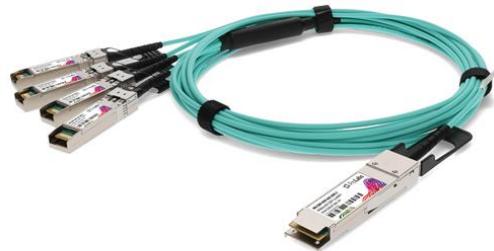


## 40G-QSFP-4SFP-AOC-0301-C

Brocade® (Formerly) Compatible TAA Compliant 40GBase-AOC QSFP+ to 4xSFP+ Active Optical Cable (850nm, MMF, 3m)

### Features:

- Compliant to Standard SFF-8436 for QSFP+ and Standard SFF-8431 for SFP+
- High-Speed/High-Density: Supports up to 4x100Gbps Bi-Directional Operation
- Reliable VCSEL and PIN Photonic Devices
- I2C Standard Management Interface
- Excellent High-Speed Signal Integrity
- Operating Case Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free



### Applications:

- 10G/40G Ethernet
- Proprietary High-Speed/High-Density Data
- High Performance Computing, Server and Data Storage

### Product Description

This is a Brocade® (Formerly) compatible 40GBase-AOC QSFP+ to 4xSFP+ active optical cable that operates over active fiber with a maximum reach of 3m. At a wavelength of 850nm, it has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. This active optical cable is TAA (Trade Agreements Act) compliant, and is built to comply with MSA (Multi-Source Agreement) standards. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



### Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	Tstg	-40		85	°C	
Operating Temperature	Tc	0	25	70	°C	
Relative Humidity	RH	5		85		
Maximum Supply Voltage	Vcc	0		3.6	V	

### Electrical Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Data Rate per Channel				4*10.3	Gbps	
Low Speed Output: Transmitter Fault (Tx_Fault)/Loss of Signal (LOS)	V\ H	2.0		Vcc	V	1
	V\ L	0		0.8	V	1
Low Speed Input: Transmitter Disable (Tx_Disable), M\ ) _D-71, M\ ) _D-72	V@	2.0		Vcc	V	2
	V@	0		0.8	V	2
Clock Rate - I2C	f			400	kHz	3
Module Turn On Time				2000	ms	4

### Notes:

1. For all control input pins: LPMode, Reset, and ModSelL.
2. For all status output pins: ModPrsL and IntL.
3. For the management interface.
4. Time from module power on/insertion/ResetL de-assert to module fully functional.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
<b>Reference Differential Input Impedance</b>	Zd		100		Ω	1
<b>Optical Return Loss Tolerance</b>				12	dB	
<b>Differential Data Input Swing</b>	VIN,pp	180		1200	mV	
<b>Differential Data Input Threshold</b>			50		mV	2
<b>Receiver</b>						
<b>Reference Differential Input Impedance</b>	Zd		100		Ω	1
<b>Differential Data Output Swing</b>	VOUT,pp	0		800	mV	
<b>Pre-Emphasis Pulse Amplitude Percentage</b>	0				%	3
	10				%	
	20				%	
	40				%	
<b>Pre-Emphasis Pulse Duration</b>			30		ps	
<b>Signal Speed</b>			4*10.3		Gbps	
<b>Differential Data Output Swing</b>		150		850	mV	
<b>Differential Data Output Swing When Squelched</b>				50	mV	
<b>Rise/Fall Time</b>		24			ps	

### Notes:

1. AC coupled inside the AOC module.
2. Input swing to trigger Tx\_Squelch.
3. User-selectable. Percentage is the ratio of pre-emphasis amplitude to output swing.

### Pin Descriptions (QSFP+ End)

Pin	Symbol	Name/Description	Notes
1	GND	Transmitter Ground (Common with Receiver Ground).	1
2	Tx2-	Transmitter Inverted Data Input.	
3	Tx2+	Transmitter Non-Inverted Data Input.	
4	GND	Transmitter Ground (Common with Receiver Ground).	1
5	Tx4-	Transmitter Inverted Data Input.	
6	Tx4+	Transmitter Non-Inverted Data Input.	
7	GND	Transmitter Ground (Common with Receiver Ground).	1
8	ModSelL	Module Select.	2
9	ResetL	Module Reset.	2
10	VccRx	+3.3V Receiver Power Supply.	
11	SCL	2-Wire Serial Interface Clock.	2
12	SDA	2-Wire Serial Interface Data.	2
13	GND	Transmitter Ground (Common with Receiver Ground).	1
14	Rx3+	Receiver Non-Inverted Data Output.	
15	Rx3-	Receiver Inverted Data Output.	
16	GND	Transmitter Ground (Common with Receiver Ground).	1
17	Rx1+	Receiver Non-Inverted Data Output.	
18	Rx1-	Receiver Inverted Data Output.	
19	GND	Transmitter Ground (Common with Receiver Ground).	1
20	GND	Transmitter Ground (Common with Receiver Ground).	1
21	Rx2-	Receiver Inverted Data Output.	
22	Rx2+	Receiver Non-Inverted Data Output.	
23	GND	Transmitter Ground (Common with Receiver Ground).	1
24	Rx4-	Receiver Inverted Data Output.	1
25	Rx4+	Receiver Non-Inverted Data Output.	
26	GND	Transmitter Ground (Common with Receiver Ground).	1
27	ModPrs1	Module Present.	
28	IntL	Interrupt.	2
29	VccTx	+3.3V Transmitter Power Supply.	
30	Vcc1	+3.3V Power Supply.	
31	LPMode	Low-Power Mode.	2
32	GND	Transmitter Ground (Common with Receiver Ground).	1
33	Tx3+	Transmitter Non-Inverted Data Input.	
34	Tx3-	Transmitter Inverted Data Input.	
35	GND	Transmitter Ground (Common with Receiver Ground).	1
36	Tx1+	Transmitter Non-Inverted Data Input.	
37	Tx1-	Transmitter Inverted Data Input.	
38	GND	Transmitter Ground (Common with Receiver Ground).	1

**Notes:**

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that, on the host board, requires a 4.7kΩ to 10kΩ pull-up resistor to the Host\_Vcc.

**Electrical Pin-Out Details (QSFP+ End)**

Pin	Signal	Card Edge	Pin	Signal	Card Edge
38	GND			GND	1
37	TX1n			TX2n	2
36	TX1p			TX2p	3
35	GND			GND	4
34	TX3n			TX4n	5
33	TX3p			TX4p	6
32	GND			GND	7
31	LPMode			ModSelL	8
30	Vcc1			ResetL	9
29	VccTx			VccRx	10
28	IntL			SCL	11
27	ModPrsL			SDA	12
26	GND			GND	13
25	RX4p			RX3p	14
24	RX4n			RX3n	15
23	GND			GND	16
22	RX2p			RX1p	17
21	RX2n			RX1n	18
20	GND			GND	19

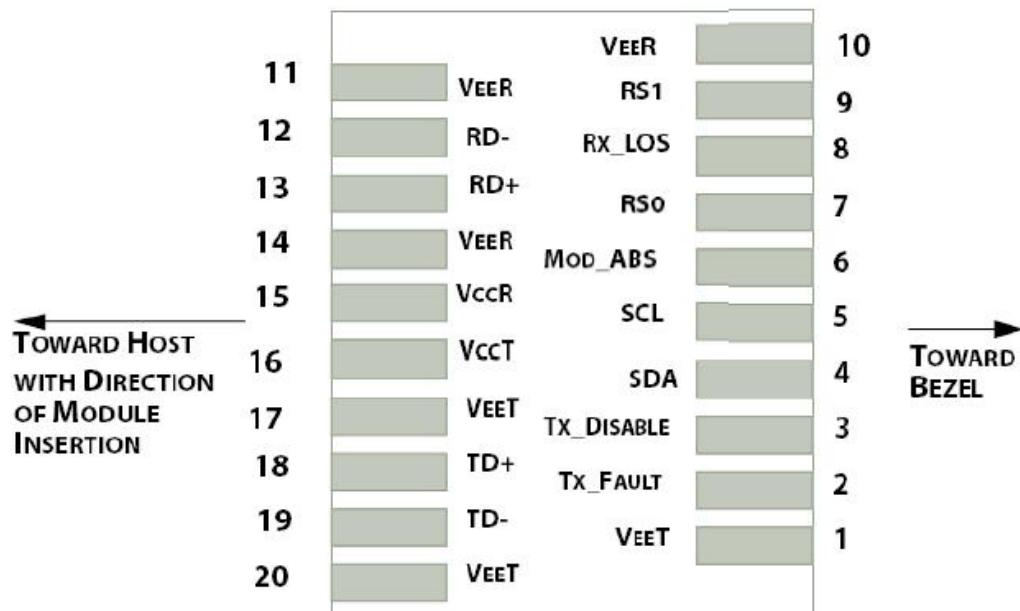
### Pin Descriptions (SFP+ End)

Pin	Symbol	Name/Description	Notes
<b>1</b>	VeeT	Transmitter Ground.	1
<b>2</b>	Tx_Fault	Transmitter Fault. LVTTL-O. "High" indicates a fault condition.	2
<b>3</b>	Tx_Disable	Transmitter Disable. LVTTL-I. "High" or "open" disables the transmitter.	3
<b>4</b>	SDA	2-Wire Serial Interface Data. LVCMOS-I/O. MOD_DEF2.	4
<b>5</b>	SCL	2-Wire Serial Interface Clock. LVCMOS-I/O. MOD_DEF1.	4
<b>6</b>	MOD_ABS	Module Absent. Output. Connected to the VeeT or VeeR in the module.	5
<b>7</b>	RS0	Rate Select 0. Not used. Presents high input impedance.	
<b>8</b>	Rx_LOS	Receiver Loss of Signal. LVTTL-O.	2
<b>9</b>	RS1	Rate Select 1. Not used. Presents high input impedance.	
<b>10</b>	VeeR	Receiver Ground.	1
<b>11</b>	VeeR	Receiver Ground.	1
<b>12</b>	RD-	Inverse Received Data Out. CML-O.	
<b>13</b>	RD+	Receiver Data Out. CML-O.	
<b>14</b>	VeeR	Receiver Ground.	
<b>15</b>	VccR	+3.3V Receiver Power.	
<b>16</b>	VccT	+3.3V Transmitter Power.	
<b>17</b>	VeeT	Transmitter Ground.	1
<b>18</b>	TD+	Transmitter Data In. CML-I.	
<b>19</b>	TD-	Inverse Transmitter Data In. CML-I.	
<b>20</b>	VeeT	Transmitter Ground.	1

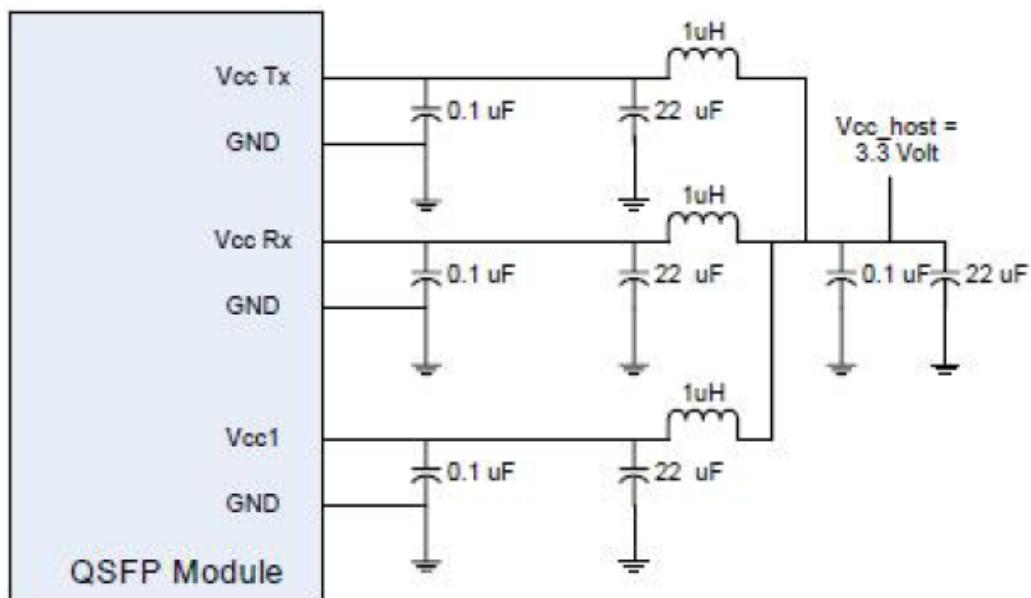
#### Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that, on the host board, requires a  $4.7\text{k}\Omega$  to  $10\text{k}\Omega$  pull-up resistor to the Host\_Vcc.
3. This input is internally biased high with a  $4.7\text{k}\Omega$  to  $10\text{k}\Omega$  pull-up resistor to the VccT.
4. 2-wire serial interface clock and data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that, on the host board, requires a  $4.7\text{k}\Omega$  to  $10\text{k}\Omega$  pull-up resistor to the Host\_Vcc.

## Electrical Pin-Out Details (SFP+ End)



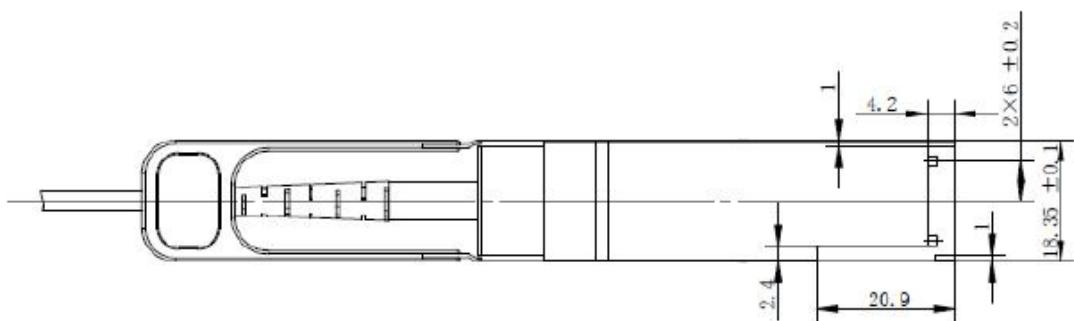
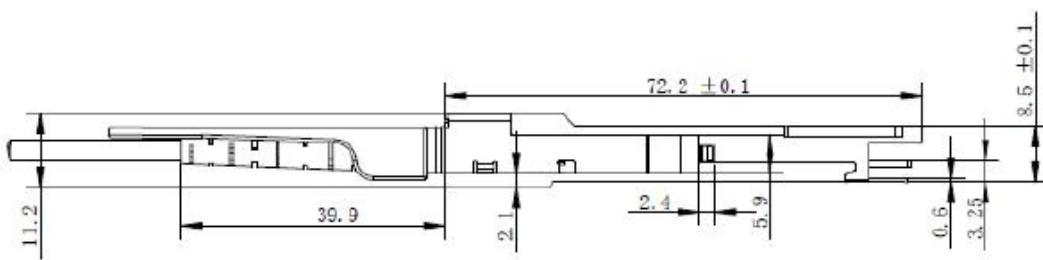
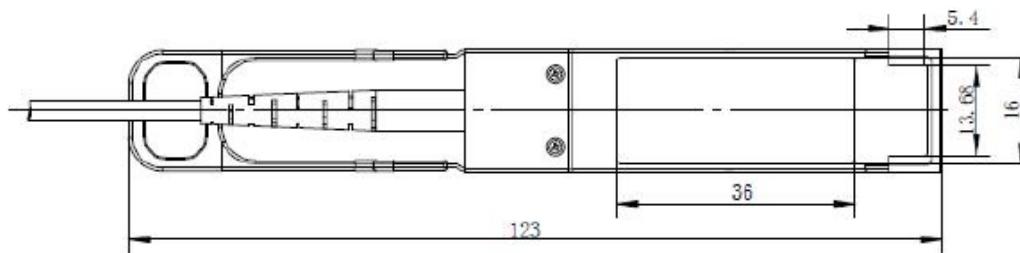
## Application Interface Circuit



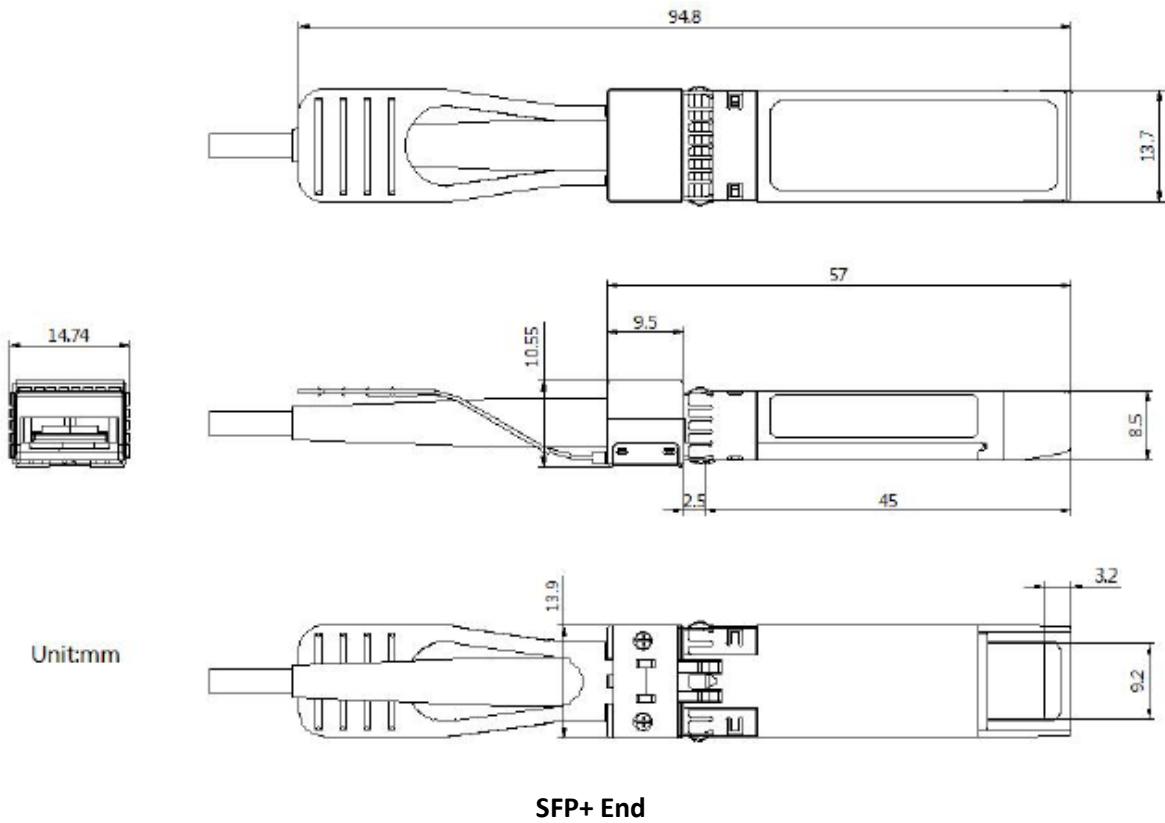
## Active Optical Cable Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
AOC Cable Length (L1 ≤ 5m)	L1	L - 0.06	L	L + 0.06	M
AOC Cable Length (L1 > 5m)	L1	L*95%	L	L*105%	M
AOC Cable Length of Branch (L2 ≤ 3m)	L2	L - 0.06	L	L + 0.06	M
Module Retention		90		170	N
Module Insertion		0		18	N
Module Extraction		0		25	N
Cable Pull Strength - Apply Load at 0°		25			N
Cable Pull Strength - Apply Load at 90°		20			N
Cable Bending Radius		30			mm
Insertion/Removal Cycles		50			cycles

## Mechanical Specifications



QSFP+ End



## About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

## A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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