

## 25 Gb/s 850 nm Multi-Mode SFP28 Transceiver

### SFP+ Series

- 25Gbps serial optical interface
- 850nm VCSEL transmitter and GaAs PIN PD receiver
- Rate Adaptation
- Operating temperature:  
Commercial (0°C to 70°C)  
Industrial (-40°C to 85°C)
- Maximum link length of  
70m via OM3 multimode  
Fiber (MMF)
- Maximum link length of  
100m via OM4  
multimode Fiber (MMF)



Ascent's SFP28 25Gb/s transceiver is an integrated fiber optic transceiver that provides a high-speed serial link at signaling rates up to 25.78 Gb/s. It is a single- channel, pluggable, fiber-optic module for short-range data communication and interconnect Ethernet applications.

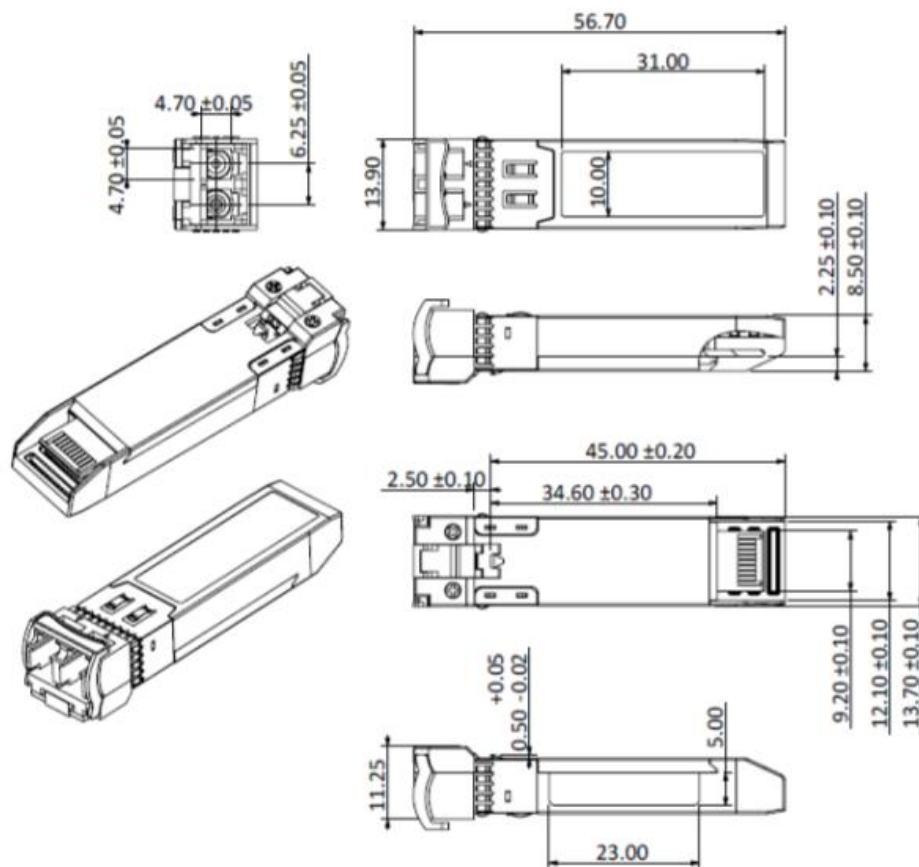
This module is designed to operate over multimode fiber systems using a nominal wavelength of 850nm. It has a transmission distance of up to 70 m on OM3 and 100 m on OM4 multi-mode fibers. The optical interface uses duplex LC receptacle. This module incorporates proven circuit and VCSEL technology to provide reliable long life, high performance, and consistent service.

The SFP28-25LP-85-01 module complies with SFF-8431 and SFF 8472 standards. It features a metal enclosure for lower EMI and utilizes a 2-wire interface that is compliant with the serial communication protocol as defined in the SFP28 MSA. It also provides a unique integrated digital diagnostic monitoring interface, allowing for real-time access to device operating parameters. This module is hot-pluggable.

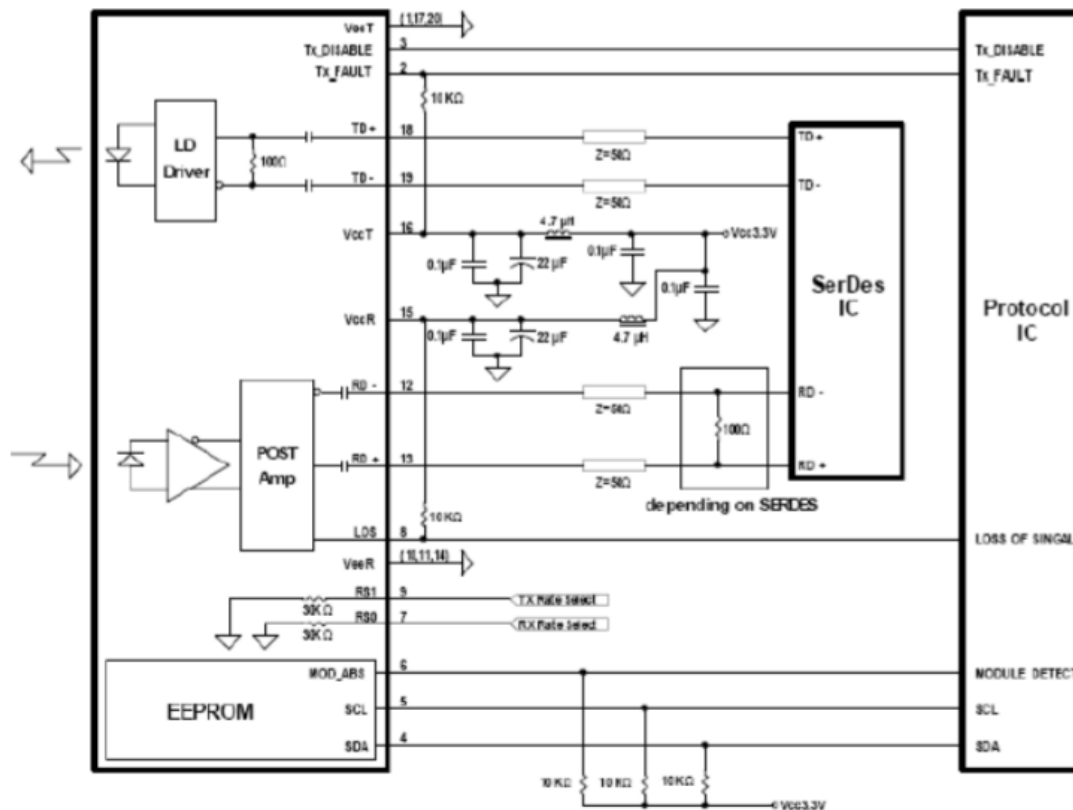
## Key Features

- 25Gbps serial optical interface
- 850nm VCSEL transmitter and GaAs PIN PD receiver
- Rate Adaptation
- Operating Temperature Range:  
Commercial: 0°C to +70°C  
Industrial: -40°C to +85°C
- Maximum link length of 70m via OM3 multimode Fiber (MMF)
- Maximum link length of 100m via OM4 multimode Fiber (MMF)
- RoHS and FCC compliant

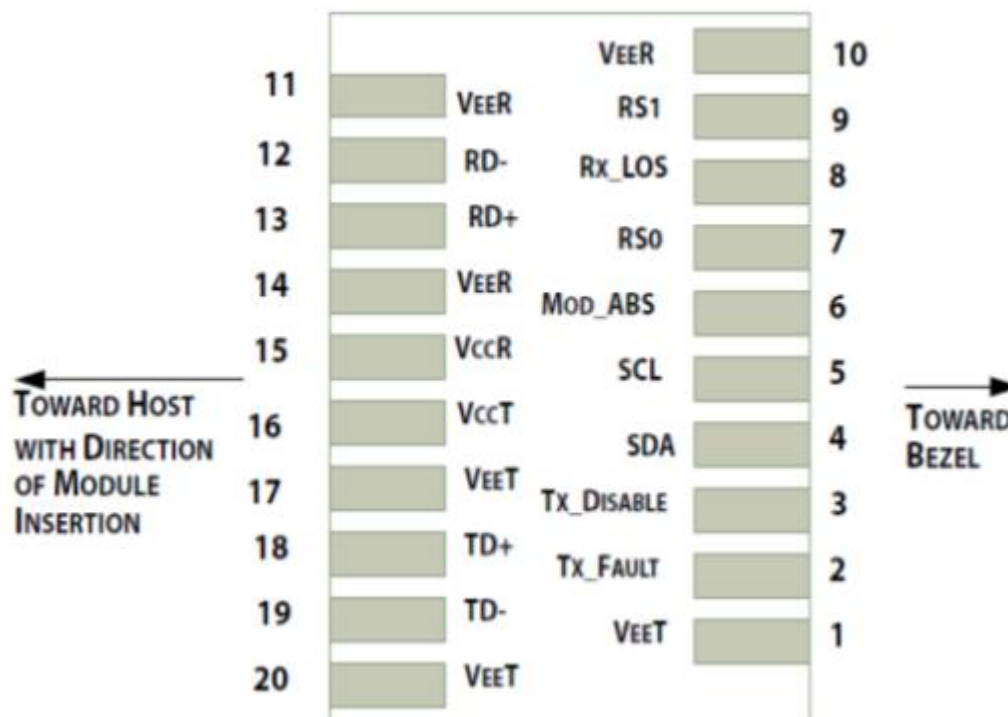
## Mechanical Dimension



## Recommended Interface Circuit



## Pin Assignment



| Pin | Logic     | Symbol   | Name/Description                                                      |
|-----|-----------|----------|-----------------------------------------------------------------------|
| 1   |           | VeeT     | Transmitter Ground                                                    |
| 2   | LVTTL-O   | Tx_Fault | Transmitter Fault - High indicates a fault condition                  |
| 3   | LVTTL-I   | Tx_Dis   | Transmitter Disable – High or open disables the transmitter           |
| 4   | LVTTL-I/O | SDA      | 2-wire Serial Interface Data Line (MOD-DEF2)                          |
| 5   | LVTTL-I   | SCL      | 2-wire Serial Interface Clock (MOD-DEF1)                              |
| 6   |           | MOD_DEF0 | Module Absent, connected to VeeT or VeeR in the module                |
| 7   | LVTTL-I   | RS0      | Rate Select 0 – Not used, Presents high input impedance               |
| 8   | LVTTL-O   | RX_LOS   | Receiver Loss of Signal (LVTTL-O). Logic 0 indicates normal operation |
| 9   | LVTTL-I   | RS1      | Rate Select 1 – Not used, Presents high input impedance               |
| 10  |           | VeeR     | Module Receiver Ground                                                |
| 11  |           | VeeR     | Module Receiver Ground                                                |
| 12  | CML-O     | RD-      | Receiver Inverted Data Output                                         |
| 13  | CML-O     | RD+      | Receiver Data Output                                                  |
| 14  |           | VeeR     | Module Receiver Ground                                                |
| 15  |           | VccR     | Module Receiver 3.3V Supply                                           |
| 16  |           | VccT     | Module Receiver 3.3V Supply                                           |
| 17  |           | VeeT     | Module Transmitter Ground                                             |
| 18  | CML-I     | TD+      | Transmitter Non-Inverted DATA in. AC Coupled.                         |
| 19  | CML-I     | TD-      | Transmitter Inverted DATA in. AC Coupled.                             |
| 20  |           | VeeT     | Transmitter Ground                                                    |

## Specifications

### Absolute Maximum Ratings

| Parameter           | Symbol         | Min. | Typ. | Max. | Unit |
|---------------------|----------------|------|------|------|------|
| Storage Temperature | T <sub>s</sub> | -40  | -    | 85   | °C   |
| Relative Humidity   | RH             | 0    |      | 85   | %    |

### Recommended Operating Conditions

| Parameter            | Symbol          | Min. | Typ.     | Max. | Unit | Notes |
|----------------------|-----------------|------|----------|------|------|-------|
| Case Temperature     | T <sub>c</sub>  | 0    | -        | 70   | °C   | 1     |
|                      |                 | -40  | -        | 85   |      | 2     |
| Power Supply Voltage | V <sub>CC</sub> | 3.15 | 3.3      | 3.45 | V    |       |
| Bit Rate             | BR              |      | 25.78125 |      | Gbps |       |

**Note1, 2:** See order information

### Optical Characteristics

| Parameter                               | Symbol           | Min. | Typ. | Max.  | Unit | Notes |
|-----------------------------------------|------------------|------|------|-------|------|-------|
| <b>Transmitter</b>                      |                  |      |      |       |      |       |
| Center Wavelength                       | λ                | 840  |      | 860   | nm   |       |
| RMS Spectral Width                      | P <sub>m</sub>   |      |      | 0.6   | nm   |       |
| Average Optical Power                   | P <sub>avg</sub> | -8.4 |      | 2.4   | dBm  |       |
| Optical Modulation Amplitude            | OMA              | -5   |      | 3     | dBm  |       |
| Average Launch Power of OFF Transmitter | P <sub>off</sub> |      |      | 0.6   | nm   |       |
| Extinction Ratio                        | ER               | 3    |      |       | dB   |       |
| Optical Return Loss Tolerance           |                  |      |      | 12    | dB   |       |
| <b>Receiver</b>                         |                  |      |      |       |      |       |
| Center Wavelength                       | λ                | 840  | 850  | 860   | nm   |       |
| Damage Threshold                        |                  | 3.4  |      |       | dBm  |       |
| Receive Power Overload                  |                  | 2.4  |      |       | dBm  |       |
| Receiver Reflectance                    |                  |      |      | -12   | dBm  |       |
| Receiver Sensitivity                    | SENS             |      |      | -5    | dBm  | 1     |
| Receiver Sensitivity                    | SENS             |      |      | -10.3 | dBm  | 2     |
| LOS Assert                              | LOS <sub>A</sub> | -30  |      |       | dBm  |       |
| LOS De-assert                           | LOS <sub>D</sub> |      |      | -13   | dBm  |       |
| LOS Hysteresis                          | LOSH             | 0.5  |      |       | dB   |       |

#### Note:

1. Measured with a 25.78125G, PRBS-31 NRZ, ER>3.5dB, BER<1E-12.
2. Measured with a 25.78125G, PRBS-31 NRZ, ER>3.5dB, BER<5E-5.

### Electrical Characteristics

| Parameter         | Symbol          | Min. | Typ. | Max. | Unit | Notes |
|-------------------|-----------------|------|------|------|------|-------|
| Power Consumption |                 |      |      | 1    | W    |       |
| Supply Current    | I <sub>cc</sub> |      | 100  | 300  | mA   |       |

## Digital Diagnostic Function

ASCENT's SFP28-25LP-85-01 supports the 2-wire serial communication protocol as defined in the SFP28 MSA, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also access and monitor module information (ex: Media type, Vendor name, Part Number, Serial Number, Wavelength, Voltage, temperature, etc), provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the SFP28 transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the SFP28 transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 00h to the maximum address of the memory.

This clause defines the Memory Map for SFP28 transceiver used for serial ID, digital monitoring and certain control functions. The interface is mandatory for all SFP28 devices. The memory map has been changed in order to accommodate 4 optical channels and limit the required memory space. The structure of the memory is shown in Figure 2 -SFP28 Memory Map. The memory space is arranged into a lower, single page, address space of 128 bytes and multiple upper address space pages. This structure permits timely access to addresses in the lower page, e.g. Interrupt Flags and Monitors. Less time critical entries, e.g. serial ID information and threshold settings, are available with the Page Select function. The structure also provides address expansion by adding additional upper pages as needed. For example, in Figure 2 upper pages 01 and 02 are optional. Upper page 01 allows implementation of Application Select Table, and upper page 02 provides user read/write space. The lower page and upper pages 00 and 03 are always implemented. The interface address used is A0xh and is mainly used for time critical data like interrupt handling in order to enable a "one-time-read" for all data related to an interrupt situation. After an Interrupt, IntL, has been asserted, the host can read out the flag field to determine the effected channel and type of flag.

For more detailed information including memory map definitions, please see the SFP28 MSA Specification.

| Parameter                                      | Accuracy | Unit |
|------------------------------------------------|----------|------|
| Internally Measured Transceiver Temperature    | +/-3     | °C   |
| Internally Measured Transceiver Supply Voltage | +/-3     | %    |
| Measured Tx bias Current                       | +/-10    | %    |
| Measured Tx Output Power                       | +/-3     | dB   |
| Measured Rx Received Average Optical Power     | +/-3     | dB   |

## Ordering Information

| Product Name     | Product Description                                                                              |
|------------------|--------------------------------------------------------------------------------------------------|
| SFP28-25LP-85-01 | SFP28 Plug-in, 25Gbps, 100m, TX/RX 850nm, on two multimode fibres, LC/PC                         |
| S28-25LP-85-01A  | SFP28 Plug-in, 25Gbps, 100m, TX/RX 850nm, on two multimode fibres, LC/PC, Industrial Temperature |

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