

# MID BOARD OPTICAL TRANSCEIVER

Featuring Coolbit Optical Engines  
12x25.78125 Gbps

## High Speed + Low Power = Your Next Communications System

TE Connectivity's (TE) mid board optical module (MBO) is a 12-channel transceiver capable of transmitting and receiving data for a total bandwidth of 300 Gbps per square inch. The MBO features TE's Coolbit optical engines that enable the product to perform at high speeds while consuming extremely low power, approximately < 4.5 Watts.

TE's MBO was designed to move the I/O connection from a system's faceplate onto its PCB—allowing systems to achieve ultra-high bandwidth density. This internal I/O connection helps free up faceplate space, enabling more connections and hence overall higher system density. The MBO module, using an LGA socket design, can be placed on a small 1-inch PCB grid.

## What's Inside Our Active Optic Products: Coolbit Optical Engines

Each TE 25 Gbps active optic product is designed with our latest Coolbit optical engine product technology. A single engine uses 25G VCSEL and PIN devices, a TIA amplifier and a driver IC and is produced in an automated wafer-scale assembly line at TE's fabrication center. In this facility, our active optics products are manufactured in a fully vertically integrated capacity—allowing TE to control the entire manufacturing process, research to release. The Coolbit optical engine is our latest creation, from start to finish.

## Features

- 12 transmit and 12 receive 25G channels (12x2, 25.78 Gb/s)
- Bandwidth density of 300 Gbps per square inch of PCB
- Low power dissipation, consuming a nominal 380mW per channel including CDRs
- Footprint 1" x 1", low-profile 1/2"
- Designed to enable densely-packed 2D arrays of MBO modules
- Enables ultra-high bandwidth density on the faceplate
- Uses a TE developed BGA/LGA high-density, high-speed electrical socket
- Compatible with the OIF-VSR electrical interface
- Differential, internally AC-coupled data I/O
- Digital Diagnostics Monitoring Interface (DDMI) allows customer management and monitoring of key modules parameters
- Internal CDR circuits on both receiver and transmitter channels
- Transmitter input equalizer and output pre-emphasis that can compensate for more than 12dB at 12.9GHz
- Optical detachable connectivity via industry standard 2x12 position MT termination
- Field-programmable firmware updates
- Secondary heat sink allows for customer specific thermal solutions



## Applications

- High-speed interconnects within/between switches, routers and transport equipment
- Server-server clusters and super-computing
- Proprietary backplanes
- Interconnects rack-to-rack, shelf-to-shelf, board-to-board, board-to-optical backplane
- Standards: OIF-CEI-28G



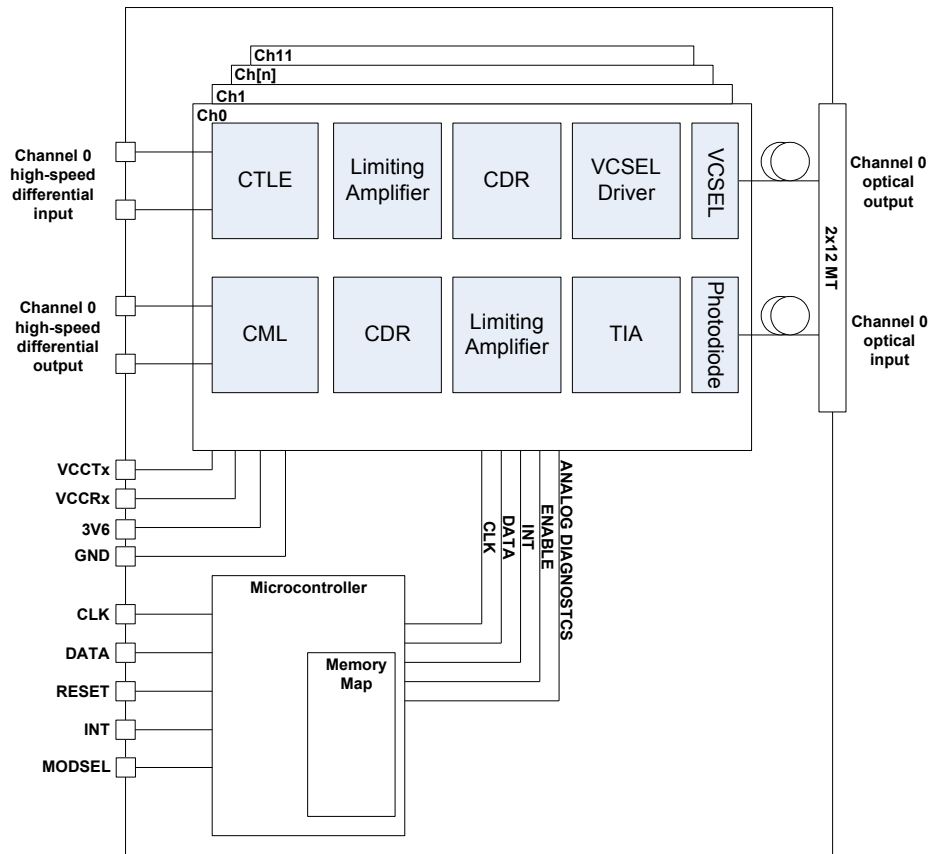


Figure 1. Basic outline of the TE MBO Interconnect

## Regulatory Compliance

The product will comply to the following as shown below:

Compliance Area	Standard/Classification
Safety of Information Technology Equipment	ANS/UL 60950-1; CAN/CSA-C22.2 No.60950-1
Electrostatic Discharge Immunity (external)	EN 55024/EN 61000-4-2: Tested to sustain 4kV contact discharge and 8kV air discharge
Electrostatic Discharge Immunity (connector pads)	Human Body Model (JESD22-A114-D): sustains 500V
Recognition by Nationally Recognized Testing Laboratories (NRTL)	TuV: Recognized component
RoHS Compliance	Compliant with EU Directive 2002/95/EC (RoHS)

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Supply voltage <sup>1</sup>	VCC	-0.5	3.6	V
Differential input voltage amplitude <sup>2</sup>	$\Delta V$		1600	mV <sub>p-p</sub>
Voltage on any pin	VPIN	-0.3	3.6	V
Relative humidity (non-condensing)	MOS	5	95	%
Operating case temperature	TCASE	-5	75	°C
Storage temperature	TSTG	-40	100	°C
ESD resistance <sup>3</sup>	VESD		± 500	V

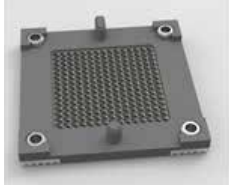
1. Applies to all input supply voltages.
2. Differential input voltage amplitude is peak to peak value.
3. All pins withstand 500V based on Human Body Model, JEDEC JESD22-A114-D.

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply voltage <sup>1</sup>	VCC	3.135	3.3	3.465	V
Module Power Consumption <sup>2</sup>	PD			5 W	W
Operating case temperature	TCASE	0		70	°C
Signaling rate (per channel) <sup>3</sup>	fD	1.25		25.78125	Gbps
Differential input voltage amplitude	$\Delta V$			1200	mV <sub>p-p</sub>
Power supply noise <sup>4</sup>	VNPS			50	mV <sub>p-p</sub>

1. Applies to all input supply voltages.
2. Includes CDRs and equalizers, 800mV output amplitude, 70C.
3. Data patterns are to have maximum run lengths and DC balance shifts no worse than that of a Pseudo Random Bit Sequence of length 231-1 (PRBS-31).
4. Power supply noise is defined at the supply side of the recommended filter for all VCC supplies over the frequency range of 1 kHz to 25.78125 GHz with the recommended power supply filter in place.

## Related products



### **SOCKETS FOR MBO**

TE offers MBO BGA/LGA sockets to complement the MBO product. [Click here to contact the product manager for more information.](#)



### **MPO CABLE ASSEMBLIES**

TE offers durable MTP brand MPO products for any parallel optics application. Available in 4, 8, 12, 24 and 48 fiber counts, the MPO cable assemblies use round cable for the most efficient, user-friendly and cost-effective solution for connecting to your CXP or QSFP transceivers.



### **LC CABLE ASSEMBLIES**

TE offers a wide range of LC cable assemblies and associated accessories to meet your design needs. The addition of the ultra short LC connector helps provide a solution for the connectivity needs in professional networks and systems, especially in places with limited space.



### **LEGACY**

We offer standard passive fiber optic products, including ST, SC, FC, adapters, attenuators and off-the-shelf cable assemblies.



### **10-14 GBPS ACTIVE OPTICS**

We offer active optical cable assemblies and transceivers for 10 and 14 Gbps applications.



### **PLUGGABLE I/O CONNECTORS AND CAGES**

TE high-speed I/O interconnects offer standard equipment I/O interfaces and the flexibility of pluggable modules for fiber and copper links and various data rates and protocols.



### **COPPER CABLE ASSEMBLIES**

TE's high-speed copper cable assembly portfolio includes multiple options for simplified cable management. The products support latest high-speed standards at 10 Gbps and beyond and offer flexibility and customizability.

## TE Technical Support Center

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### te.com/coolbit

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