

# 1.25Gb/s CWDM SFP Optical Transceiver with DDMI

HCSFP-24-0XXY2-22F

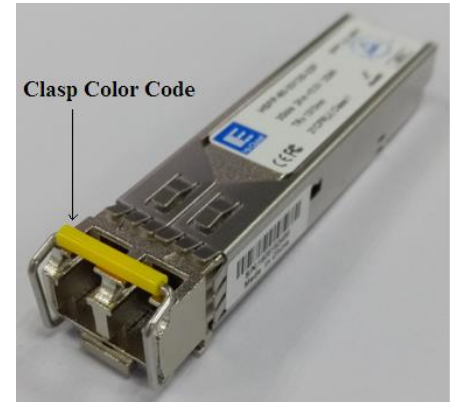
1271~1611nm DFB-LD/APD-TIA

XX=27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61



## Features:

- ✧ Multi-Source Package with Duplex LC Connector
- ✧ Up to 1.25Gb/s Data Links
- ✧ 34dB Power budget
- ✧ Single +3.3V Power Supply
- ✧ Hot-Pluggable
- ✧ Compliant with Specifications for ITU-T G.957, G.958
- ✧ Eye Safety Designed to Meet Laser Class1, Compliant with IEC60825
- ✧ Monitoring Interface Compliant with SFF-8472
- ✧ Compliant with Bellcore TA-NWT-000983
- ✧ Operating Case Temperature  
Standard(Y=1):0°C~+70°C  
Industrial(Y=2):-20°C~+85°C
- ✧ RoHS Compliant Products



## Applications:

- ✧ Gigabit Ethernet
- ✧ Metro/Access Networks
- ✧ SDH/SONET/ATM
- ✧ Fiber Channel
- ✧ Other Optical Links

## Specification:

### Product Selection:

HCSFP-24-0XXY2-22F

| XX | Centre Wavelength(λ) | Clasp Color Code. | XX | Centre Wavelength(λ) | Clasp Color Code. |
|----|----------------------|-------------------|----|----------------------|-------------------|
| 27 | 1271nm               | Gray              | 45 | 1451nm               | Yellow            |
| 29 | 1291nm               | Purple            | 47 | 1471nm               | Gray              |
| 31 | 1311nm               | Blue              | 49 | 1491nm               | Purple            |
| 33 | 1331nm               | Green             | 51 | 1511nm               | Blue              |
| 35 | 1351nm               | Yellow            | 53 | 1531nm               | Green             |
| 37 | 1371nm               | Orange            | 55 | 1551nm               | Yellow            |
| 39 | 1391nm               | Red               | 57 | 1571nm               | Orange            |
| 41 | 1411nm               | Brown             | 59 | 1591nm               | Red               |
| 43 | 1431nm               | Green             | 61 | 1611nm               | Brown             |

\*For the relation between transmission distance and power budget, it is related to the power penalty, the value is about 0.20~0.35dB/km under 1271~1611nm.

## Shenzhen Hi-Optel Technology Co., Ltd.

Hi-Optel Building,BLOG2,Gaofa Technology Park,Longjing,Nanshan Shenzhen,China. 518055

Tel: +86 755 2675 3088

Fax: +86 755 2675309

E-mail: info@hioptel.com

[Http://www.hioptel.com](http://www.hioptel.com)

# 1.25Gb/s CWDM SFP Optical Transceiver with DDMI

HCSFP-24-0XXY2-22F

1271~1611nm DFB-LD/APD-TIA

XX=27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61



## Electrical and Optical Characteristics: (Condition: T<sub>a</sub>=T<sub>OP</sub>)

| Parameter                           | Symbol          | Min. | Typical | Max.            | Unit   |
|-------------------------------------|-----------------|------|---------|-----------------|--------|
| Transmitter Differential Input Volt | +/-TX_DAT       | 200  |         | 2400            | mV p-p |
| Supply Current                      | ICC             |      | 180     | 350             | mA     |
| Tx_Disable Input Voltage – Low      | V <sub>IL</sub> | 0    |         | 0.8             | V      |
| Tx_Disable Input Voltage – High     | V <sub>IH</sub> | 2.0  |         | V <sub>CC</sub> | V      |
| Tx_Fault Output Voltage – Low       | V <sub>OL</sub> | 0    |         | 0.8             | V      |
| Tx_Fault Output Voltage – High      | V <sub>OH</sub> | 2.0  |         | V <sub>CC</sub> | V      |
| Receiver Differential Output Volt   | +/-RX_DAT       | 400  |         | 1400            | mV p-p |
| Rx_LOS Output Voltage- Low          | V <sub>OL</sub> | 0    |         | 0.8             | V      |
| Rx_LOS Output Voltage- High         | V <sub>OH</sub> | 2.0  |         | V <sub>CC</sub> | V      |

### Transmitter:

| Parameter                       | Symbol                            | Min.          | Typical   | Max.          | Unit |
|---------------------------------|-----------------------------------|---------------|-----------|---------------|------|
| Data Rate                       | B                                 | -             | 1.25      | -             | Gb/s |
| Centre Wavelength*Note1         | $\lambda_c$                       | $\lambda-6.5$ | $\lambda$ | $\lambda+6.5$ | nm   |
| Output Spectral Width           | $\Delta\lambda(-20dB)$            | -             | -         | 1             | nm   |
| Side Mode Suppression Ratio     | SMSR                              | 30            |           |               | dB   |
| Average Output Power*Note2      | P <sub>o</sub>                    | 0             | -         | 5             | dBm  |
| Extinction Ratio*Note3          | E.R.                              | 8.2           | -         | -             | dB   |
| Supply Current                  | ICC                               | -             | 100       | 230           | mA   |
| Rise/Fall Time(20%~80%)         | tr/tf                             | -             | -         | 260           | ps   |
| Average Output Power@TX_DISABLE | P <sub>o_dis</sub>                |               |           | -45           | dBm  |
| Output Optical Eye              | Compatible with IEEE 802.3ah-2004 |               |           |               |      |

### Receiver:

| Parameter                         | Symbol           | Min. | Typical | Max. | Unit |
|-----------------------------------|------------------|------|---------|------|------|
| Date Rate                         | B                | -    | 1.25    | -    | Gb/s |
| Receive Sensitivity*Note4         | P <sub>min</sub> | -    | -       | -34  | dBm  |
| Maximum Input Power               | P <sub>max</sub> | -7   | -       | -    | dBm  |
| Signal Detect Threshold-De-Assert | S <sub>D</sub>   |      |         | -36  | dBm  |
| Signal Detect Threshold-Assert    | S <sub>A</sub>   | -45  |         |      | dBm  |
| Hysteresis                        | -                |      | 2.0     |      | dB   |
| Return Loss                       | RL               | 12   | -       | -    | dB   |
| Supply Current                    | ICC              | -    | 80      | 120  | mA   |
| Operating Wavelength              | $\lambda_c$      | 1100 | -       | 1620 | nm   |

## Shenzhen Hi-Optel Technology Co., Ltd.

Hi-Optel Building,BLOG2,Gaofa Technology Park,Longjing,Nanshan Shenzhen,China. 518055

Tel: +86 755 2675 3088

Fax: +86 755 2675309

E-mail: info@hioptel.com

[Http://www.hioptel.com](http://www.hioptel.com)

## 1.25Gb/s CWDM SFP Optical Transceiver with DDMI

HCSFP-24-0XXY2-22F

1271~1611nm DFB-LD/APD-TIA

XX=27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61



Note1: Wavelengths from 1271 nm to 1611 nm, with 20 nm span. Please contact Hi-Optel to confirm the wavelength availability.

Note2: Measured with 9/125μm single-mode fiber.

Note3: Filtered, measured with a PRBS 2<sup>7</sup>-1 test pattern @1.25Gbps

Note4: Measured with ER=8.2dB, 2<sup>7</sup>-1 PRBS data pattern, BER ≤ 1E-12.

### Absolute Maximum Ratings:

| Parameter             |     | Symbol          | Min. | Max. | Unit |
|-----------------------|-----|-----------------|------|------|------|
| Storage Temperature   |     | T <sub>ST</sub> | -40  | +85  | °C   |
| Operating Temperature | Y=1 | T <sub>IP</sub> | 0    | +70  | °C   |
|                       | Y=2 |                 | -20  | +85  |      |
| Input Voltage         |     | T <sub>CC</sub> | 0    | +3.6 | V    |

### Recommended Operating Environment:

| Parameter             |     | Symbol          | Min. | Typical | Max. | Unit |
|-----------------------|-----|-----------------|------|---------|------|------|
| Supply Voltage        |     | V <sub>CC</sub> | +3.0 | +3.3    | +3.6 | V    |
| Operating Temperature | Y=1 | T <sub>OP</sub> | 0    | -       | +70  | °C   |
|                       | Y=2 |                 | -20  | -       | +85  |      |

### Timing Characteristics

| Parameter                                       | Symbol             | Min. | Typical | Max. | Unit |
|-------------------------------------------------|--------------------|------|---------|------|------|
| TX_DISABLE Assert Time                          | t <sub>off</sub>   |      | 3       | 10   | usec |
| TX_DISABLE Negate Time                          | t <sub>on</sub>    |      | 0.5     | 1    | msec |
| Time to Initialize Include Reset of TX_FAULT    | t <sub>int</sub>   |      | 30      | 300  | msec |
| TX_FAULT from Fault to Assertion                | t <sub>fault</sub> |      | 20      | 100  | usec |
| TX_DISBEL Time to Start Reset                   | t <sub>reset</sub> | 10   |         |      | usec |
| Receiver Loss of Signal Assert Time (Off to On) | Ta,RX_LOS          |      |         | 100  | usec |
| Receiver Loss of Signal Assert Time (On to Off) | Td,RX_LOS          |      |         | 100  | usec |

## Shenzhen Hi-Optel Technology Co., Ltd.

Hi-Optel Building,BLOG2,Gaofa Technology Park,Longjing,Nanshan Shenzhen,China. 518055

Tel: +86 755 2675 3088

Fax: +86 755 2675309

E-mail: info@hioptel.com

[Http://www.hioptel.com](http://www.hioptel.com)

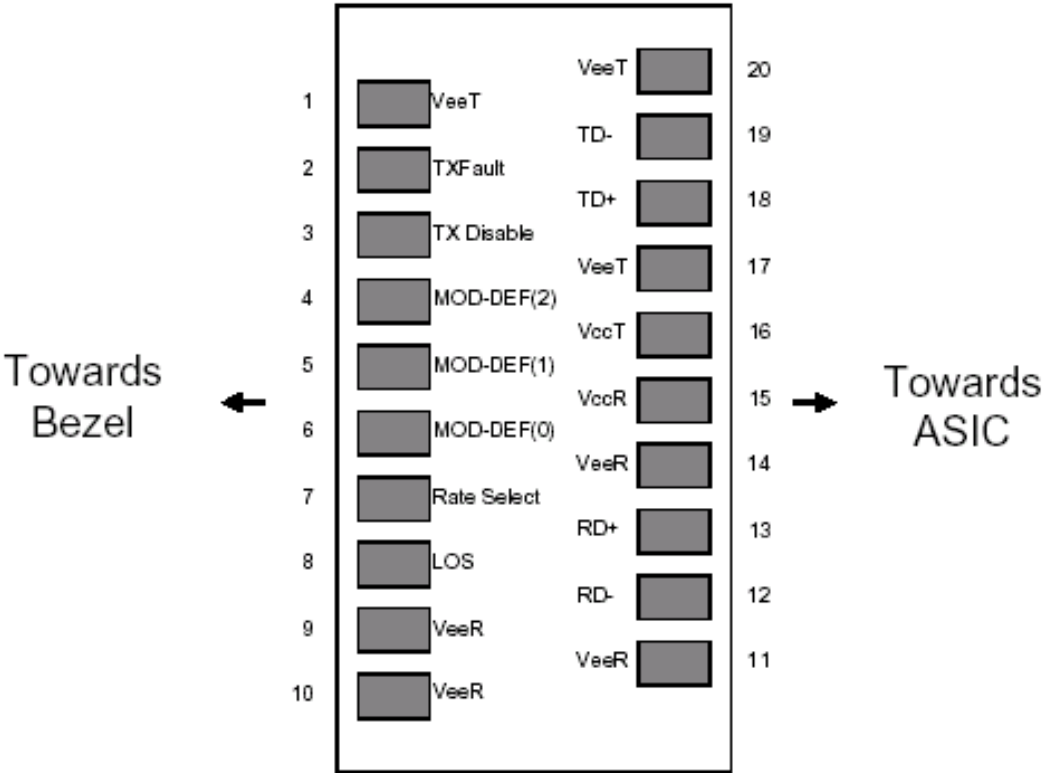


Regulatory Compliance

| Feature                                               | Standard                                                 | Performance                           |
|-------------------------------------------------------|----------------------------------------------------------|---------------------------------------|
| Electrostatic Discharge(ESD) to the Electrical Pins   | MIL-STD-883E Method 3015.7                               | Class 1(>500 V)                       |
| Electrostatic Discharge(ESD) To the Duplex Receptacle | IEC61000-4-2                                             | Class 2(>4000V)                       |
| Electromagnetic Interference (EMI)                    | FCC Part 15 Class B                                      | Compatible with standards             |
| Immunity                                              | IEC61000-4-3                                             | Compatible with standards             |
| Laser eye safety                                      | FDA21CFR1040.10and1040.11<br>EN60950, EN (IEC) 60825-1,2 | Compatible with Class I laser product |
| Component Recognition                                 | UL and CE                                                | Compatible with standards             |
| ROHS                                                  | ROHS6                                                    | Compatible with standards             |

Note: For the latest certification information, please check with Hi-Optel.

Pin Assignment



Pin out of Connector Block on Host Board

## 1.25Gb/s CWDM SFP Optical Transceiver with DDMI

HCSFP-24-0XXY2-22F

1271~1611nm DFB-LD/APD-TIA

XX=27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61



### Pin Description

| Pin | Symbol      | Name/Description                                              | Ref |
|-----|-------------|---------------------------------------------------------------|-----|
| 1   | VEET        | Transmitter Ground(Common with Receiver Ground)               | 1   |
| 2   | TFAULT      | Transmitter Fault.Low normal operation,High Fault indication  |     |
| 3   | TDIS        | Transmitter Disable.Laser output disabled on high or open     | 2   |
| 4   | MOD_DEF(2)  | Module Definition 2.Data line for Serial ID                   | 3   |
| 5   | MOD_DEF(1)  | Module Definition 1.Clock line for Serial ID                  | 3   |
| 6   | MOD_DEF(0)  | Module Definition 0.Grounded within the moudle                | 3   |
| 7   | Rate Select | No connection required                                        |     |
| 8   | LOS         | Loss of Signal indication.Logic 0 indicates normal operation. | 4   |
| 9   | VEER        | Receiver Ground(Common with Transmitter Ground)               | 1   |
| 10  | VEER        | Receiver Ground(Common with Transmitter Ground)               | 1   |
| 11  | VEER        | Receiver Ground(Common with Transmitter Ground)               | 1   |
| 12  | RD-         | Receiver Inverted DATA out.AC Coupled                         |     |
| 13  | RD+         | Receiver Non-inverted DATA out.AC Coupled                     |     |
| 14  | VEER        | Receiver Ground(Common with Transmitter Ground)               | 1   |
| 15  | VCCR        | Receiver Power Supply                                         |     |
| 16  | VCCT        | Transmitter Power Supply                                      |     |
| 17  | VEET        | Transmitter Ground(Common with Receiver Ground)               | 1   |
| 18  | TD+         | Transmitter Non-inverted DATA in.AC Coupled                   |     |
| 19  | TD-         | Transmitter Inverted DATA in.AC Coupled                       |     |
| 20  | VEET        | Transmitter Ground(Common with Receiver Ground)               | 1   |

#### Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.  
MOD\_DEF(0) pulls line low to indicate module is plugged in.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

### Shenzhen Hi-Optel Technology Co., Ltd.

Hi-Optel Building,BLOG2,Gaofa Technology Park,Longjing,Nanshan Shenzhen,China. 518055

Tel: +86 755 2675 3088

Fax: +86 755 2675309

E-mail: info@hioptel.com

[Http://www.hioptel.com](http://www.hioptel.com)

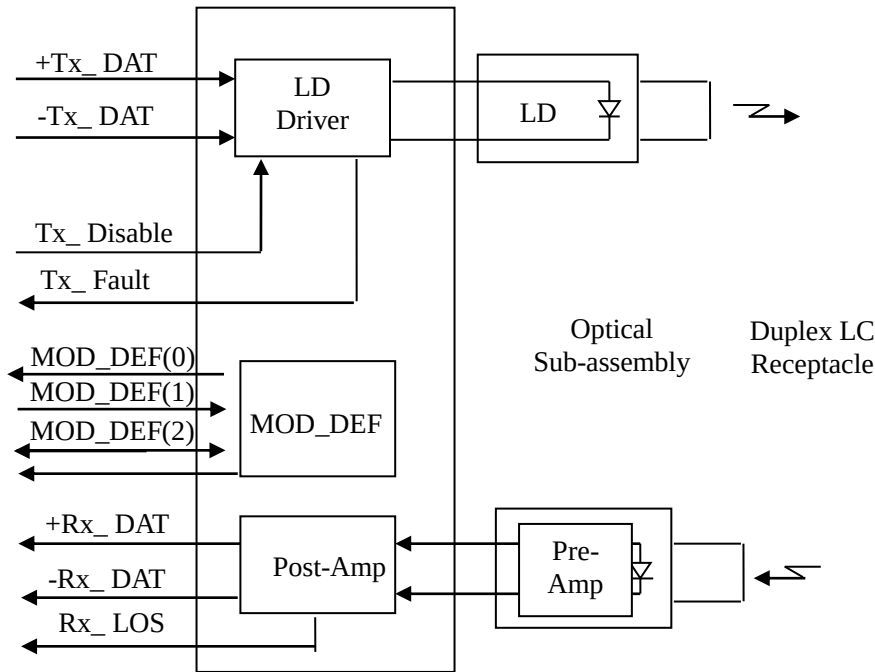
Page 5 of 8

Rev2.0

Issued Date: 2017-10-09



Block Diagram of Transceiver



Data Field Descriptions

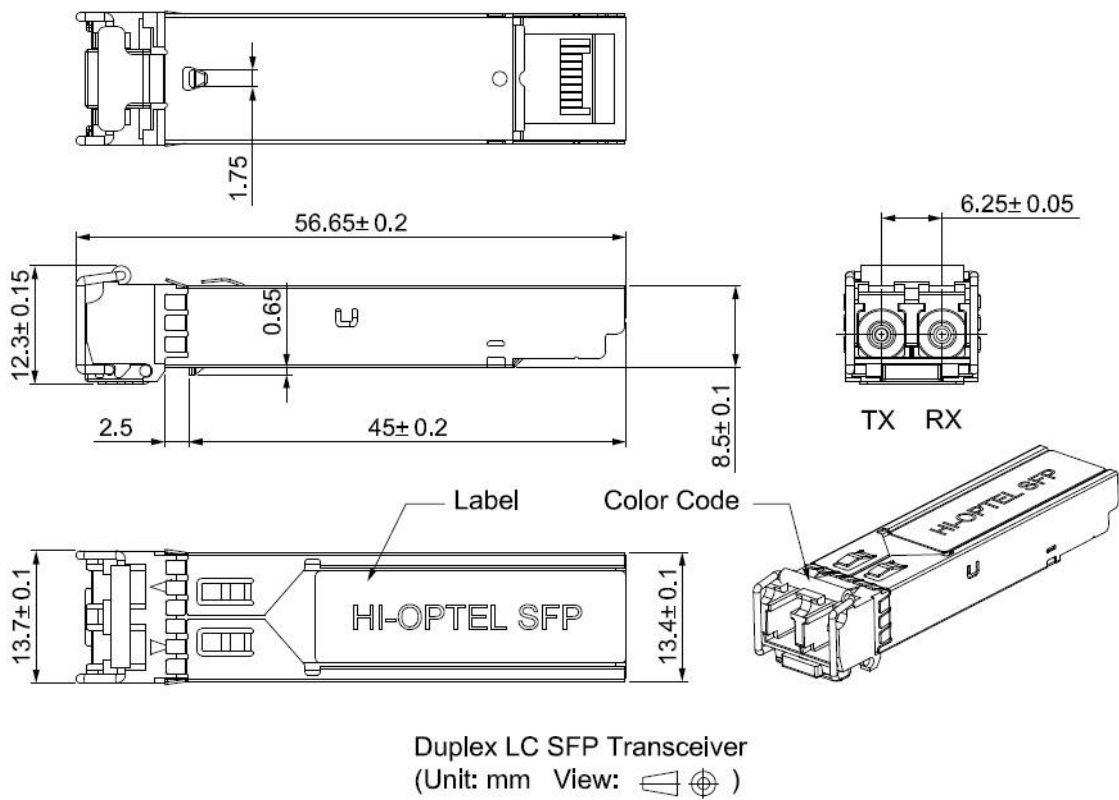
| Address(1010000X) (A0h)                      | Address(1010001X) (A2h)                               |
|----------------------------------------------|-------------------------------------------------------|
| 0                                            | 0                                                     |
| Serial ID Information:<br>Defined by SFP MSA | Alarm and Warning Limits                              |
| 95                                           | 55                                                    |
| Hi-Optel Specific Information                | Reserved for External<br>Calibration Constants        |
| 127                                          | 95                                                    |
| Reserved for SFP MSA                         | Real Time Diagnostic<br>Information                   |
| 255                                          | 119                                                   |
|                                              | Hi-Optel Specific Information                         |
|                                              | 127                                                   |
|                                              | Non-volatile, customer-<br>writeable, field-writeable |
|                                              | 247                                                   |
|                                              | Hi-Optel Specific Information                         |
|                                              | 255                                                   |



Digital Diagnostic Monitor Characteristics

| A2h address | Parameter   | Calibration | Accuracy | Unit |
|-------------|-------------|-------------|----------|------|
| 96-97       | Temperature | Internal    | +/- 3    | ℃    |
| 98-99       | Vcc         | Internal    | +/- 3%   | V    |
| 100-101     | Tx bias     | Internal    | +/- 10%  | mA   |
| 102-103     | Tx power    | Internal    | +/- 3    | dB   |
| 104-105     | Rx Power    | Internal    | +/- 3    | dB   |

Mechanical Dimensions:



## 1.25Gb/s CWDM SFP Optical Transceiver with DDMI

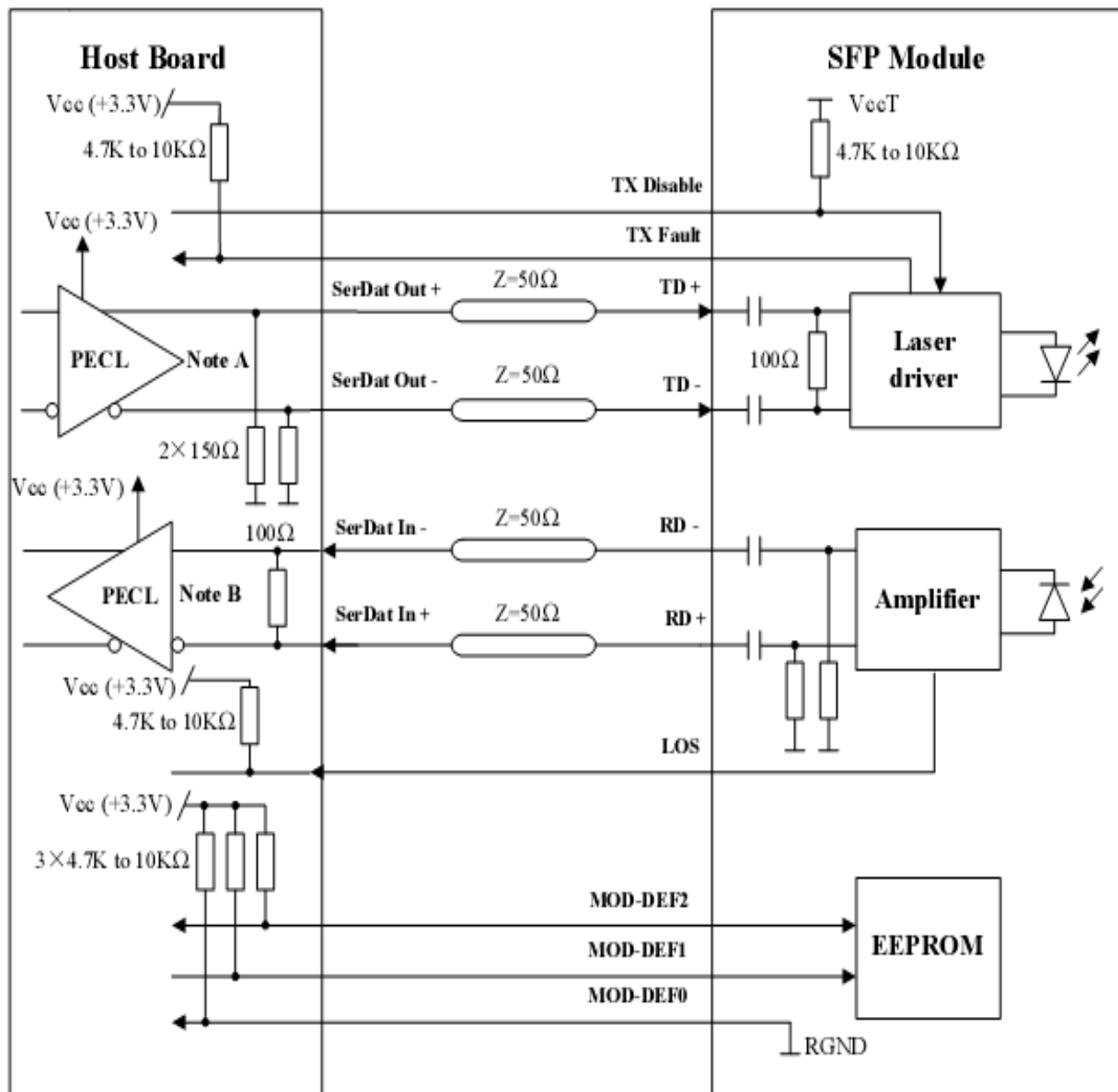
HCSFP-24-0XXY2-22F

1271~1611nm DFB-LD/APD-TIA

XX=27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61



### Recommended Circuit:



Note A: Circuit assumes open emitter output

Note B: Circuit assumes high impedance internal bias @Vcc-1.3V

### Shenzhen Hi-Optel Technology Co., Ltd.

Hi-Optel Building, BLOG2, Gaofa Technology Park, Longjing, Nanshan Shenzhen, China. 518055

Tel: +86 755 2675 3088

Fax: +86 755 2675309

E-mail: [info@hioptel.com](mailto:info@hioptel.com)

<http://www.hioptel.com>