

## Product Specification Sheet

### OLSP5525L-C(D)60

RoHS Compliant 2.5Gbps 1550nm 60km Reach SFP Optical Transceiver



### Product Features

- Multi-rate operation, optimized at 2.5Gb/s
- 1550nm DFB laser and PIN photo detector for 60km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitor Interface
- Very low EMI and excellent ESD protection
- +3.3V single power supply
- RoHS compliant
- Case operating temperature

Commercial: 0°C to +70°C

Extended: -10°C to +80°C

Industrial: -40°C to +85°C

### Applications

- SDH STM-16 and SONET OC-48 system
- 2X Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

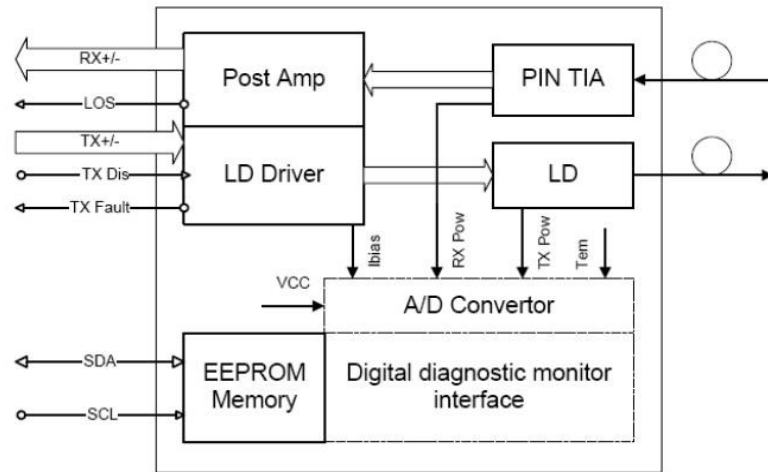
### Description

The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 2.5Gbps and 60km transmission distance with SMF.

The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

### Functional Diagram



### Ordering information

| Product part Number | Data Rate<br>(Mbps) | Media             | Wavelength<br>(nm) | Transmission<br>Distance(m) | Temperature Range<br>(Tcase) (°C) |            |
|---------------------|---------------------|-------------------|--------------------|-----------------------------|-----------------------------------|------------|
|                     |                     |                   |                    |                             |                                   |            |
| OLSP5525L-C(D)60    | 2500                | Single mode fiber | 1550               | 60                          | 0~70                              | commercial |
| OLSP5525L-E(D)60    | 2500                | Single mode fiber | 1550               | 60                          | -10~80                            | extended   |
| OLSP5525L-I(D)60    | 2500                | Single mode fiber | 1550               | 60                          | -45~85                            | industrial |

### Absolute Maximum Ratings

| Parameter           | Symbol | Min. | Max  | Unit | Notes |
|---------------------|--------|------|------|------|-------|
| Supply Voltage      | Vcc    | -0.5 | 3.60 | V    |       |
| Storage Temperature |        | -40  | 85   | °C   |       |
| Relative Humidity   |        | 5    | 85   | %    |       |

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module.

## General Operating Characteristics

| Parameter                  | Symbol          | Min. | Typ. | Max. | Unit | Notes |
|----------------------------|-----------------|------|------|------|------|-------|
| Data Rate                  |                 |      | 2.5  |      | Gb/s |       |
| Supply Voltage             | V <sub>CC</sub> | 3.1  | 3.3  | 3.5  | V    |       |
| Supply Current             | I <sub>CC</sub> |      |      | 220  | mA   |       |
| Operating Case Temperature | T <sub>C</sub>  | 0    |      | 70   | °C   |       |
|                            |                 | -10  |      | 80   |      |       |
|                            |                 | -45  |      | 85   |      |       |

## Electrical Input/Output Characteristics

### • Transmitter

| Parameter                 | Symbol          | Min.            | Typ. | Max.                 | Unit             | Notes |
|---------------------------|-----------------|-----------------|------|----------------------|------------------|-------|
| Diff. Input Voltage Swing |                 | 300             |      | 1800                 | mV <sub>pp</sub> | 1     |
| Tx Disable Input          | H               | V <sub>IH</sub> | 2.0  | V <sub>CC</sub> +0.3 | V                |       |
|                           | L               | V <sub>IL</sub> | 0    | 0.8                  |                  |       |
| Tx Fault Output           | H               | V <sub>OH</sub> | 2.0  | V <sub>CC</sub> +0.3 | V                | 2     |
|                           | L               | V <sub>OL</sub> | 0    | 0.5                  |                  |       |
| Input Diff. Impedance     | Z <sub>in</sub> |                 | 100  |                      | Ω                |       |

### • Receiver

| Parameter                  | Symbol | Min.            | Typ. | Max.                 | Unit             | Notes |
|----------------------------|--------|-----------------|------|----------------------|------------------|-------|
| Diff. Output Voltage Swing |        | 400             |      | 1000                 | mV <sub>pp</sub> | 1     |
| Rx LOS Output              | H      | V <sub>OH</sub> | 2.0  | V <sub>CC</sub> +0.3 | V                | 2     |
|                            | L      | V <sub>OL</sub> | 0    | 0.8                  |                  |       |

Note 1) AC-Coupled CML logic family.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ ohm resistors on the host board. Pull up voltage between 2.0V and V<sub>CC</sub>+0.3V.

## Optical Characteristics

### • Transmitter

| Parameter                   | Symbol                | Min. | Type | Max. | Unit | Notes |
|-----------------------------|-----------------------|------|------|------|------|-------|
| Ave. Output Power (Enable)  | P <sub>o</sub>        | -4   |      | 3    | dBm  | 1     |
| Side mode Suppression Ratio | SMSR                  | 30   |      |      | dB   |       |
| Extinction Ratio            | ER                    | 8.5  |      |      | dB   | 1     |
| Wavelength Range            | $\lambda_c$           |      | 1550 |      | nm   |       |
| Spectral Width (RMS)        | $\Delta\lambda$       |      |      | 1    | nm   |       |
| Output Optical Eye          | ITU-T G.957 Compliant |      |      |      |      |       |

### • Receiver

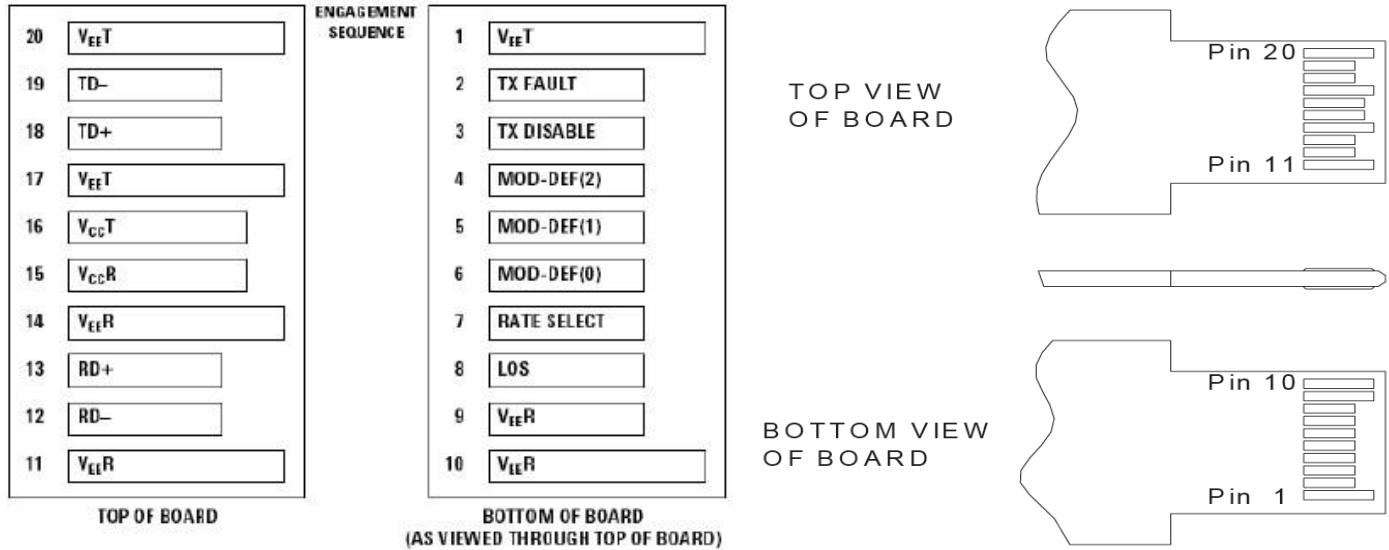
| Parameter            | Symbol                         | Min. | Type | Max. | Unit | Notes |
|----------------------|--------------------------------|------|------|------|------|-------|
| Operating Wavelength |                                | 1270 |      | 1610 | nm   |       |
| Sensitivity          | P <sub>imin</sub>              |      |      | -21  | dBm  | 3     |
| Min. Overload        | P <sub>imax</sub>              | -3   |      |      | dBm  | 3     |
| LOS Assert           | P <sub>a</sub>                 | -35  |      |      | dBm  |       |
| LOS De-assert        | P <sub>d</sub>                 |      |      | -22  | dBm  |       |
| LOS Hysteresis       | P <sub>d</sub> -P <sub>a</sub> | 0.5  |      | 6    | dB   |       |

Note 1) Measured at 2488 Mb/s with PRBS 2<sup>23</sup> – 1 NRZ test pattern.

Note 2) Meet the specified maximum output jitter requirements if the specified maximum input jitter is present.

Note 3) Measured at 2488 Mb/s with PRBS 2<sup>23</sup> – 1 NRZ test pattern for BER < 1x10<sup>-10</sup>

## Pin Definitions and Functions



| PIN # | Name              | Function                                               | Notes  |
|-------|-------------------|--------------------------------------------------------|--------|
| 1     | V <sub>ee</sub> T | Tx ground                                              |        |
| 2     | Tx Fault          | Tx fault indication, Open Collector Output, active "H" | Note 1 |
| 3     | Tx Disable        | LVTTTL Input, internal pull-up, Tx disabled on "H"     | Note 2 |
| 4     | MOD-DEF2          | 2 wire serial interface data input/output (SDA)        | Note 3 |
| 5     | MOD-DEF1          | 2 wire serial interface clock input (SCL)              | Note 3 |
| 6     | MOD-DEF0          | Model present indication                               | Note 3 |
| 7     | Rate select       | No connection                                          |        |
| 8     | LOS               | Rx loss of signal, Open Collector Output, active "H"   | Note 4 |
| 9     | V <sub>ee</sub> R | Rx ground                                              |        |
| 10    | V <sub>ee</sub> R | Rx ground                                              |        |
| 11    | V <sub>ee</sub> R | Rx ground                                              |        |
| 12    | RD-               | Inverse received data out                              | Note 5 |
| 13    | RD+               | Received data out                                      | Note 5 |
| 14    | V <sub>ee</sub> R | Rx ground                                              |        |
| 15    | V <sub>cc</sub> R | Rx power supply                                        |        |
| 16    | V <sub>cc</sub> T | Tx power supply                                        |        |
| 17    | V <sub>ee</sub> T | Tx ground                                              |        |
| 18    | TD+               | Transmit data in                                       | Note 6 |
| 19    | TD-               | Inverse transmit data in                               | Note 6 |
| 20    | V <sub>ee</sub> T | Tx ground                                              |        |

Note 1) When high, this output indicates a laser fault of some kind. Low indicates normal operation. And

should be pulled up with a 4.7 – 10K $\Omega$  resistor on the host board.

Note 2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10K $\Omega$  resistor. Its states are:

Low (0 – 0.8V): Transmitter on ( $>0.8, < 2.0V$ ): Undefined  
High (2.0V~Vcc+0.3V): Transmitter Disabled Open: Transmitter Disabled

Note 3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10K $\Omega$  resistor on the host board. The pull-up voltage shall be between 2.0V~Vcc+0.3V.

Mod-Def 0 has been grounded by the module to indicate that the module is present

Mod-Def 1 is the clock line of two wire serial interface for serial ID

Mod-Def 2 is the data line of two wire serial interface for serial ID

Note 4) When high, this output indicates loss of signal (LOS). Low indicates normal operation.

Note 5) RD+/-: These are the differential receiver outputs. They are AC coupled 100 $\Omega$  differential lines which should be terminated with 100 $\Omega$  (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

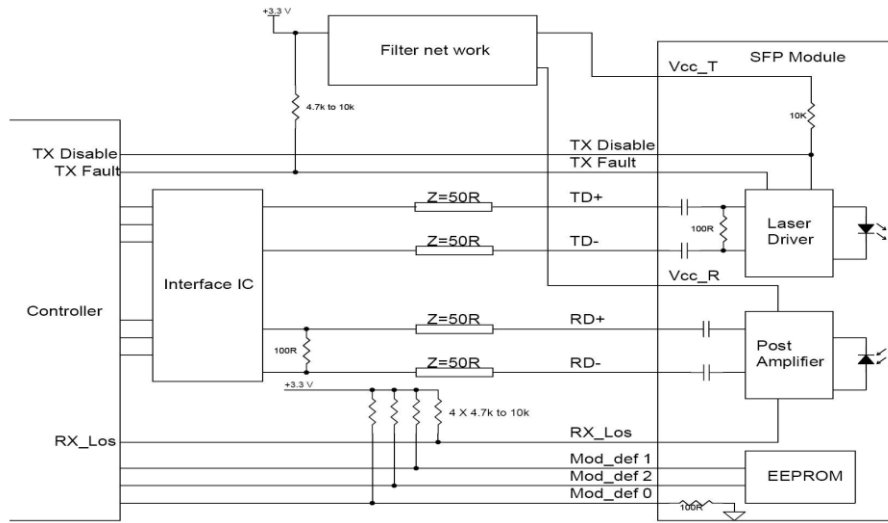
Note 6) TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 $\Omega$  differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

## Diagnostics

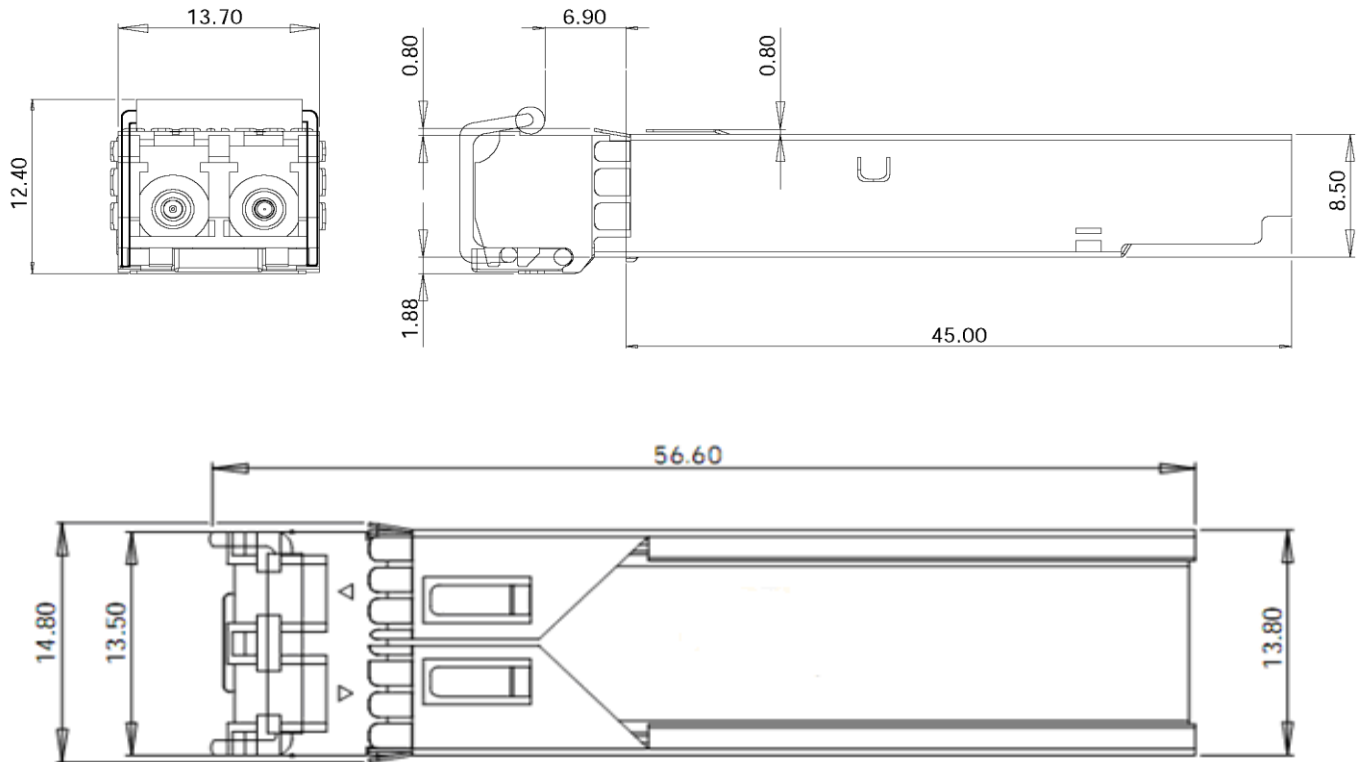
### Diagnostics Specification

| Parameter    | Range               | Unit               | Accuracy                | Calibration        |
|--------------|---------------------|--------------------|-------------------------|--------------------|
| Temperature  | 0 to +70 -40 to +85 | $^{\circ}\text{C}$ | $\pm 3^{\circ}\text{C}$ | Internal/ External |
| Voltage      | 3.0 to 3.6          | V                  | $\pm 3\%$               | Internal/ External |
| Bias Current | 2 to 15             | mA                 | $\pm 10\%$              | Internal/ External |
| TX Power     | -6 to 5             | dBm                | $\pm 3\text{dB}$        | Internal/ External |
| RX Power     | -24 to 0            | dBm                | $\pm 3\text{dB}$        | Internal/ External |

### Typical Interface Circuit



### Package Dimensions



### Ordering Information & Related Products

|                |                                                    |
|----------------|----------------------------------------------------|
| OLSP5525L-CN60 | Dual Fiber SFP, 2.5Gbps, 1550nm, 60km, without DDM |
| OLSP5525L-CD60 | Dual Fiber SFP, 2.5Gbps, 1550nm, 60km, with DDM    |