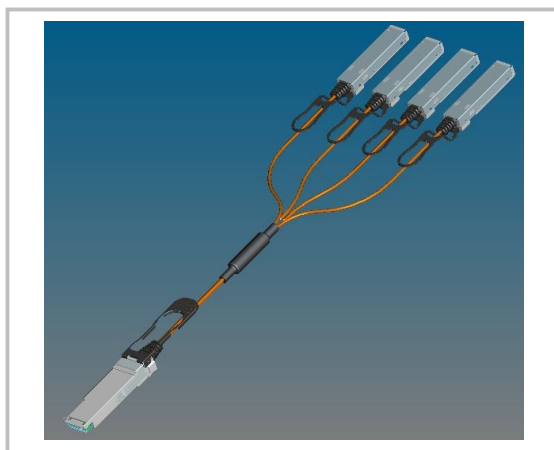


QSFP+ to 4xSFP+ 40G AOC

AKOA9NxxADLN0721



Applications

- ❑ 40Gb/s Ethernet 40GBASE-SR4
- ❑ Infiniband QDR and DDR interconnects
- ❑ Proprietary multi-channel links

Features

- ❑ QSFP+ to 4xSFP+ AOC type transceiver
- ❑ 850nm VCSEL Laser
- ❑ 40Gb/s aggregated bidirectional data throughput
- ❑ 1m, 2m,3m, 5m,7m, 10m, 15m, 20m transmission with MMF
- ❑ 3.3V single power supply
- ❑ Low power consumption of max 1.5 W at QSFP+ side. Power Level 1 compliant.
- ❑ Low power consumption of max 1.041 W at SFP+ side total.
- ❑ Infiniband 4x QDR / 40G Base-SR4
- ❑ Serial ID information support
- ❑ Compliant with QSFP+ MSA SFF-8436 and SFP+ MSA SFF-8432
- ❑ Compliant with RoHS
- ❑ Compliant with UL & TUV

Ordering Information

Form Factor	Date Rate	Media	Distance	Wavelength (nm)	Voltage (V)	Coupling	DDM (Y/N)	Temperature (°C)	Part Number
QSFP+ to 4xSFP+	40G	MMF	1M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N01ADLN0721
QSFP+ to 4xSFP+	40G	MMF	2M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N02ADLN0721
QSFP+ to 4xSFP+	40G	MMF	3M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N03ADLN0721
QSFP+ to 4xSFP+	40G	MMF	5M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N05ADLN0721
QSFP+ to 4xSFP+	40G	MMF	7M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N07ADLN0721
QSFP+ to 4xSFP+	40G	MMF	10M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N10ADLN0721
QSFP+ to 4xSFP+	40G	MMF	15M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N15ADLN0721
QSFP+ to 4xSFP+	40G	MMF	20M	850	3.3	AC/AC	Y	0 ~ +70	AKOA9N20ADLN0721


QSFP+ to 4xSFP+ 40G AOC
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Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	TS	-40	+85	°C
Power Case Temperature	Tc	0	70	°C
Storage Relative Humidity	RH	5	85	%
Supply Voltage	VCC ₁ / VCCT _x / VCC _{Rx}	-0.5	3.6	V

- Limited by the fiber cable jacket, not the active ends
- Non-condensing

Electrical Characteristics for QSFP+ side (T_c = 0 to 70 °C, V_{CC} = 3.135 to 3.465 Volts)

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VCC ₁ / VCC _{Tx} / VCC _{Rx}	3.13	3.3	3.47	V
Supply Current	ICC	--	--	420	mA
Transmitter					
Data Input Differential Peak-to Peak Voltage Swing(AC-Coupled)	V _{in,pp}	200	--	1200	mVpp
LOS Assert Threshold	V _{in,pp} LOS	120	--	--	mV
Receiver					
Data Output Differential Peak-to Peak Voltage Swing(AC-Coupled)	ΔV _{DO pp}	340	--	650	mVpp

- Measured with PRBS 2³¹ -1 at 10⁻¹² BER

Electrical Characteristics for SFP+ side (T_c = 0 to 70 °C, V_{CC} = 3.135 to 3.465 Volts)

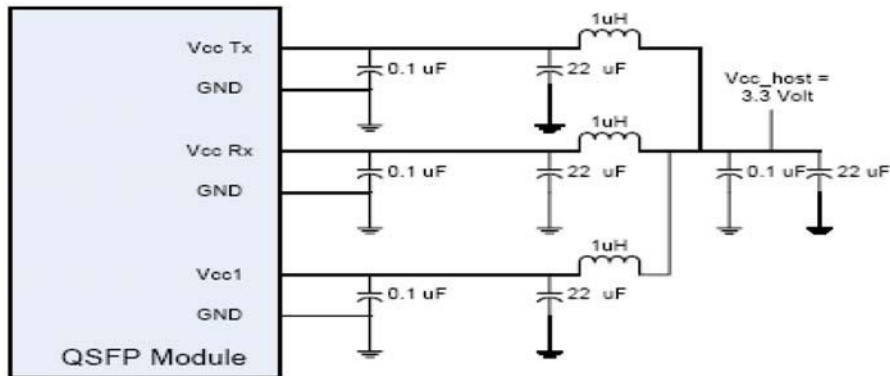
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VCC ₁ / VCC _{Tx} / VCC _{Rx}	3.13	3.3	3.47	V
Supply Current (each)	ICC	--	--	75	mA
Transmitter					
Differential Input Impedance	R _{DI}	90	100	110	ohm
Data Input Differential Peak-to Peak Voltage Swing	V _{DI}	270	--	1200	mVpp
Receiver					
Differential Output Impedance	R _{DO}	90	100	110	ohm
Data Output Differential Peak-to Peak Voltage Swing(AC-Coupled)	V _{DO}	330	--	510	mVpp
Jitter Tolerance	--	--	0.6	--	UI
Rise / Fall Time	--	24	--	--	ps

- Measured with PRBS 2³¹ -1 at 10⁻¹² BER

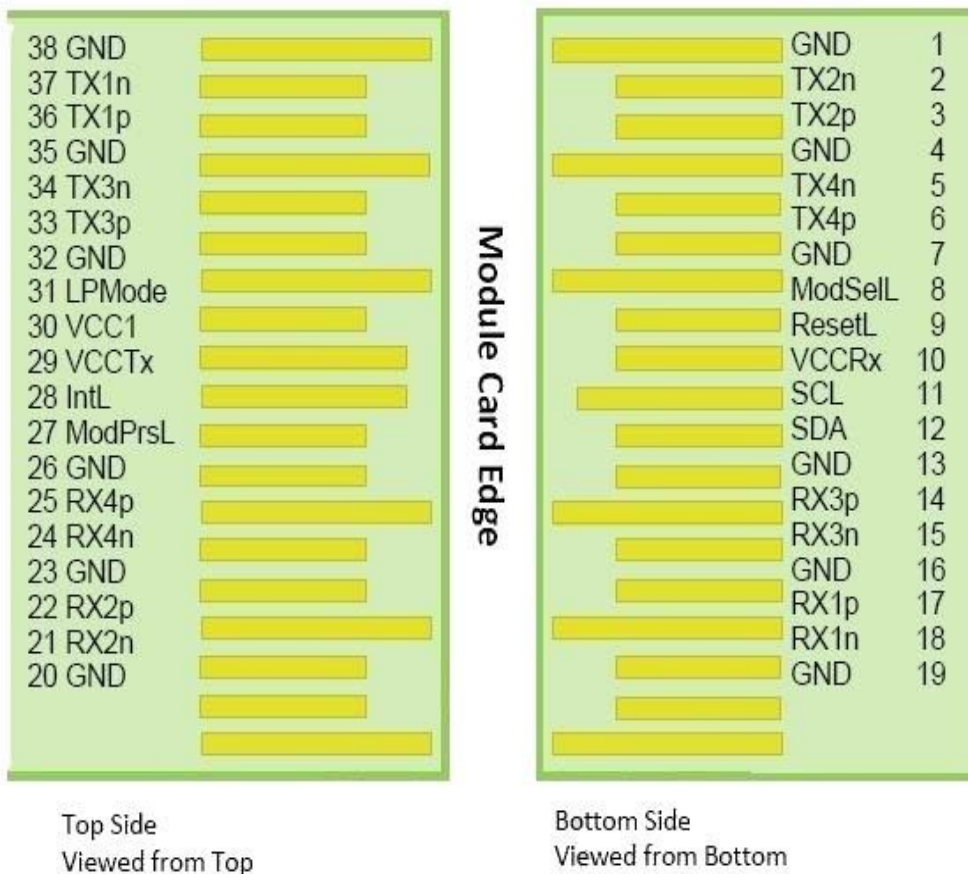
QSFP+ to 4xSFP+ 40G AOC

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Recommended Host Board Power Supply Circuit Filter for QSFP+ side



Pin Description for QSFP+ side




QSFP+ to 4xSFP+ 40G AOC
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Pin Function Definitions for QSFP+ side

Pin No.	Pin Name	Symbol	Function/Description	Plug Sequence	Note
1	GND	Ground		1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4	GND	Ground		1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7	GND	Ground		1	1
8	LVTTL-I	ModSelL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10	Vcc Rx	Rx	+3.3V Power Supply Receiver	2	2
11	LVCMOSI/O	SCL	2-wire serial interface clock	3	
12	LVCMOSI/O	SDA	2-wire serial interface data	3	
13	GND	Ground		1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16	GND	Ground		1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19	GND	Ground		1	1
20	GND	Ground		1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23	GND	Ground		1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26	GND	Ground		1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL	Interrupt	3	
29	Vcc Tx	Tx	+3.3V Power supply transmitter	2	2
30	Vcc 1	+3.3V	+3.3V Power supply	2	2
31	LVTTL-I	LPMode	Low Power Mode	3	
32	GND	Ground		1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35	GND	Ground		1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38	GND	Ground		1	1



QSFP+ to 4xSFP+ 40G AOC

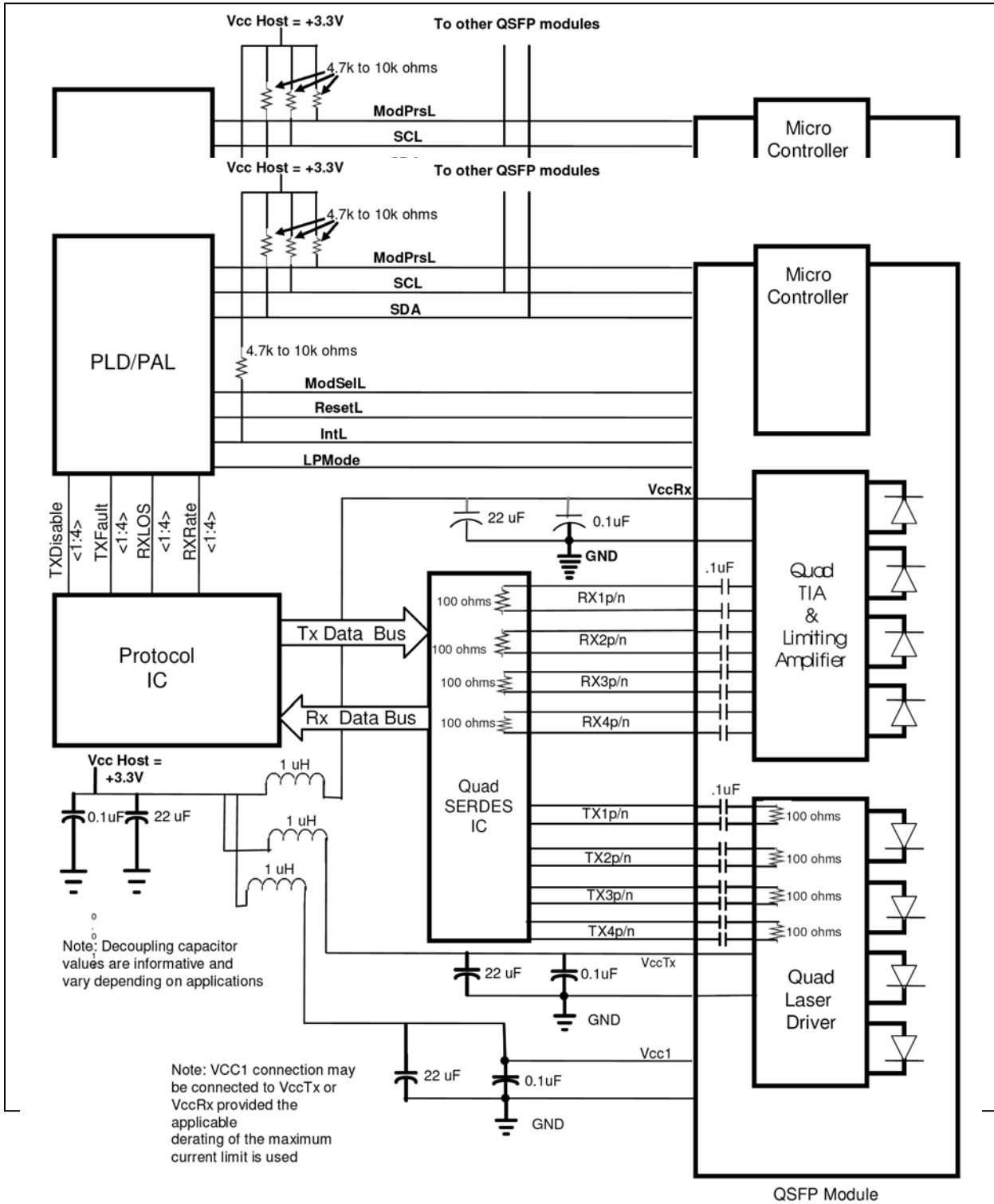
AKOA9NxxADLN0721

-
1. GND is the symbol for signal and supply (power) common for the QSFP+ module. 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.
 2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in Table 6. Recommended host board power supply filtering is shown in Figure 4. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP+ Module module in any combination. The connector pins are each rated for a maximum current of 500 mA. This contact is an input contact with a 4.7 k Ω to 10k Ohms pull up to VccT inside the module.

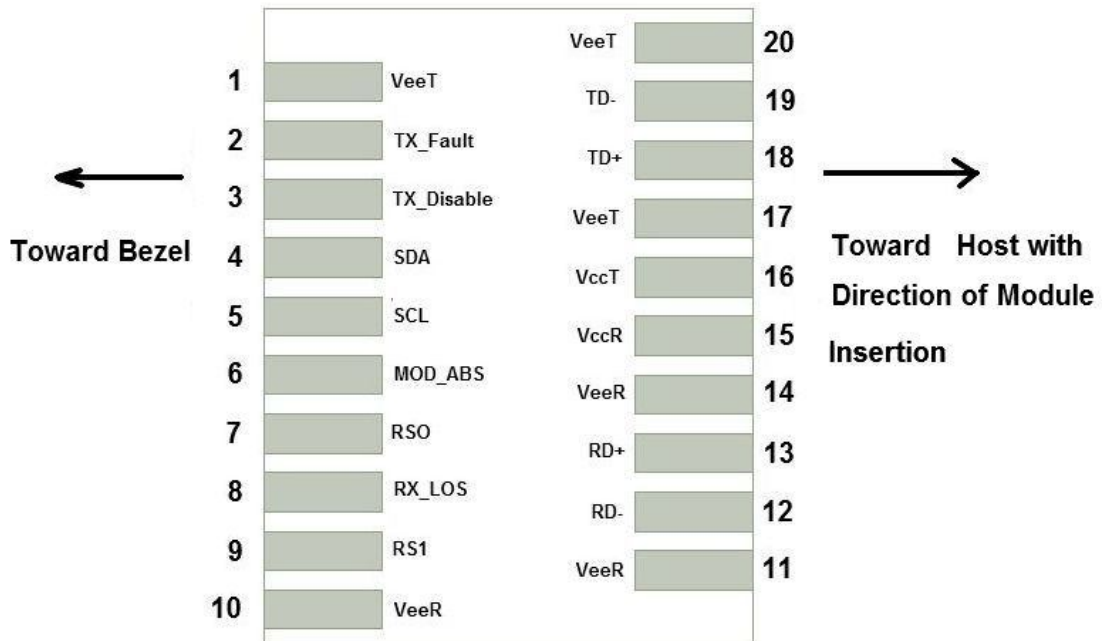
QSFP+ to 4xSFP+ 40G AOC

AKO9NxxADLN0721

Recommended Interface Circuit for QSFP+ side



Pin Description for SFP+ side





Pin Function Definitions for SFP+ side

Pin No.	Pin Name	Function/Description	Power Sequence Order	Note
1	VeeT	Transmitter Ground	1	1
2	Tx_Fault	Not functional	3	2
3	Tx_Disable	Not functional	3	3
4	SDA	2-wire Serial Interface Data Line (MOD-DEF2)	3	4
5	SCL	2-wire Serial Interface Clock (MOD-DEF1)	3	4
6	Mod_ABS	Module Absent, connected to VeeT or VeeR in the module	3	4
7	RS0	Rate Select 0, (not functional)	3	
8	Rx_LOS	Not functional	3	2
9	RS1	Not functional	3	
10	VeeR	Receiver Ground	1	1
11	VeeR	Receiver Ground	1	1
12	RD-	Receiver Inverted Data Output	3	
13	RD+	Receiver Non-Inverted Data Output	3	
14	VeeR	Module Receiver Ground	1	1
15	VccR	Receiver 3.3 V Supply	2	
16	VccT	Transmitter 3.3 V Supply	2	
17	VeeT	Transmitter Ground	1	1
18	TD+	Transmitter Non-Inverted Data Input	3	
19	TD-	Transmitter Inverted Data Input	3	
20	VeeT	Transmitter Ground	1	1

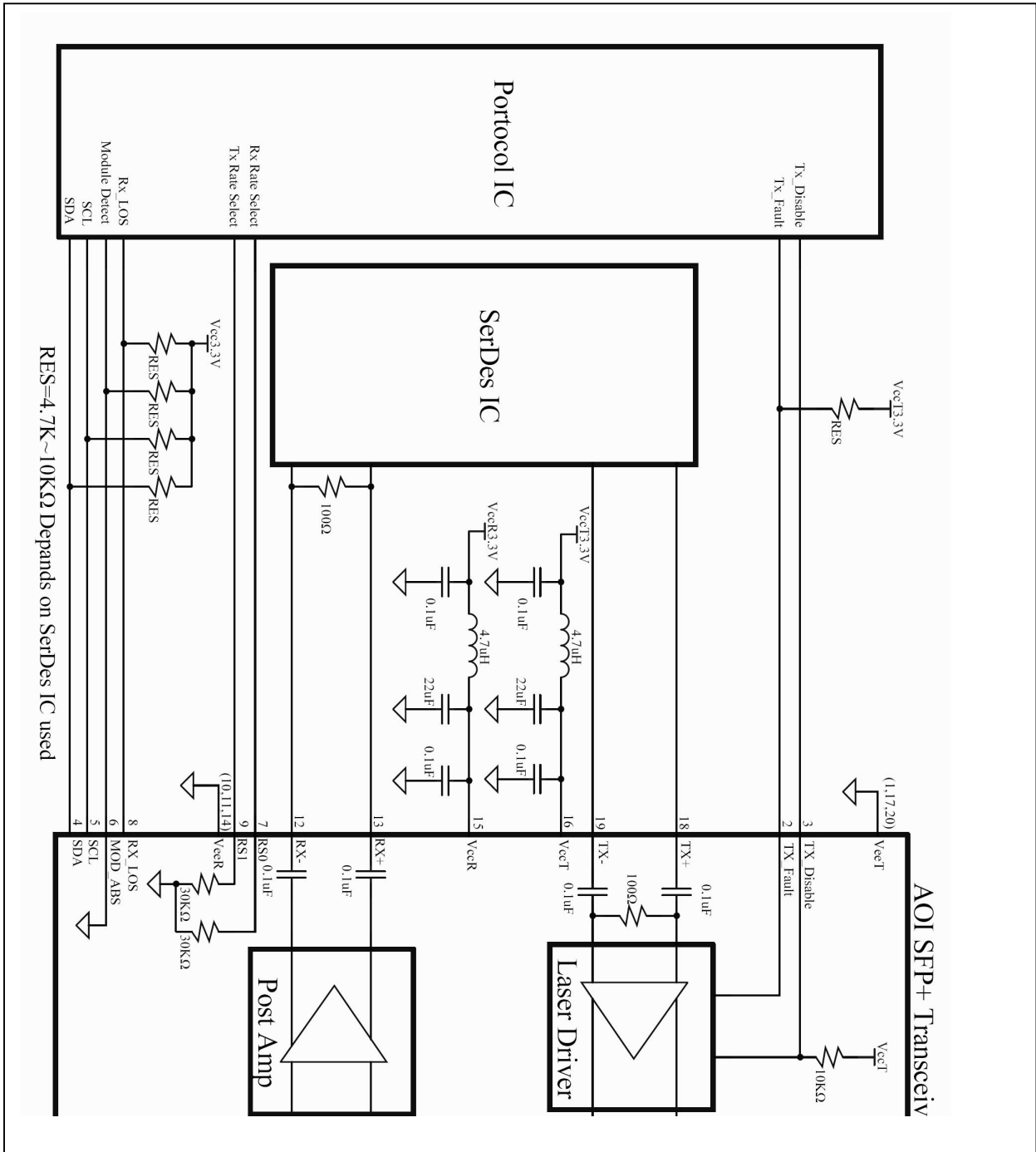
Notes:

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. This contact is an open collector/drain output contact and shall be pulled up with a 4.7k to 10k Ohms resistor to host_Vcc on the host board. Pull ups can be connected to one of several power supplies, however the host board design shall ensure that no module contact has voltage exceeding module VccT/R + 0.5 V. Low for normal operation.
3. This contact is an input contact with a 4.7 kΩ to 10k Ohms pull up to VccT inside the module. Low for enable and High for disable.
4. This contact shall be pulled up with a 4.7k to 10k Ohms resistor to host_Vcc on the host board. Mod_ABS grounded by the module to indicate that the module is present. Mod_ABS grounded by the module to indicate that the module is present.

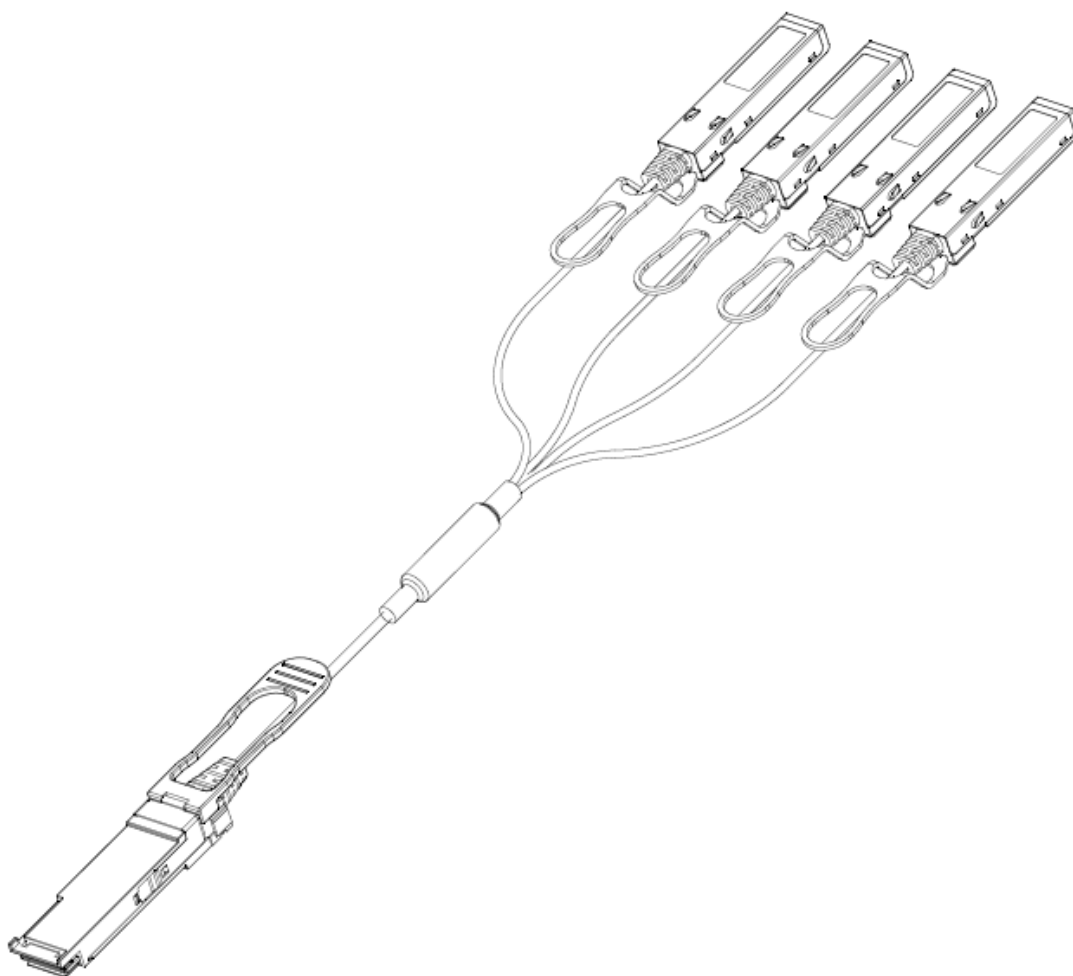
QSFP+ to 4xSFP+ 40G AOC

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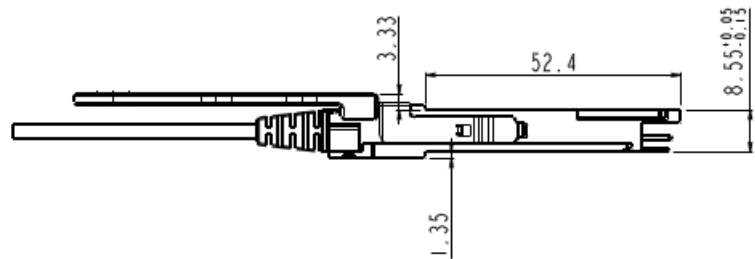
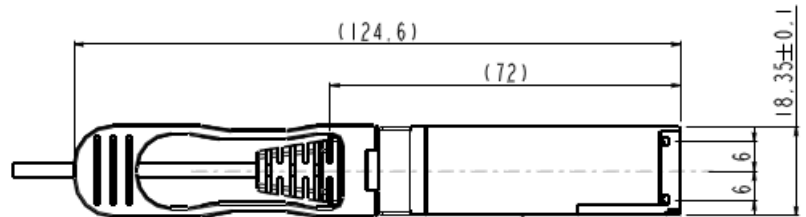
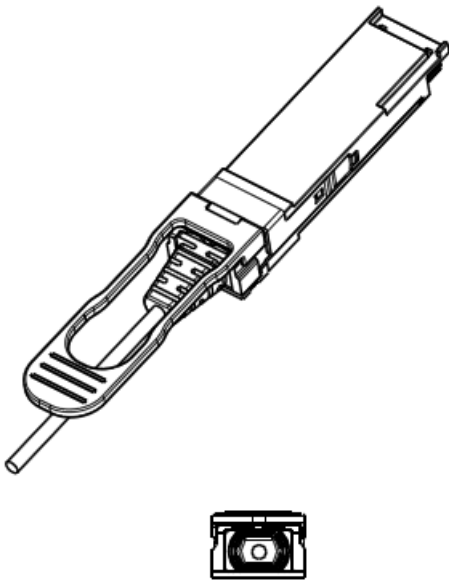
Recommended Interface Circuit for SFP+ side



Mechanical Diagram

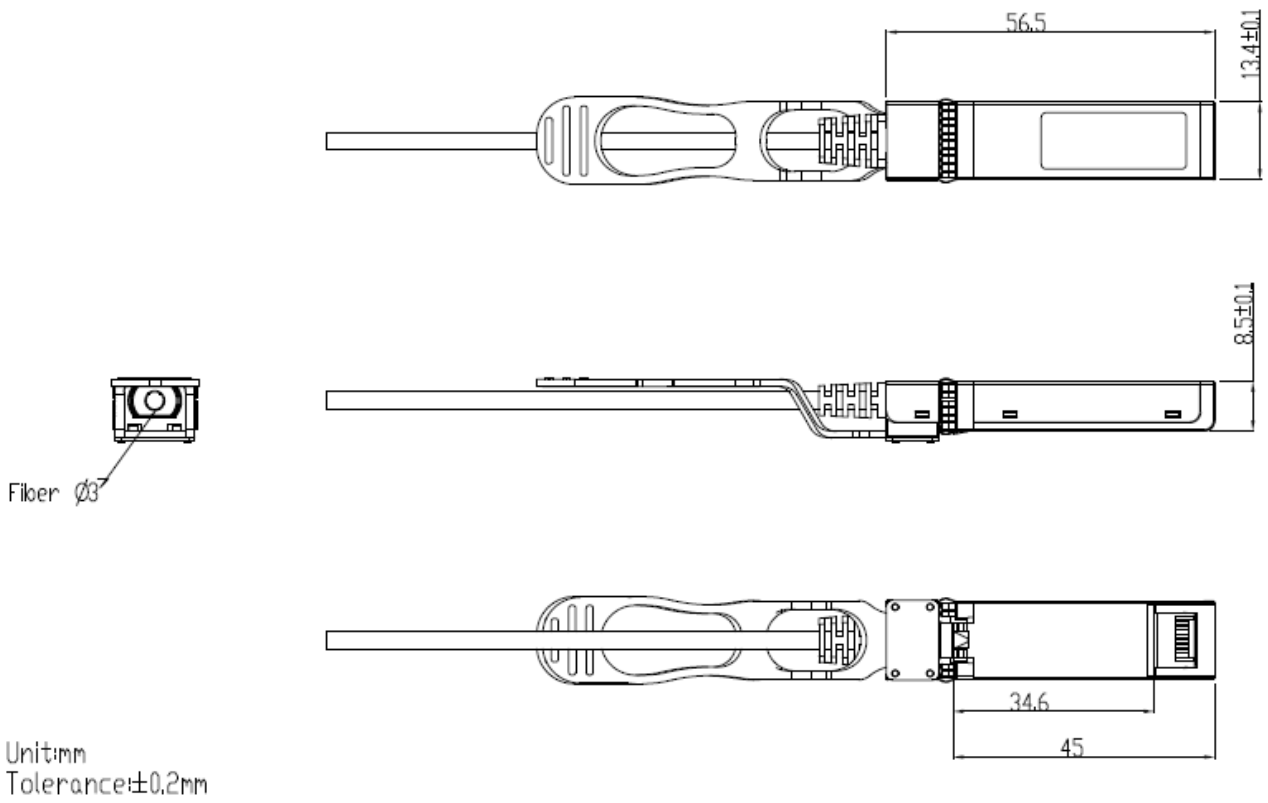


Mechanical Diagram (QSFP+ side)



UNIT: mm
TOLERANCE: ±0.2

Mechanical Diagram (SFP+ side)



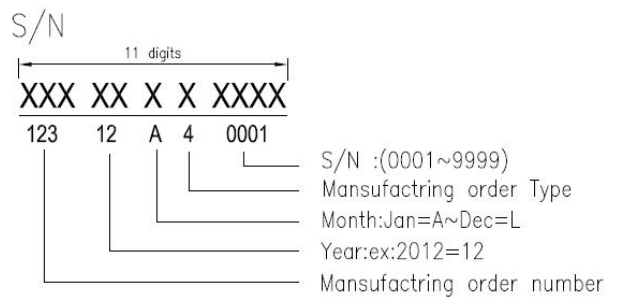
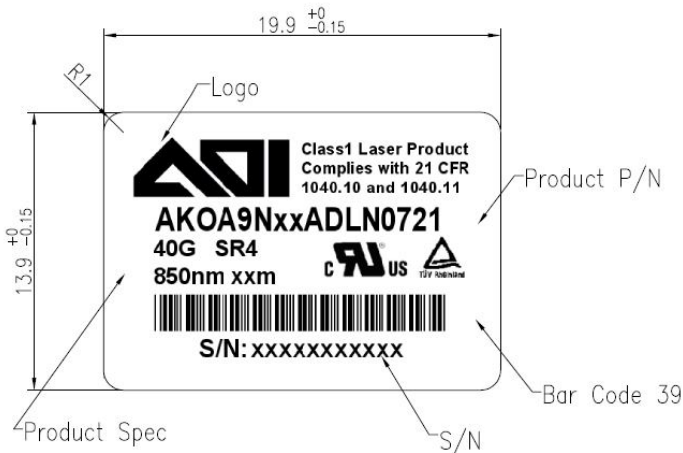


QSFP+ to 4xSFP+ 40G AOC

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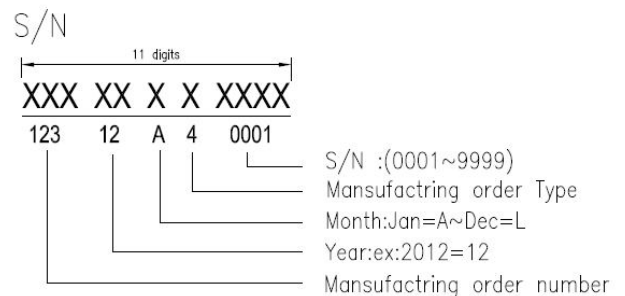
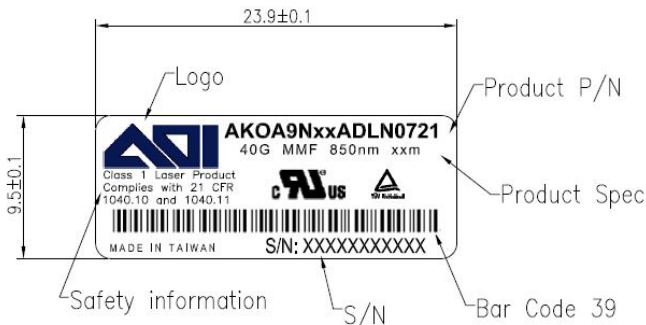
Module Label Diagram

QSFP+ side



Unit:mm

SFP+ side



Unit:mm



QSFP+ to 4xSFP+ 40G AOC

AKOA9NxxADLN0721

EEPROM Memory A0h contents Address

	AOI	AKOA9NxxADLN0721	J258	xxM
Add	Name of field	Description	ACSII	HEX
0	Identifier	03:SFP or SFP "Plus" Transceiver		03
1	Ext. Identifier	04:SFP Transceiver		04
2	Connector	0B:Optical pigtail		0B
3	Transceiver	10G Ethernet 10:10G Base-SR		10
4		SONET/SDH		00
5		SONET/SDH		00
6		Ethernet		00
7		Fiber Channel		00
8		Fiber Channel		00
9		Fiber Channel		00
10		Fiber Channel		00
11	Encoding	01:8B10B, 05:SONET, 06:64B/66B		06
12	BR, Nominal	100Mbps/unit -> HEX (67:10.3125G)		67
13	Rate Identifier	Rate Select		00
14	Length(9um)	1km /unit -> HEX		00
15	Length (9um)	100m /unit -> HEX		00
16	Length (50um), OM2	10m /unit -> HEX		00
17	Length (62.5um), OM1	10m /unit -> HEX		xx
18	Length (Copper)	1m /unit -> HEX		00
19	Length (50 um), OM3	10m /unit -> HEX		00
20	Vendor name	SFP Vendor Name (ASCII)	A	41
21			O	4F
22			I	49
23				20
24				20
25				20
26				20
27				20
28				20
29				20
30				20
31				20
32				20
33				20
34				20



QSFP+ to 4xSFP+ 40G AOC

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35				20
36	Reserved	Reserved		00
37	Vendor OUI	SFP Vendor IEEE company ID, No ID set "00"		00
38				00
39				00
40	Vendor PN	SFP Vendor Part Number (ASCII)	A	41
41			K	4B
42			O	4F
43			A	41
44			9	39
45			N	4E
46			x	xx
47			x	xx
48			A	41
49			D	44
50			L	4C
51			N	4E
52			0	30
53			7	37
54			2	32
55	1	31		
56	Vendor rev	Hardware Revision (HEX) Ver A	A	41
57				20
58		Firmware Revision (HEX) N/A		20
59			20	
60	Wavelength	1nm /unit -> HEX 0352:850nm		xx
61				xx
62	Reserved			xx
63	CC_BASE	Check Sum 0 to 62 byte		xx
64	Options			00
65		18:TX-DIS,TX_Fault 1A:TX-DIS,TX_Fault,RX-LOS		00
66	BR, max	1% /unit		00
67	BR, min	1% /unit		00
68	Vendor SN	Vendor SN (ASCII)		XX
69				XX
70				XX
71				XX
72				XX



QSFP+ to 4xSFP+ 40G AOC

AKOA9NxxADLN0721

73				XX
74				XX
75				XX
76				XX
77				XX
78				XX
79				XX
80				XX
81				XX
82				XX
83				XX
84	Date code	Year (ASCII)		XX
85				XX
86		Month (ASCII)		XX
87				XX
88		Day (ASCII)		XX
89				XX
90		Blank		20
91			20	
92	Diagnostic Monitoring Type	00:W/O DDM, 58:W/I DDM(Ext_Cal), 68:W/I DDM(Int_Cal)		00
93	Enhanced Options	E0:A/W, Tx_Dis, Tx_fault F0:A/W, Tx_Dis, Tx_fault, Rx_LOS B0:A/W, Tx_fault, Rx_LOS		00
94	SFF-8472 Compliance	01:9.3, 02:9.5 04:10.4 05:11.0		05
95	CC_EXT	Check Sum 64 to 94 byte		XX
96	Read-only	Vendor name : AOI (PM suggest)	A	41
97			O	4F
98			I	49
99				20
100				20
101			w	xx
102			x	xx
103			y	xx
104			z	xx
105				00
106			00	
107		Reserved		00
108				00
109				00



QSFP+ to 4xSFP+ 40G AOC

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110				00
111				00
112				00
113				00
114				00
115				00
116				00
117				00
118				00
119				00
120				00
121				00
122				00
123				00
124				00
125				00
126				00
127				00
128-255	Read-only	Read-only		00



Regulatory Compliance

Item	Standard
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
ESD (Module case)	Contact Discharge EN61000-4-2 criterion B
ESD (Module case)	Air Discharge EN61000-4-2 criterion B
ESD (Electrical connector)	JEDEC JESD22-A114-B
RoHS	2011/65/EU
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11
Component Recognition	UL and TUV

Laser Safety Information

All versions of this laser are Class 1 laser products per IEC¹/EN² 60825-1. Users should observe safety precautions such as those recommended by ANSI³ Z136.1, ANSI Z36.2 and IEC 60825-1.

This product conforms to FDA (CDRH) 21 CFR 1040.10 and 1040.11 except for deviations of laser safety class designation pursuant to ['Laser Notice No.50'](#).

Product labeling:

Class 1 Laser Product
Compliance with 21 CFR
1040.10 and 1040.11

If labeling is not affixed to the module due to size constraints; then rather, labeling is placed on the outside of the shipping box.

This product is not shipped with a power supply.

Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Certifications

UL	60950-1 (E243407)
TUV	EN60950-1, EN 60825-1, EN 60825-2

Documentation is available upon request.

(1) IEC is a registered trademark of the International Electrotechnical Commission

(2) Within Europe the IEC standard has been adopted as a European Normative standard known as EN 60825, and each European country will have its own version of this standard, for example, the British Standards version known as BS EN 60825. There can be small differences between the different countries versions of EN 60825, and these are in part caused by the process of translating the standard into the native language of that country.

(3) ANSI is a registered trademark of the American National Standards Institute

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