

SO-QSFP28-AOCxM

QSFP28, 100Gbase, AOC, xm

OVERVIEW

The SO-QSFP28-AOCxM is a parallel active optical cable (AOC). This product overcomes the bandwidth limitation of traditional copper cables, offering four independent data transmission channels and four data receiving channels via multimode ribbon fibers. Each channel operates at 25Gbps, resulting in an aggregate data rate of 100Gbps. The AOC can be used for distances up to 100m, achieving the ultrafast data exchange. The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP Multi-Source Agreement (MSA). It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference.

PRODUCT FEATURES

- QSFP MSA form factor
- 4 independent full-duplex channels
- Up to 100m reach for OM4 MMF
- Single +3.3V power supply
- Operating case temperature: 0~70°C
- Up to 4x28Gbps data rate
- Maximum power consumption 3.5W each terminal
- RoHS-6 compliant

APPLICATIONS

- 100G Ethernet
- Infiniband EDR

ORDERING INFORMATION

Part Number	Description
SO-QSFP28-AOCxM	AOC, 100Gbps, QSFP28-QSFP28 cable, xm*
	* x=5, 7, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100m

FUNCTIONAL DIAGRAM

The AOC converts the parallel electrical input signals into parallel optical signals, by a driven Vertical Cavity Surface Emitting Laser (VCSEL) array. The light propagates through the ribbon fiber individually, and be captured by the photo diode array. The optical signals are converted into parallel electrical signals and outputted. Each terminal of the cable has 8 ports, 4 for data transmission and 4 for data receiving, each providing 25Gbps data exchange. Consequently, a total of 100Gbps data exchange is achieved. Figure 1 shows the functional block diagram of the parallel AOC.

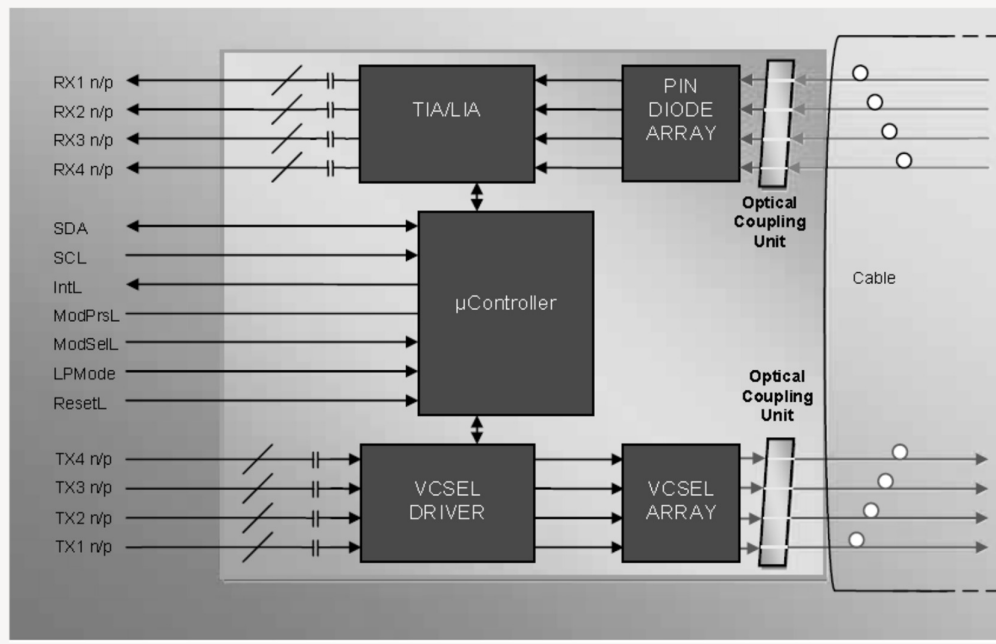


Figure 1. Functional diagram

A single +3.3V power supply is required to power up this product. Both power supply pins VccTx and VccRx are internally connected and should be applied concurrently. Compliant with MSA specifications, the module offers 7 low speed hardware control pins (including the 2-wire serial interface): ModSelL, SCL, SDA, ResetL, LPMode, ModPrsL and IntL. Module Select (ModSelL) is an input pin. When held low by the host, this product responds to 2-wire serial communication commands. The ModSelL allows the use of this product on a single 2-wire interface bus – individual ModSelL lines must be used. Serial Clock (SCL) and Serial Data (SDA) are required for the 2-wire serial bus communication interface and enable the host to access the QSFP memory map. The ResetL pin enables a complete reset, returning the settings to their default state, when a low level on the ResetL pin is held for longer than the minimum pulse length. During the execution of a reset the host shall disregard all status bits until it indicates a completion of the reset interrupt. The product indicates this by posting an IntL (Interrupt) signal with the Data_Not_Ready bit negated in the memory map. Note that on power up (including hot insertion) the module should post this completion of reset interrupt without requiring a reset. Low Power Mode (LPMode) pin is used to set the maximum power consumption for the product in order to protect hosts that are not capable of cooling higher power modules, should such modules be accidentally inserted. Module Present (ModPrsL) is a signal local to the host board which, in the absence of a product, is normally pulled up to the host Vcc. When the product is inserted into the connector, it completes the path to ground through a resistor on the host board and asserts the signal. ModPrsL then indicates it is present by setting ModPrsL to a “Low” state. Interrupt (IntL) is an output pin. “Low” indicates a possible operational fault or a status critical to the host system. The host identifies the source of the interrupt using the 2-wire serial interface. The IntL pin is an open collector output and must be pulled to the Host Vcc voltage on the Host board. This is a Class 1 Laser Product according to EN 60825-1:2014.

This transceiver is specified as ESD threshold 1kV for SFI pin and 2kV for all others electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007). Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

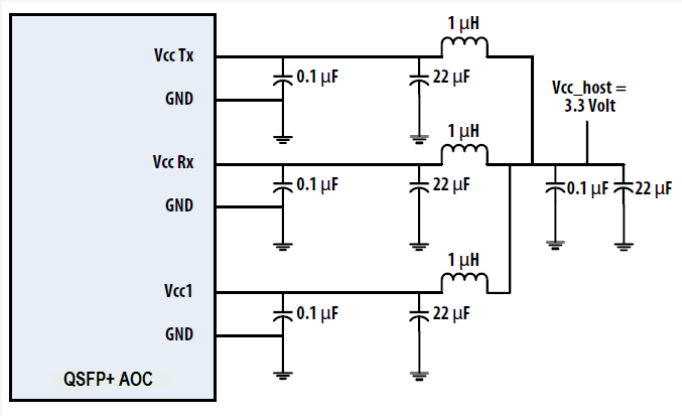
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Storage temperature	T_s	-40	+85	degC
Operating case temperature	TOP	0	70	degC
Power supply voltage	V_{cc}	-0.5	3.6	V
Relative humidity (non-condensation)	RH	0	85	%

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Operating case temperature	TOP	0		70	degC
Power supply voltage	V_{cc}	3.135	3.3	3.465	V
Data rate, each lane			25.78125	28.05	Gb/s
Control input voltage high)		2		V_{cc}	V
Control input voltage low		0		0.8	V
Link distance with OM4 MMF	D			100	m

RECOMMENDED POWER SUPPLY FILTER



ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Power consumption		-		3.5	W
Supply current	I_{cc}			1.21	A
Transceiver power-on initialization time (note 1)				2000	ms

ELECTRICAL CHARACTERISTICS – TRANSMITTER (EACH LANE)

Parameter	Symbol	Min	Typ	Max	Unit
Single-ended input voltage tolerance (note 2)		-0.3		3.6	V
AC Common mode input voltage tolerance		15			mV
Differential input voltage swing threshold		50			mVpp
Differential input voltage swing	$V_{in.pp}$	180		1000	mVpp
Differential input impedance	Z_{in}	90	100	110	Ω
Total jitter				0.40	UI
Deterministic jitter				0.15	UI

ELECTRICAL CHARACTERISTICS – RECEIVER

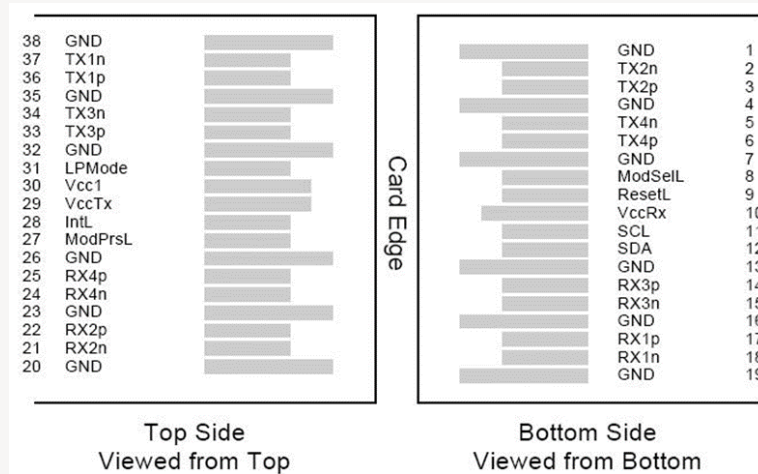
Parameter	Symbol	Min	Typ	Max	Unit
Single-ended output voltage		-0.3		4.0	V
AC common mode output voltage				7.5	mV
Differential output voltage swing	$V_{out.pp}$	300		1000	mVpp
Differential output impedance	Z_{out}	90	100	110	ohm
Total jitter				0.3	UI
Deterministic jitter				0.15	UI

Notes:

1. Power-on initialization time is the time from when the power supply voltages reach and remain above the minimum recommended operating supply voltages to the time when the module is fully functional.
2. The single ended input voltage tolerance is the allowable range of the instantaneous input signals.

PIN ASSIGNMENT AND FUNCTION DEFINITIONS

PIN ASSIGNMENT



PIN DEFINITION

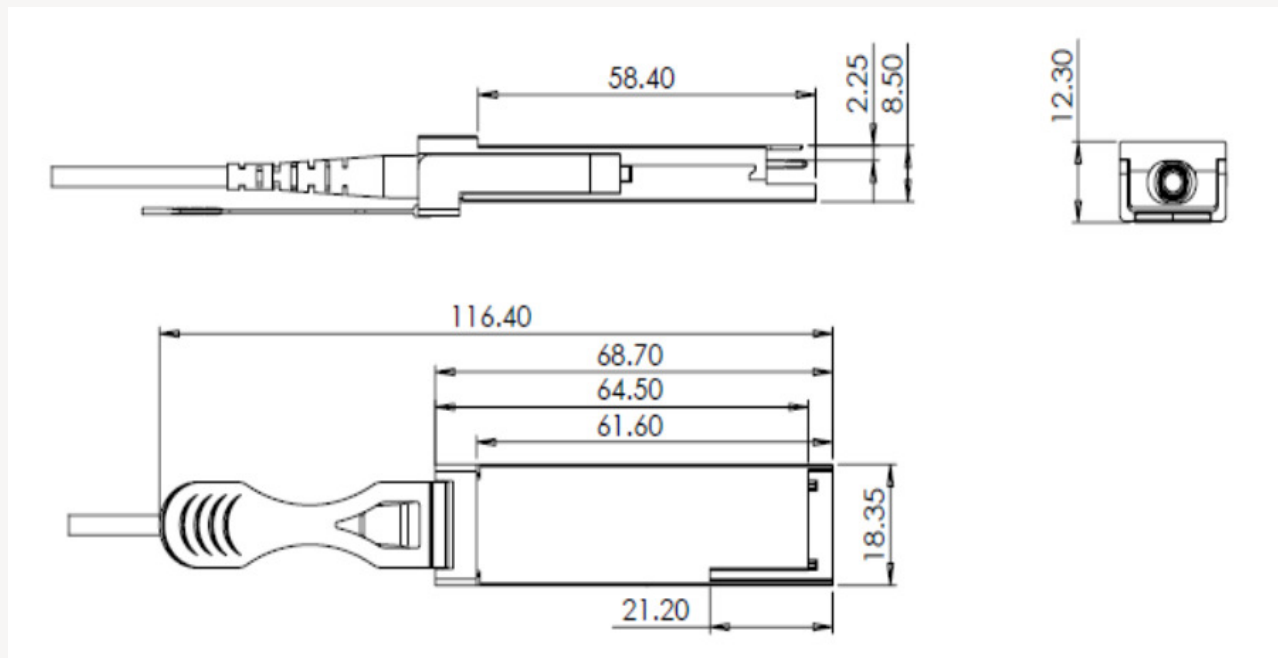
PIN	Signal Name	Description	PIN	Signal Name	Description
1	GND	Ground (1)	20	GND	Ground (1)
2	Tx2n	CML-I Transmitter 2 Inverted Data Input	21	Rx2n	CML-O Receiver 2 Inverted Data Output
3	Tx2p	CML-I Transmitter 2 Non-Inverted Data Input	22	Rx2p	CML-O Receiver 2 Non-Inverted Data Output
4	GND	Ground (1)	23	GND	Ground (1)
5	Tx4n	CML-I Transmitter 4 Inverted Data Input	24	Rx4n	CML-O Receiver 4 Inverted Data Output
6	Tx4p	CML-I Transmitter 4 Non-Inverted Data Input	25	Rx4p	CML-O Receiver 4 Non-Inverted Data Output
7	GND	Ground (1)	26	GND	Ground (1)
8	ModSelL	LVTTLL-I Module Select	27	ModPrsL	Module Present
9	ResetL	LVTTLL-I Module Reset	28	IntL	Interrupt
10	VccRx	+3.3V Power Supply Receiver (2)	29	VccTx	+3.3V Power Supply Transmitter (2)
11	SCL	LVC MOS-I/O 2-Wire Serial Interface Clock	30	Vcc1	+3.3V Power Supply
12	SDA	LVC MOS-I/O 2-Wire Serial Interface Data	31	LPMODE	LVTTLL-I Low Power Mode
13	GND	Ground (1)	32	GND	Ground (1)
14	Rx3p	CML-O Receiver 3 Non-Inverted Data Output	33	Tx3p	CML-I Transmitter 3 Non-Inverted Data Input
15	Rx3n	CML-O Receiver 3 Inverted Data Output	34	Tx3n	CML-I Transmitter 3 Inverted Data Input
16	GND	Ground (1)	35	GND	Ground (1)
17	Rx1p	CML-O Receiver 1 Non-Inverted Data Output	36	Tx1p	CML-I Transmitter 1 Non-Inverted Data Input
18	Rx1n	CML-O Receiver 1 Inverted Data Output	37	Tx1n	CML-I Transmitter 1 Inverted Data Input
19	GND	Ground (1)	38	GND	Ground (1)

Notes:

1. All Ground (GND) are common within the QSFP28 module and all module voltages are referenced to this potential unless noted otherwise. Connect these directly to the host board signal common ground plane.

2. V_{ccRx} , V_{cc1} and V_{ccTx} are the receiving and transmission power suppliers and shall be applied concurrently. V_{ccRx} , V_{cc1} and V_{ccTx} may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

MECHANICAL DRAWING



Subject to change without notice.

For more information, visit smaroptics.com.