

## QSFP+ AOC 40G MMF 850nm Transceiver

AQOA9NxxADLN0720



### Applications

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

### Features

- QSFP Type AOC Transceiver
- 850nm VCSEL Laser
- 40Gb/s aggregated bidirectional data throughput
- 1m-40m transmission with MMF
- 3.3V single power supply
- Low power consumption of max 1.5 W single transceiver  
Power Level 1 compliant
- Cable material: PVC
- Infiniband 4x QDR / 40G Base-SR4
- Serial ID information support
- Compliant with QSFP+ MSA SFF-8436
- 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+ AOC	40G	MMF	1m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N01ADLN0720
QSFP+ AOC	40G	MMF	1.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N1AADLN0720
QSFP+ AOC	40G	MMF	2m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N02ADLN0720
QSFP+ AOC	40G	MMF	2.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N2AADLN0720
QSFP+ AOC	40G	MMF	3m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N03ADLN0720
QSFP+ AOC	40G	MMF	3.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N3AADLN0720
QSFP+ AOC	40G	MMF	4m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N04ADLN0720
QSFP+ AOC	40G	MMF	4.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N4AADLN0720
QSFP+ AOC	40G	MMF	5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N05ADLN0720



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QSFP+ AOC	40G	MMF	5.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N5AADLN0720
QSFP+ AOC	40G	MMF	6m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N06ADLN0720
QSFP+ AOC	40G	MMF	6.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N6AADLN0720
QSFP+ AOC	40G	MMF	7m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N07ADLN0720
QSFP+ AOC	40G	MMF	7.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N7AADLN0720
QSFP+ AOC	40G	MMF	8m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N08ADLN0720
QSFP+ AOC	40G	MMF	8.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N8AADLN0720
QSFP+ AOC	40G	MMF	9m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N09ADLN0720
QSFP+ AOC	40G	MMF	9.5m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N9AADLN0720
QSFP+ AOC	40G	MMF	10m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N10ADLN0720
QSFP+ AOC	40G	MMF	11m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N11ADLN0720
QSFP+ AOC	40G	MMF	12m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N12ADLN0720
QSFP+ AOC	40G	MMF	13m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N13ADLN0720
QSFP+ AOC	40G	MMF	14m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N14ADLN0720
QSFP+ AOC	40G	MMF	15m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N15ADLN0720
QSFP+ AOC	40G	MMF	16m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N16ADLN0720
QSFP+ AOC	40G	MMF	17m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N17ADLN0720
QSFP+ AOC	40G	MMF	18m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N18ADLN0720
QSFP+ AOC	40G	MMF	19m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N19ADLN0720
QSFP+ AOC	40G	MMF	20m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N20ADLN0720
QSFP+ AOC	40G	MMF	21m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N21ADLN0720
QSFP+ AOC	40G	MMF	22m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N22ADLN0720
QSFP+ AOC	40G	MMF	23m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N23ADLN0720
QSFP+ AOC	40G	MMF	24m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N24ADLN0720
QSFP+ AOC	40G	MMF	25m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N25ADLN0720
QSFP+ AOC	40G	MMF	26m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N26ADLN0720



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QSFP+ AOC	40G	MMF	27m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N27ADLN0720
QSFP+ AOC	40G	MMF	28m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N28ADLN0720
QSFP+ AOC	40G	MMF	29m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N29ADLN0720
QSFP+ AOC	40G	MMF	30m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N30ADLN0720
QSFP+ AOC	40G	MMF	31m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N31ADLN0720
QSFP+ AOC	40G	MMF	32m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N32ADLN0720
QSFP+ AOC	40G	MMF	33m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N33ADLN0720
QSFP+ AOC	40G	MMF	34m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N34ADLN0720
QSFP+ AOC	40G	MMF	35m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N35ADLN0720
QSFP+ AOC	40G	MMF	36m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N36ADLN0720
QSFP+ AOC	40G	MMF	37m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N37ADLN0720
QSFP+ AOC	40G	MMF	38m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N38ADLN0720
QSFP+ AOC	40G	MMF	39m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N39ADLN0720
QSFP+ AOC	40G	MMF	40m	850	3.3	AC/AC	Y	0 ~ +70	AQOA9N40ADLN0720



### Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T <sub>s</sub>	-40	+85	°C
Power Case Temperature	T <sub>c</sub>	0	70	°C
Storage Relative Humidity	RH	5	85	%
Supply Voltage	VCC <sub>I</sub> / VCC <sub>Tx</sub> / VCC <sub>Rx</sub>	-0.5	3.6	V

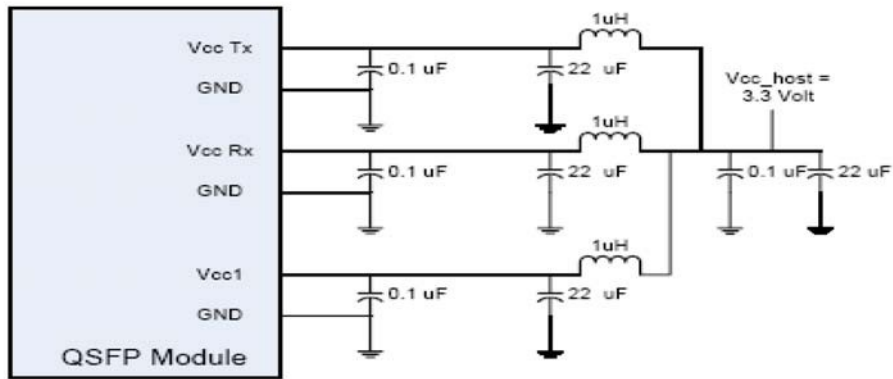
- Limited by the fiber cable jacket, not the active ends
- Non-condensing

### Electrical Characteristics (T<sub>c</sub> = 0 to 70 °C, V<sub>CC</sub> = 3.135 to 3.465 Volts)

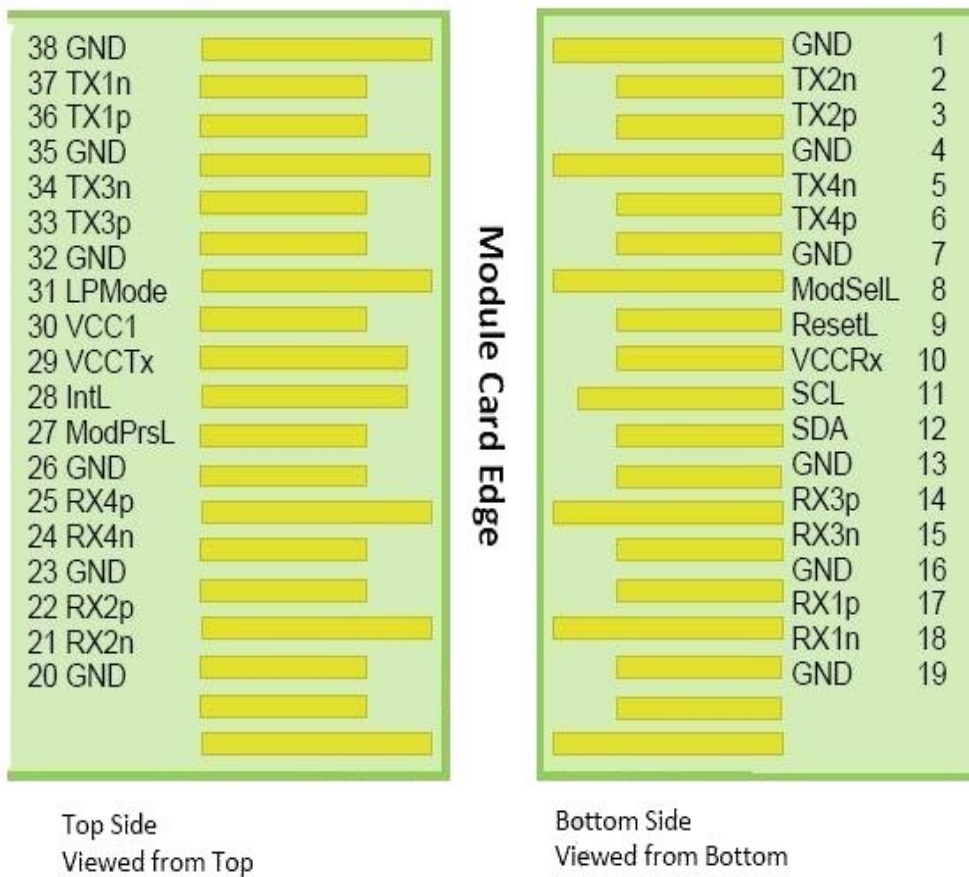
Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	VCC <sub>I</sub> / VCC <sub>Tx</sub> / VCC <sub>Rx</sub>	3.13	3.3	3.47	V
Supply Current	ICC	--	--	420	mA
<b>Transmitter Electrical Characteristics</b>					
Data Input Differential Peak-to Peak Voltage Swing	V <sub>in,pp</sub>	200	--	1200	mVpp
LOS Assert Threshold	V <sub>in,pp</sub> LOS	120	--	--	mV
<b>Receiver Electrical Characteristics</b>					
Data Output Differential Peak-to Peak Voltage Swing(AC-Coupled)	ΔVDO <sub>pp</sub>	340	--	650	mVpp

- Measured with PRBS 2<sup>31</sup> -1 at 10<sup>-12</sup> BER

Recommended Host Board Power Supply Circuit Filter



Pin Description



## Pin Function Definitions

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	Vcc1	+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



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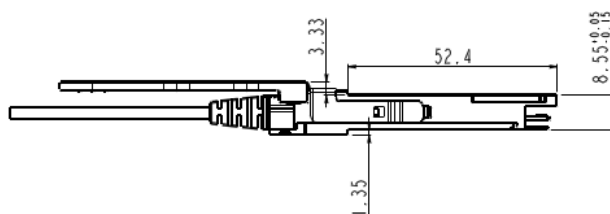
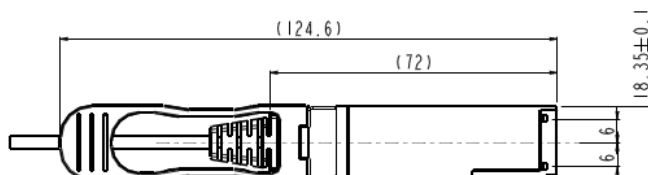
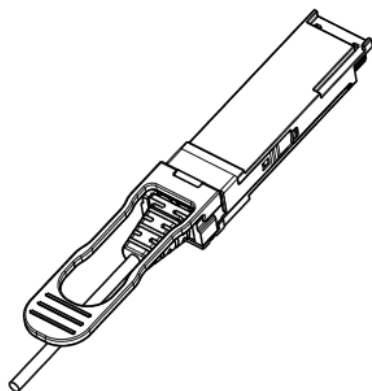
1. GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. Vcc Rx, Vcc1 and Vcc Tx are the 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 $\Omega$  to 10k Ohms pull up to VccT inside the module.





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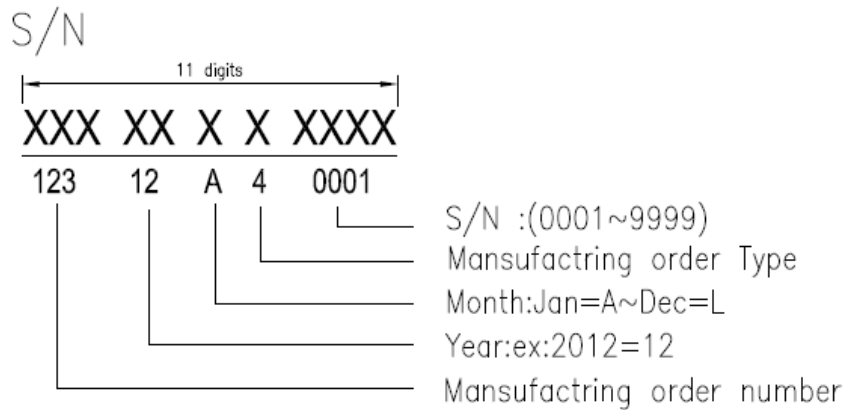
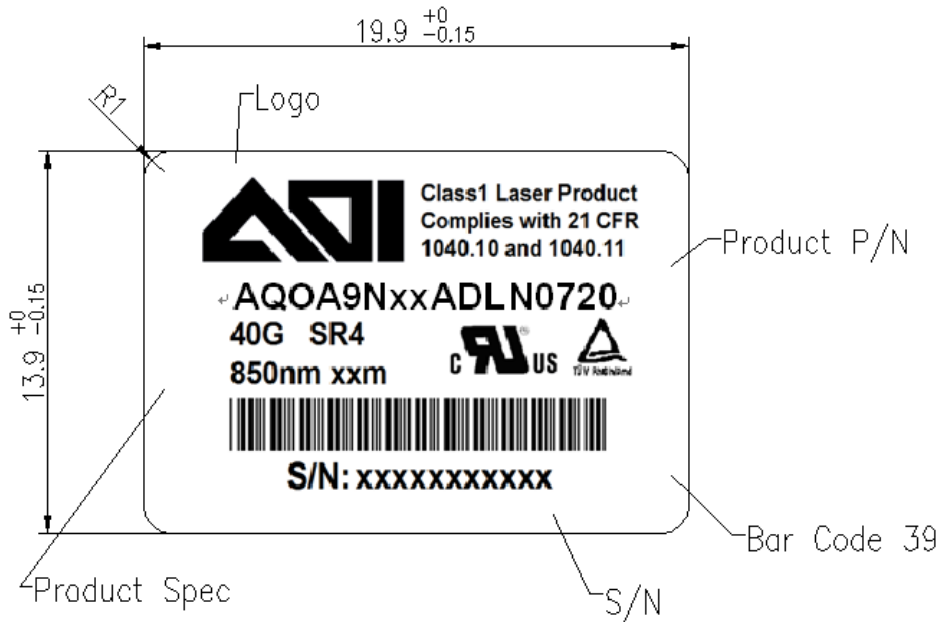
Mechanical Diagram



UNIT: mm  
TOLERANCE: ±0.2

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Module Label Diagram





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EEPROM Memory contents Address A0h

	AOI	AQOA9NxxADLN0720	BA130	1
Add	Name of field	Description	ACSII	HEX
128	Identifier	0D:QSFP+		0D
129	Ext. Identifier	QSFP Transceiver ,00: Power Max 1.5W		00
130	Connector	0B:Optical Pigtail		0B
131	Transceiver	10G/40G Ethernet 04: 40G BASE-SR4		04
132		SONET Compliance codes		00
133		SAS/SATA compliance codes		00
134		Gigabit Ethernet compliance codes		00
135		Fiber Channel Compliant codes		00
136		Fiber Channel link length		00
137		Fiber Channel transmission media		00
138		Fiber Channel Speed		00
139	Encoding	05: 64B/66B,		05
140	BR, Nominal	100Mbps/unit -> HEX 67: 10.3125G / each channel		67
141	Ext. RateSelect	bit7-1:0 reserved bit0:0 no QSFP+ Rate Select (see Table 35)		00
142	Length(9um, SMF)	1km /unit -> HEX		00
143	Length (50um, OM3)	2m /unit -> HEX (21~40M)		00
144	Length (50um, OM2)	1m /unit -> HEX		00
145	Length (62.5um, OM1)	1m /unit -> HEX (2~20M)		XX
146	Length (Copper)	1m /unit -> HEX		00
147	Device Tech	Device technology (see Table 36,37)		00
148	Vendor name	QSFP Vendor Name (ASCII)	A	41
149			O	4F
150			I	49
151				20
152				20
153				20
154				20
155				20
156				20
157				20
158				20
159				20
160				20
161				20



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162				20
163				20
164	Ext. Transceiver	Ext. Transceiver (see Table 38) 06:QDR / DDR		06
165	Vendor OUI	SFP Vendor IEEE company ID, No ID set "00"		00
166				00
167				00
168	Vendor PN	SFP Vendor Part Number (ASCII)	A	41
169			Q	51
170			O	4F
171			A	41
172			9	39
173			N	4E
174			x	XX
175			x	XX
176			A	41
177			D	44
178			L	4C
179			N	4E
180			0	30
181			7	37
182			2	32
183			0	30
184	Vendor rev	Hardware Revision (HEX) Ver A	A	41
185				20
186	Wavelength	Nominal laser wavelength (Wavelength = value / 20 in nm) 4268:850nm		42
187				68
188	Wavelength Tolerance	Guaranteed range of laser wavelength (+/- value) from Nominal wavelength. (Wavelength Tol. = value/200 in nm) 07D0:10nm		07
189				D0
190	Max Case Temp	Maximum Case Temperature 46:70°C		46
191	CC_BASE	Check Sum (128-190)		XX
192	Options (see Table 39)	Reserved		00
193		Reserved bit0:0 no RX Output amplitude programming		00
194		bit7-4:0 reserved bit3:0 no Rx Squelch Disable implemented bit2:0 no Rx Output Disable implemented bit1:0 no Tx Squelch Disable implemented bit0:0 no Tx Squelch implemented		00

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195		bit7:1 memory page02 bit6:0 no memory page01 bit5:0 no RATE_SELECT bit4:1 TX_DISABLE bit3:1 TX_FAULT bit2:0 no TX Squelch bit1:0 no TX Loss bit0:0 reserved		98
196	Vendor SN	Vendor SN (ASCII)		XX
197				XX
198				XX
199				XX
200				XX
201				XX
202				XX
203				XX
204				XX
205				XX
206				XX
207				XX
208				XX
209				XX
210		XX		
211		XX		
212	Date code	Year (ASCII)		XX
213				XX
214		Month (ASCII)		XX
215				XX
216		Day (ASCII)		XX
217				XX
218		Blank		20
219			20	
220	Diagnostic Monitoring Type	bit3:1 = Average power / 0 = OMA others:0 reserve (see Table 41)		08
221	Enhanced Options	bit7-4:0 reserved bit3:0 no Rate Select bit2:0 no Application select bit1-0:0 reserved (see Table 42)		00
222	Reserved	Reserved		00
223	CC_EXT	Check Sum 64 to 94 byte		XX
224	Read-only	Vendor name : AOI (PM suggest)	A	41
225			O	4F
226			I	49



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227				20
228				20
229			w	XX
230		Define cable length, unit: 0.1mEX: 123.4m (wxy.z)w=0x01, x=0x02, y=0x03, z=0x04	x	XX
231			y	XX
232			z	XX
233				00
234			00	
235			00	
236			00	
237			00	
238			00	
239			00	
240			00	
241			00	
242			00	
243			00	
244			00	
245			00	
246			00	
247			00	
248			00	
249			00	
250			00	
251			55	
252		FW Check sum	1D	
253			E2	
254	FW Version	04 00 = V4.00	04	
255			00	

## QSFP+ AOC 40G MMF 850nm Transceiver

### 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 IEC<sup>1</sup>/EN<sup>2</sup> 60825-1. Users should observe safety precautions such as those recommended by ANSI<sup>3</sup> 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.