

# DATA SHEET

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SFP-25G-AOCXM-BB SERIES

# 25G ACTIVE OPTICAL CABLE NETWORKING

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24/7 TECHNICAL SUPPORT AT 877.877.2269 OR VISIT [BLACKBOX.COM](http://BLACKBOX.COM)



# OVERVIEW

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET



SFP-25G-AOC1M-BB

### INTRODUCTION

Black Box 25G Active Optical Cables provide premium, error-free performance for data, storage, and high-performance computing (HPC) interconnectivity. 100% compatible to Cisco SFP-25G-AOCxM= Active Optical Cables, these cables connect your Cisco switches, routers and servers. Constructed for full compliance with the SFP28 Multi-Source Agreement (MSA) and SFF-8402, SFF-8431 and SFF 8472 industry standards, you can also make connections among your non-Cisco, 25G compatible networking equipment. Programmed, tested and serialized to ensure compliance and functionality, Black Box Active Optical Cables are the ideal solution for 25G Ethernet, Infiniband (QDR, SDR, DDR), Fiber Channel applications and more.

### Ultra-Thin and Light Design is Ideal for High-Density, High-Bandwidth Applications

Active Optical Cables are much thinner and lighter than their copper direct attach cable (DAC) counterparts, making them perfect for use in today's ultra-high density applications, where they take up less space and put less stress on equipment. The increase in space leads to increased air flow, saving you money on cooling overheated equipment. Also, optical technology provides significantly higher bandwidth than direct attach copper, allowing for ultra-fast data transmission at long distances, unlike DACs, which start to experience excessive bit error rates at over 16.4 feet (5 m).

### All-in-One Solution Makes for Simple Connections with Low Latency

With an all-in-one, hot-swappable cable design, active optical cables provide you with an easy to connect solution that doesn't require purchasing multiple transceivers and cabling. The lack of additional connection points also means lower latency, so you can be confident of your data integrity. Hot-swappability makes upgrades and equipment replacements a breeze, minimizing downtime to your network. In addition, AOCs provide a cost-efficient low-power solution (less than 1 W) that is essential in today's high data-rate applications.

### Minimal EMI Profile

Active Optical Cables (AOC) feature a minimal EMI/RFI profile due to their fiber optic construction. Superior resistance to EMI/RFI interference ensures data integrity, which is essential in today's ultra-high density rackmount applications that cannot tolerate any signal downtime or interruption. And as security concerns continue to grow, fiber is well suited to provide protection against tapping of your data.

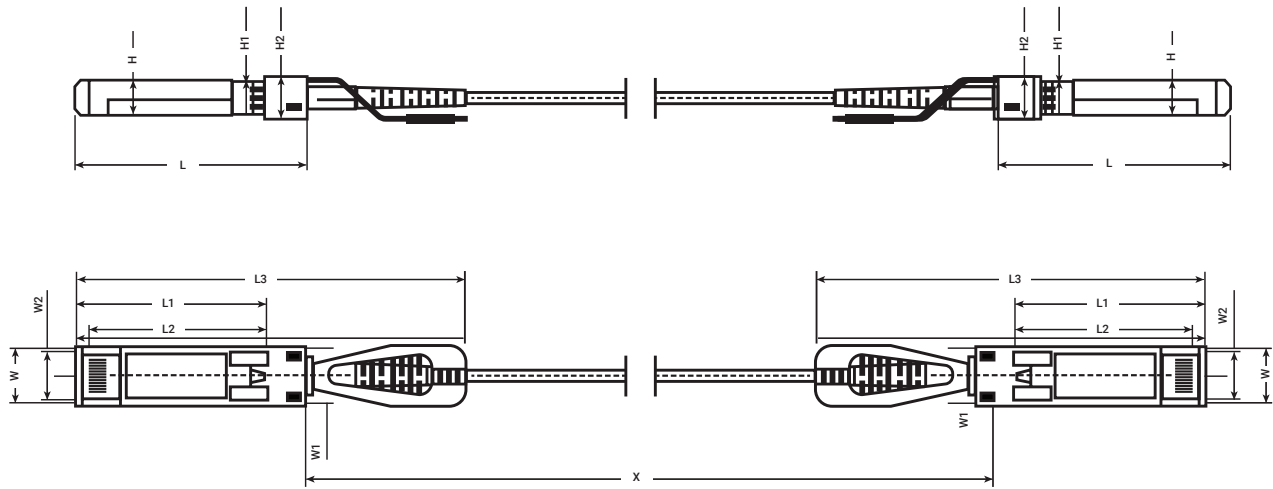
### FEATURES

- 100% COMPATIBLE TO CISCO SFP-25G-AOCXM
- COMPLIES WITH SFP28 MULTI-SOURCE AGREEMENT (MSA), SFF-8402, SFF-8431 AND SFF 8472 STANDARDS
- USES VCSEL TECHNOLOGY OVER 850-NM MULTIMODE FIBER FOR OPTIMAL PERFORMANCE
- ULTRA-THIN AND LIGHT OPTICAL CABLING IDEAL FOR HIGH-DENSITY NETWORKING APPLICATIONS
- LOW POWER USAGE (LESS THAN 1 W) IS EXTREMELY VALUABLE IN HIGH DATA RATE APPLICATIONS
- PERFECT FOR POINT-TO-POINT, INTRA-RACK AND RACK-TO-RACK CONNECTIONS OF 25G EQUIPMENT
- CONSTRUCTED USING LSZH LOW-SMOKE ZERO HALOGEN CABLING
- CASE SUPPORTS OPERATING TEMPERATURE RANGE OF 32 TO 158° F (0 TO 70° C)



# DIMENSIONAL DIAGRAMS AND SPECIFICATIONS

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET



### DIMENSIONS IN MILLIMETERS (MM)

	L	L1	L2	L3	W	W1	W2	H	H1	H2
<b>MAXIMUM</b>	57.75	48.0	44.65	102.5	13.75	14.0	12.25	8.65	0.55	10.4
<b>TYPICAL</b>	57.55	47.8	44.45	101.5	13.65	13.9	12.15	8.55	0.50	10.2
<b>MINIMUM</b>	57.35	47.6	44.25	100.5	13.55	13.8	12.05	8.45	0.45	10.0

NOTE: X is the cable length (1, 2, 3, 5, 7, or 10 meters [m]).

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	TYPICAL	MAX	UNIT	NOTES
SUPPLY VOLTAGE	VCC3	-0.5	—	+3.6	V	—
STORAGE TEMPERATURE	Ts	-10	—	+70	°C	—
OPERATING HUMIDITY	RH	+5	—	+85	%	1

NOTE1: No condensation.

# SPECIFICATIONS

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET

RECOMMENDED OPERATING CONDITIONS						
PARAMETER	SYMBOL	MIN.	TYPICAL	MAX	UNIT	NOTES
OPERATING CASE TEMPERATURE	Tc	0	–	+70	°C	–
POWER SUPPLY VOLTAGE	Vcc	3.14	3.3	3.47	V	–
POWER SUPPLY CURRENT	Icc	–	–	300	mA	–
POWER DISSIPATION	Pd	–	–	1.0	W	–
BIT RATE	BR	8.5	25.78125	–	Gbps	–
FIBER BEND RADIUS	Rb	3	–	–	cm	–

ELECTRICAL CHARACTERISTICS							
PARAMETER		SYMBOL	MIN.	TYPICAL	MAX	UNIT	NOTES
<b>TRANSMITTER</b>							
DIFFERENTIAL DATA INPUT SWING		Vin p-p	200	–	1600	mVpp	–
INPUT DIFFERENTIAL IMPEDANCE		ZIN	90	100	110	Ohms	–
TX_FAULT	NORMAL OPERATION	VOL	0	–	0.8	V	–
	TRANSMITTER FAULT	VOH	2.0	–	Vcc	V	–
TX_DISABLE	NORMAL OPERATION	VIL	0	–	0.8	V	–
	LASER DISABLE	VIH	2.0	–	VCC±0.3	V	–
<b>RECEIVER</b>							
DIFFERENTIAL DATA OUTPUT		Vout	400	–	800	mV	–
OUTPUT DIFFERENTIAL IMPEDANCE		ZD	90	100	110	Ohms	–
RX_LOS	NORMAL OPERATION	VOL	0	–	0.8	V	–
	LOSE SIGNAL	VOH	2.0	–	Vcc	V	–



# SPECIFICATIONS

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET

OPTICAL CHARACTERISTICS						
PARAMETER	SYMBOL	MIN.	TYPICAL	MAX	UNIT	NOTES
<b>OPTICAL TRANSMITTER CHARACTERISTICS</b>						
DATA RATE	DR	8.5	25.78125	–	Gbps	–
CENTER WAVELENGTH RANGE	$\lambda_c$	820	850	880	nm	–
LASER OFF POWER	P <sub>off</sub>	–	–	-45	dBm	–
LAUNCH OPTICAL POWER	P <sub>o</sub>	-6.0	–	2.4	dBm	1
EXTINCTION RATIO	ER	2	–	–	dB	–
SPECTRAL WIDTH (RMS)	RMS	–	–	0.65	nm	–
DIFFERENTIAL DATA INPUT SWING	RMS	40	–	1000	mV	–
<b>OPTICAL RECEIVER CHARACTERISTICS</b>						
BIT RATE	DR	8.5	25.78125	–	Gbps	–
BIT ERROR RATE	BER	–	–	E-12	–	–
DAMAGE THRESHOLD	DT	3.4	–	–	dBm	–
OVERLOAD INPUT OPTICAL POWER	PIN	2.4	–	–	dBm	2
CENTER WAVELENGTH RANGE	$\lambda_c$	820	–	880	nm	–
RECEIVER SENSITIVITY IN AVERAGE POWER	SEN	–	–	-5.2	dBm	3
LOS ASSERT	LosA	-30	–	–	dBm	–
LOS DE-ASSERT	LosD	–	–	-13	dBm	–
LOS HYSTERESIS	LosH	0.5	–	–	dB	–

### NOTES:

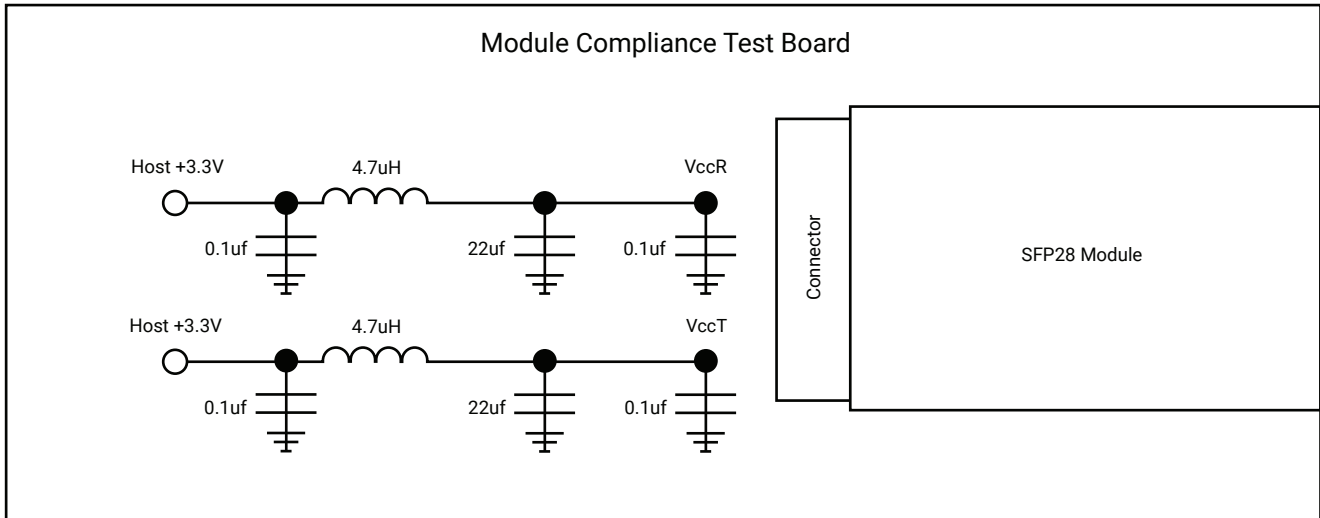
1. Coupled into 50/125 MMF.
2. Measured with PRBS 2<sup>31</sup> -1 test pattern @25.78125 Gbps BER = 10E-12.
3. BER = 1 x 10<sup>-12</sup>; PRBS2<sup>31</sup> - 1 @25.78125 Gbps



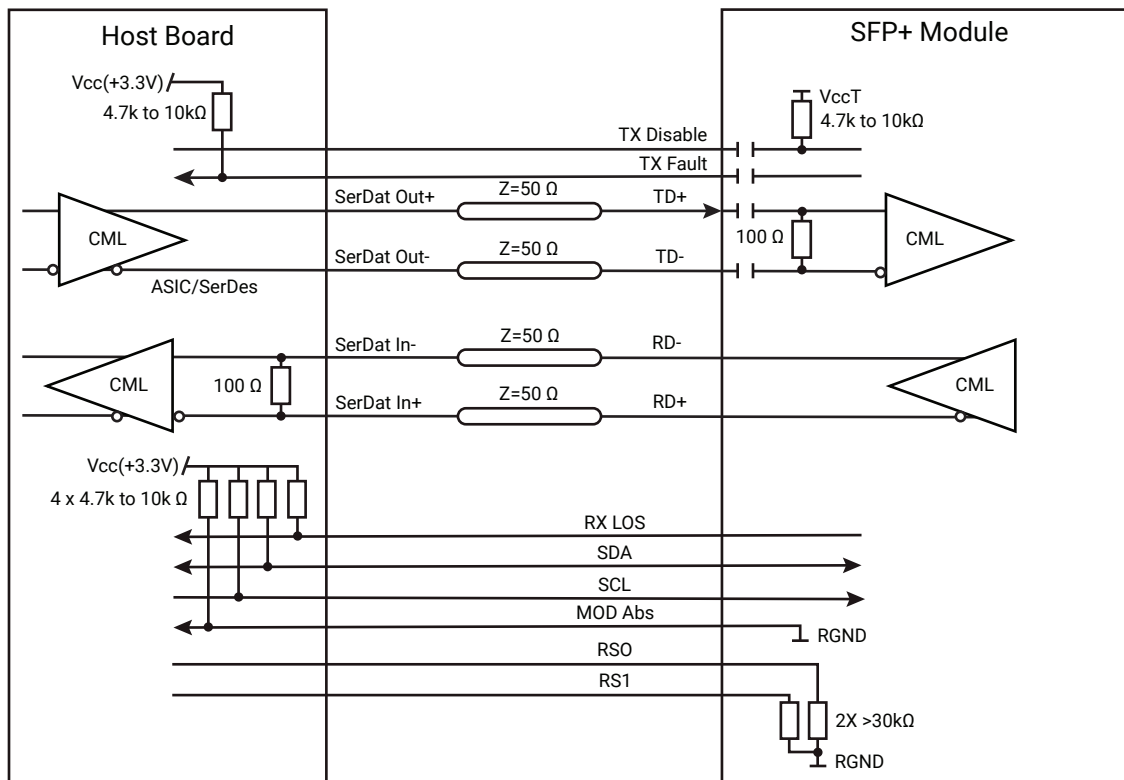
# SPECIFICATIONS

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET

### RECOMMENDED HOST BOARD POWER SUPPLY CIRCUIT



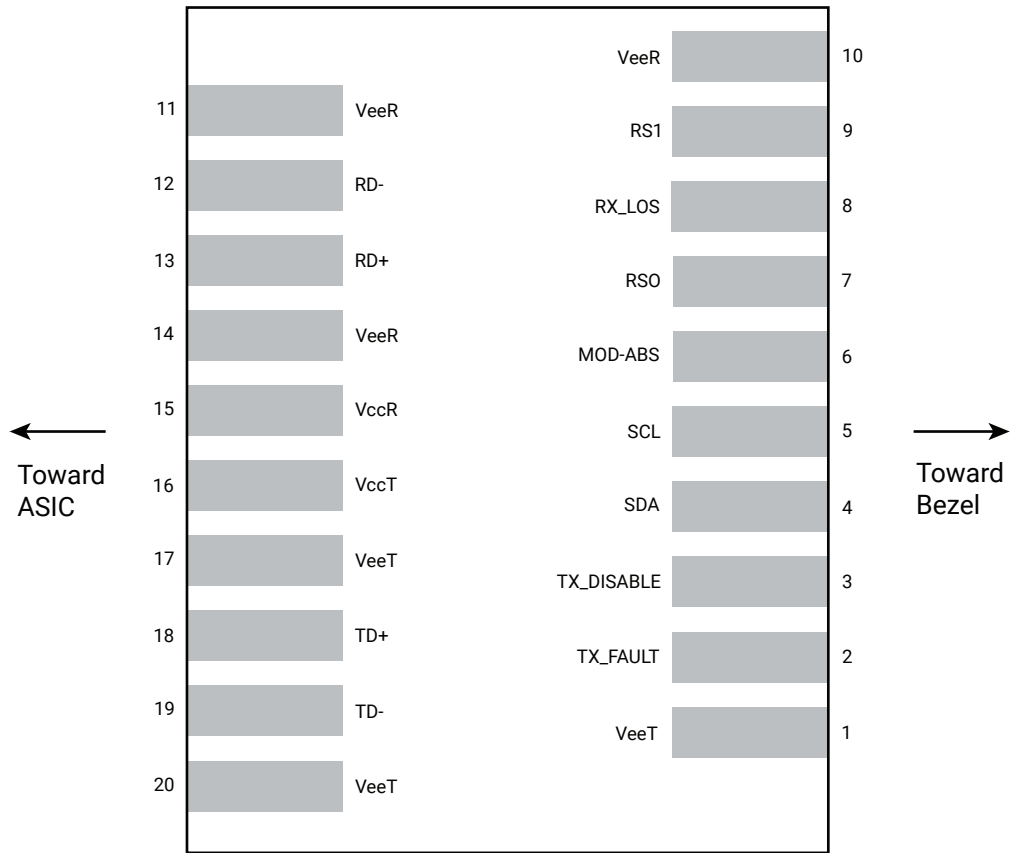
### RECOMMENDED INTERFACE CIRCUIT



# SPECIFICATIONS

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET

### PIN ARRANGEMENTS



# SPECIFICATIONS

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET

PIN FUNCTION DEFINITIONS			
PIN	SYMBOL	NAME/DESCRIPTION	NOTES
1	VeeT	Module Transmitter Ground	1
2	TX_FAULT	Module Transmitter Fault	2
3	TX_DISABLE	Transmitter Disable; Turns off transmitter laser output	3
4	SDL	2-wire Serial Interface Data Line (MOD-DEF2)	–
5	SCL	2-wire Serial Interface Clock (MOD-DEF1)	–
6	MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	2
7	RS0	Rate Select 0, optionally controls SFP+ module receiver	–
8	RX_LOS	Receiver Loss of Signal Indication (in FC designated as RX_LOS and in Ethernet designated as NOT Signal Detect)	2
9	RS1	Rate Select 1, optionally controls STP+ module transmitter	–
10	VeeR	Module Receiver Ground	1
11	VeeR	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	–
13	RD+	Receiver Non-Inverted Data Output	–
14	VeeR	Module Receiver Ground	1
15	VccR	Module Receiver 3.3 V Supply	–
16	VccT	Module Transmitter 3.3 V Supply	–
17	VeeT	Module Transmitter Ground	1
18	TD+	Transmitter Inverted Data Output	–
19	TD-	Transmitter Non-Inverted Data Output	–
20	VeeT	Module Transmitter Ground	1

### NOTES:

1. The module ground pins are isolated from the module case.
2. The pins shall be pulled up with 4.7 K–10 Kohms to a voltage between 3.14 V and 3.46 V on host board.
3. The pin is pulled up to VccT with a 4.7 K–10 Kohms resistor in the module.





# SPECIFICATIONS

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET

### MECHANICAL DESIGN DIAGRAM, MEMORY MAP

2-wire address 1010000x (A0h)

Serial ID defined by SFP MSA (96 bytes)
Vendor-specific (32 bytes)
Reserved (128 bytes)

2-wire address 1010001x (A2h)

0	Alarm and Warning threshold (56 bytes)
55	Cal Constants (40 bytes)
95	Real-time Diagnostic Interface (24 bytes)
119	Vendor-specific (7 bytes)
126	Page Select byte (Optional)
127	

128	User Writable EEPROM (120 bytes)
247	Vendor-specific (8 bytes)
255	

Page 00h/01h

Control Functions
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Page 02h

Reserved
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Page 03h-7Fh

Vendor- specific
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Pages 80h-FFh

#### CABLE MECHANICAL SPECIFICATIONS

PARAMETER	VALUE	UNITS
Diameter	3	mm
Minimum Bend Radius	30	mm
Length Tolerance	Length < 1 m: +5/-0 Length 1 m to 4.5 m: +15/-0 Length 5 m to 14.5 m: +30/-0 Length > 15.0 m: +2%/-0	mm
Cable Color	Aqua (OM3)	

# SPECIFICATIONS AND ORDERING INFORMATION

## 25G ACTIVE OPTICAL CABLE FOR NETWORKING DATA SHEET

25G ACTIVE OPTICAL CABLE FOR NETWORKING	
CONNECTOR A	SFP28 male
CONNECTOR B	SFP28 male
CABLE JACKET TYPE	LSZH (Low-Smoke Zero Halogen)
COLOR	Aqua
FIBER GLASS TYPE	OM3
DATA TRANSFER RATE	25 Gbps
OPERATING TEMPERATURE	32 to 158° F (0 to 70° C)
STORAGE TEMPERATURE	14 to +158° F (-10 to +70° C)
POWER CONSUMPTION	Less than 1 W
STANDARDS	SFP28 MSA, SFF-8402, SFF-8431, SFF-8472
APPROVALS	RoHS, CE, FCC

LENGTH	MODEL
1-m	SFP-25G-AOC1M-BB
2-m	SFP-25G-AOC2M-BB
3-m	SFP-25G-AOC3M-BB
5-m	SFP-25G-AOC5M-BB
7-m	SFP-25G-AOC7M-BB
10-m	SFP-25G-AOC10M-BB

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