

## Specification

### 48Gbit/s Mini SAS HD

### Active Optical Cable



## Ordering Information

Model Name	Voltage	Category	Device type	Interface	Temperature	Distance
TMS-E1EH8-X6101	3.3V	DDMI	VCSEL x 4 / PIN x 4	AC / AC Coupling	0°C ~ +70°C	1 m
TMS-E1EH8-X6104						4 m
TMS-E1EH8-X6105						5 m
TMS-E1EH8-X6110						10 m
TMS-E1EH8-X6125						25 m
TMS-E1EH8-X6150						50 m
TMS-E1EH8-X61A0						100 m

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## Features

- **Maximum Data Rate up to 48Gbps**
- **Link distance up to 100m over OM4 MMF**
- **4 channel 850nm VCSEL and PIN type detector**
- **Connector compliant to SFF-8644**
- **Management interface compliant to SFF-8636**
- **Hot Pluggable**
- **Single 3.3V and high speed AC-Coupled**
- **Operating Temperature range: 0°C to 70°C**
- **ROHS Compliant**

## Applications

- **48G Mini SAS HD**
- **Server / Storage, Work Stations**
- **HBA's (Host Bus Adapters) Servers**
- **Storage Racks, RAID's**

## General Description

FormericaOE Mini-SAS HD active optical cable (AOC) is of high- performance with full-duplex and aggregate 48-Gbps bandwidth for SAS-3 protocol in storage applications. Compared to conventional copper cables, longer, lighter, and flexible optical cables enable the ease of complicated data-center cablings. High-quality of 850-nm VCSELs and PIN PDs are utilized in the AOC cables, with superior signal integrity and bit-error-rate performance, which enables reliable operation performance.

**Function Block**

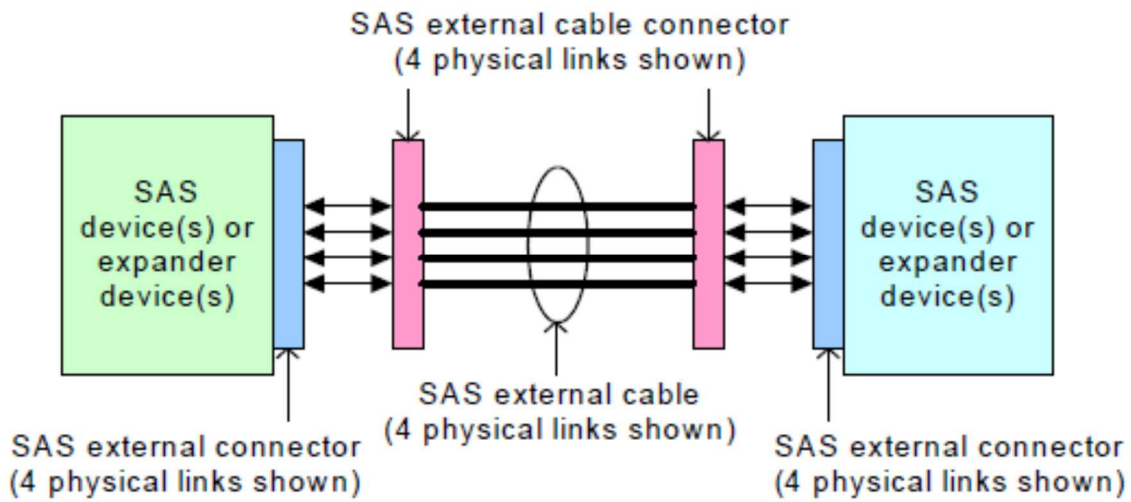


Figure - SAS external cable environment

**Operating Conditions**

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case temperature	Top	0		70	°C
Supply Voltage (Active Cable Power)	Vact	3.15	3.3	3.45	V
Current Consumption (per cable end)	Iact		300	450	mA
Data Rate per Channel			12		Gbps
Receiver Differential Impedance			100		Ohm
Receiver Common-mode Impedance			25		Ohm
Control Input Voltage High	Vih	2		Vact	V
Control Input Voltage Low	Vil	0		0.8	V
Two Wire Serial Interface Clock Rate	fsck			400	kHz

**Electrical characteristics for 12 Gbps (one channel)**

Parameter	Cable Input	Cable Output	Unit
Maximum peak to peak voltage (2 x Z2)	1200	1200	mV(P-P)
Minimum eye opening (2 x Z1)	200	190	mV(P-P)
Maximum half of TJ (X1)	0.175	0.3	UI
Maximum RJ	0.15	0.33	UI
Center of bit time (X2)	0.5	0.5	UI

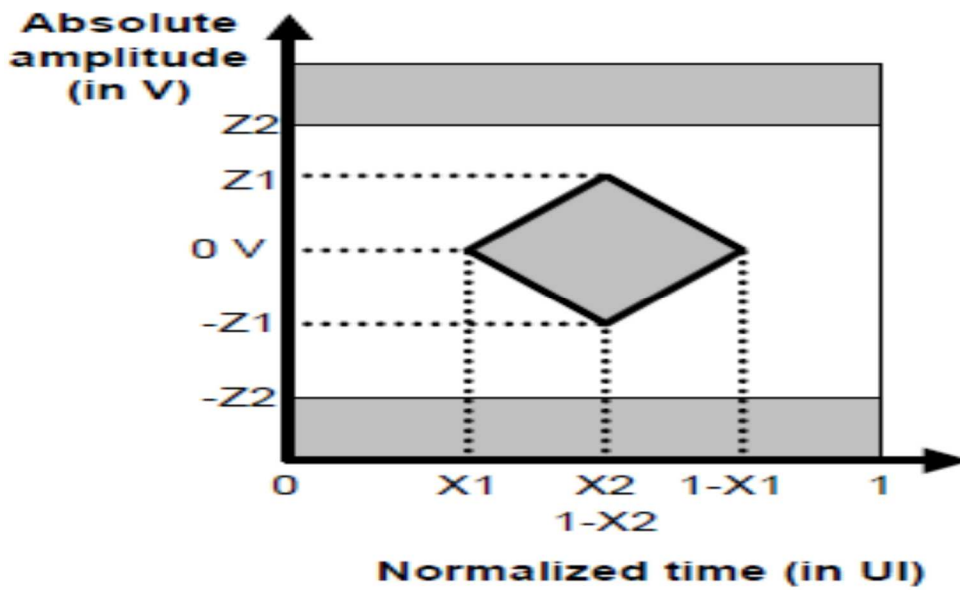
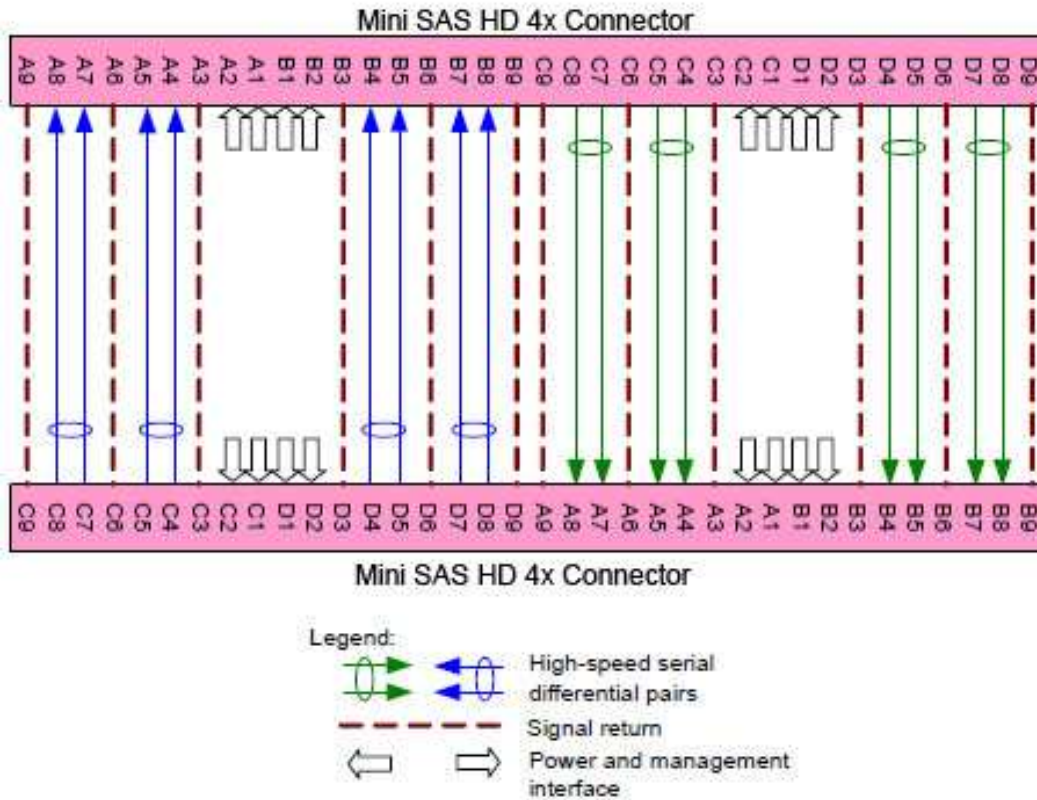
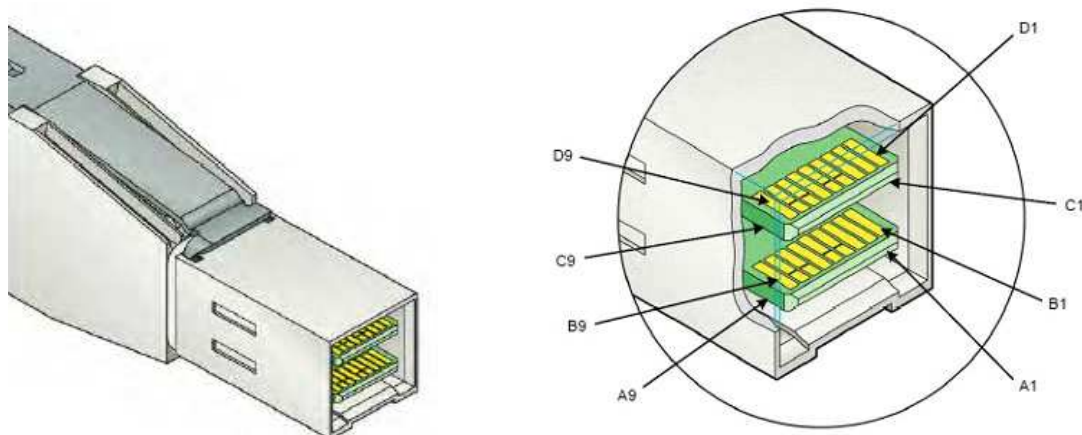


Figure - Active cable eye mask for 12 Gbps

Typical Application



Pin Definition



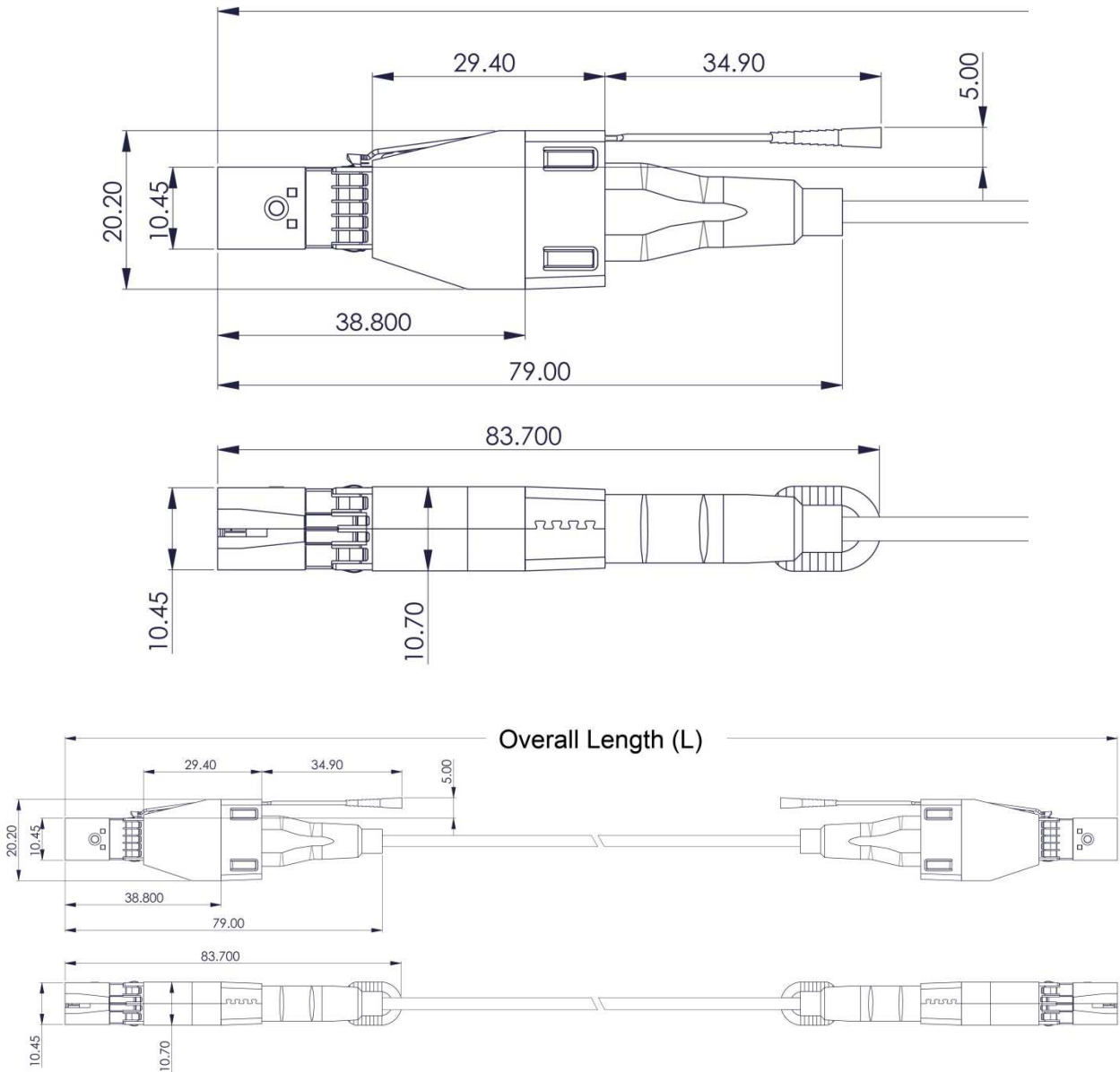
**Pin Descriptions**

Pin	Pin usage based on number of physical links supported by the cable assembly <sup>a</sup>				Mating level <sup>b</sup>
	One	Two	Three	Four	
Rx 0-	B5	B5	B5	B5	Third
Rx 0+	B4	B4	B4	B4	
Rx 1-	N/C	A5	A5	A5	
Rx 1+	N/C	A4	A4	A4	
IntL	A2	A2	A2	A2	Second
Reserved	A1	A1	A1	A1	
ModPrsL	B2	B2	B2	B2	
Vact	B1	B1	B1	B1	
Rx 2-	N/C	N/C	B8	B8	Third
Rx 2+	N/C	N/C	B7	B7	
Rx 3-	N/C	N/C	N/C	A8	
Rx 3+	N/C	N/C	N/C	A7	
Tx 0-	D5	D5	D5	D5	Third
Tx 0+	D4	D4	D4	D4	
Tx 1-	N/C	C5	C5	C5	
Tx 1+	N/C	C4	C4	C4	
SDA	C2	C2	C2	C2	Second
SDL	C1	C1	C1	C1	
Vman	D2	D2	D2	D2	
Vact	D1	D1	D1	D1	
Tx 2-	N/C	N/C	D8	D8	Third
Tx 2+	N/C	N/C	D7	D7	
Tx 3-	N/C	N/C	N/C	C8	
Tx 3+	N/C	N/C	N/C	C7	
SIGNAL GROUND	A3, A6, A9, B3, B6, B9, C3, C6, C9 D3, D6, D9				First

a. N/C = not connected

b. The mating level indicates the physical dimension of the contact (see SFF-8644).

Mechanical Outlines (Unit: mm)



Model Name	L (meters)
TMS-E1EH8-X6101	1 ± 0.02
TMS-E1EH8-X6104	4 ± 0.05
TMS-E1EH8-X6105	5 ± 0.05
TMS-E1EH8-X6110	10 ± 0.05
TMS-E1EH8-X6125	25 ± 0.10
TMS-E1EH8-X6150	50 ± 0.10
TMS-E1EH8-X61A0	100 ± 0.20

## ESD

Normal ESD precautions are 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.

### Contact Information

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