

## 1.25Gb/s SFP BIDI 20km Transceiver HXSX-1L35/5323x

### Features

- Up to 1.25Gb/s data links
- 1310nm FP laser and PIN receiver for HXSX-1L3523x
- 1550nm DFB laser and PIN receiver for HXSX-1L5323x
- Up to 20km on 9/125um SMF
- Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- Low power dissipation
- RoHS-10 compliant and lead-free
- Support Digital Monitoring interface
- Single +3.3V power supply
- Compliant with SFF-8472
- Metal enclosure, for lower EMI
- Meet ESD requirements, resist 8KV direct contact voltage
- Case operating temperature  
Commercial: 0 ~ +70°C  
Extended: -10 ~ +80°C  
Industrial: -40 ~ +85°C



### Applications

- Switch to Switch Interface
- Gigabit Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

### Part Number Ordering Information

| Part Number     | Data Rate<br>(Gb/s) | Wavelength<br>(nm)             | Transmission<br>Distance(km) | Temperature (°C)<br>(Operating Case) |
|-----------------|---------------------|--------------------------------|------------------------------|--------------------------------------|
| HXSX-1L35/5323C | 1.25                | 1310Tx/1550Rx<br>1550Tx/1310Rx | 20                           | 0~70 commercial                      |
| HXSX-1L35/5323E | 1.25                |                                | 20                           | -10~80 Extended                      |
| HXSX-1L35/5323I | 1.25                |                                | 20                           | -40~85 Industrial                    |

## I. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

| Parameter                            | Symbol          | Min  | Max | Unit | Notes |
|--------------------------------------|-----------------|------|-----|------|-------|
| Storage Temperature                  | T <sub>S</sub>  | -40  | 85  | °C   |       |
| Power Supply Voltage                 | V <sub>CC</sub> | -0.5 | 3.6 | V    |       |
| Relative Humidity (non-condensation) | RH              | 5    | 95  | %    |       |
| Damage Threshold                     | TH <sub>d</sub> | 5    |     | dBm  |       |

## II. Recommended Operating Conditions

| Parameter                  | Symbol          | Min   | Typical | Max             | Unit | Notes      |
|----------------------------|-----------------|-------|---------|-----------------|------|------------|
| Operating Case Temperature | T <sub>OP</sub> | 0     |         | 70              | °C   | commercial |
|                            |                 | -10   |         | 80              |      | extended   |
|                            |                 | -40   |         | 85              |      | Industrial |
| Power Supply Voltage       | V <sub>CC</sub> | 3.135 | 3.3     | 3.465           | V    |            |
| Data Rate                  |                 |       | 1.25    |                 | Gb/s |            |
| Control Input Voltage High |                 | 2     |         | V <sub>CC</sub> | V    |            |
| Control Input Voltage Low  |                 | 0     |         | 0.8             | V    |            |
| Link Distance (SMF)        | D               |       |         | 20              | km   | 9/125um    |

## III. General Description

Walsun'HXSX-1L3523x/ HXSX-1L5323x Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the 1310nm FP/1550nm DFB laser and the PIN photo-detector. The module data link up to 20km in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser.

Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

## IV. Pin Assignment and Pin Description

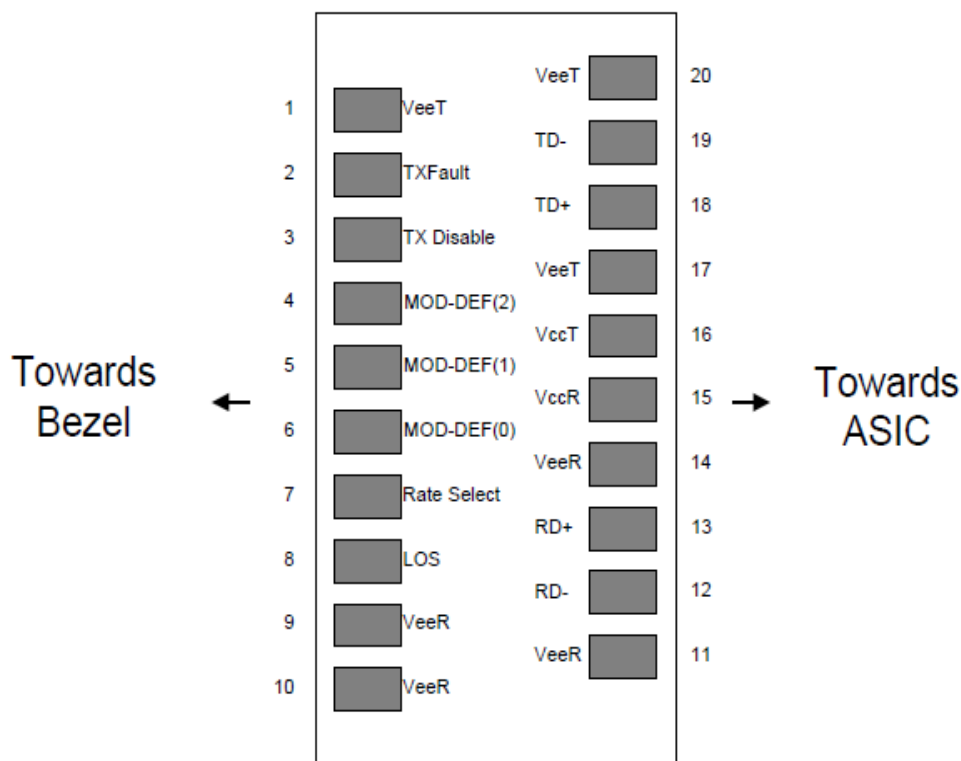


Figure1. Diagram of host board connector block pin numbers and names

| Pin | Symbol      | Name/Description                                               | Notes |
|-----|-------------|----------------------------------------------------------------|-------|
| 1   | VEET        | Transmitter Ground (Common with Receiver Ground)               | 1     |
| 2   | TXFAULT     | Transmitter Fault.                                             |       |
| 3   | TXDIS       | 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 module.               | 3     |
| 7   | Rate Select | No connection required                                         | 4     |
| 8   | LOS         | Loss of Signal indication. Logic 0 indicates normal operation. | 5     |

|    |      |                                                  |   |
|----|------|--------------------------------------------------|---|
| 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-10k ohms 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. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates). If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:
  - 1) Low (0 – 0.8V): Reduced Bandwidth
  - 2) (>0.8, < 2.0V): Undefined
  - 3) High (2.0 – 3.465V): Full Bandwidth
  - 4) Open: Reduced Bandwidth
5. LOS is open collector output should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## V. Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter         | Symbol | Min. | Typical | Max  | Unit | Notes      |
|-------------------|--------|------|---------|------|------|------------|
| Power Consumption | P      |      |         | 0.86 | W    | commercial |
|                   |        |      |         | 0.95 |      | Industrial |

|                                      |                     |                      |     |                 |                  |            |
|--------------------------------------|---------------------|----------------------|-----|-----------------|------------------|------------|
| Supply Current                       | I <sub>cc</sub>     |                      |     | 260             | mA               | commercial |
|                                      |                     |                      |     | 280             |                  | Industrial |
| Transmitter                          |                     |                      |     |                 |                  |            |
| Single-ended Input Voltage Tolerance | V <sub>CC</sub>     | -0.3                 |     | 4.0             | V                |            |
| Differential Input Voltage Swing     | V <sub>in,pp</sub>  | 200                  |     | 2400            | mV <sub>pp</sub> |            |
| Differential Input Impedance         | Z <sub>in</sub>     | 90                   | 100 | 110             | Oh <sub>m</sub>  |            |
| Transmit Disable Assert Time         |                     |                      |     | 5               | us               |            |
| Transmit Disable Voltage             | V <sub>dis</sub>    | V <sub>cc</sub> -1.3 |     | V <sub>cc</sub> | V                |            |
| Transmit Enable Voltage              | V <sub>en</sub>     | V <sub>ee</sub> -0.3 |     | 0.8             | V                |            |
| Receiver                             |                     |                      |     |                 |                  |            |
| Differential Output Voltage Swing    | V <sub>out,pp</sub> | 500                  |     | 900             | mV <sub>pp</sub> |            |
| Differential Output Impedance        | Z <sub>out</sub>    | 90                   | 100 | 110             | Oh <sub>m</sub>  |            |
| Data output rise/fall time           | Tr/Tf               |                      | 100 |                 | ps               | 20% to 80% |
| LOS Assert Voltage                   | V <sub>losH</sub>   | V <sub>cc</sub> -1.3 |     | V <sub>cc</sub> | V                |            |
| LOS De-assert Voltage                | V <sub>losL</sub>   | V <sub>ee</sub> -0.3 |     | 0.8             | V                |            |

## VI. Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

| Parameter                   | Symbol      | Min. | Typical | Max   | Unit | Notes  |
|-----------------------------|-------------|------|---------|-------|------|--------|
| <b>Transmitter</b>          |             |      |         |       |      |        |
| Center Wavelength           | $\lambda_c$ | 1290 | 1310    | 1330  | nm   |        |
|                             |             | 1530 | 1550    | 1570  | nm   |        |
| Spectrum Bandwidth (RMS)    | $\sigma$    |      |         | 3.5/1 | nm   | FP/DFB |
| Side Mode Suppression Ratio | SMSR        | 30   |         |       | dB   | DFB    |

|                                  |                                             |      |      |      |     |   |
|----------------------------------|---------------------------------------------|------|------|------|-----|---|
| Average Optical Power            | P <sub>AVG</sub>                            | -9   |      | -3   | dBm | 1 |
| Extinction Ratio                 | ER                                          | 9    |      |      | dB  |   |
| Transmitter OFF Output Power     | P <sub>off</sub>                            |      |      | -45  | dBm |   |
| Transmitter Eye Mask             | Compliant with 802.3z(class 1 laser safety) |      |      |      |     | 2 |
| Receiver                         |                                             |      |      |      |     |   |
| Center Wavelength                | $\lambda_c$                                 | 1530 | 1550 | 1570 | nm  |   |
|                                  |                                             | 1290 | 1310 | 1330 | nm  |   |
| Sensitivity (Average Power)      | Sen.                                        |      |      | -20  | dBm | 3 |
| Input Saturation Power(overload) | P <sub>sat</sub>                            | -3   |      |      | dBm |   |
| LOS Assert                       | LOSA                                        | -36  |      |      | dBm | 4 |
| LOS De-assert                    | LOSD                                        |      |      | -21  | dBm | 4 |
| LOS Hysteresis                   | LOSH                                        | 0.5  |      |      | dB  |   |

Notes:

1. Measure at 2<sup>7</sup>-1 NRZ PRBS pattern
2. Transmitter eye mask definition.
3. Measured with Light source 1310nm/1550nm, ER=9dB; BER≤1E-12 @PRBS=2<sup>7</sup>-1 NRZ
4. When LOS de-asserted, the RX data+/- output is High-level (fixed).

## VII. Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

| Parameter                             | Symbol   | Min.  | Max  | Unit | Notes                |
|---------------------------------------|----------|-------|------|------|----------------------|
| Temperature monitor absolute error    | DMI_Temp | -3    | 3    | °C   | Over operating temp  |
| Supply voltage monitor absolute error | DMI_VCC  | -0.15 | 0.15 | V    | Full operating range |
| RX power monitor absolute error       | DMI_RX   | -3    | 3    | dB   |                      |
| Bias current monitor                  | DMI_bias | -10%  | 10%  | mA   |                      |
| TX power monitor absolute error       | DMI_TX   | -3    | 3    | dB   |                      |

## VIII. Mechanical Dimensions

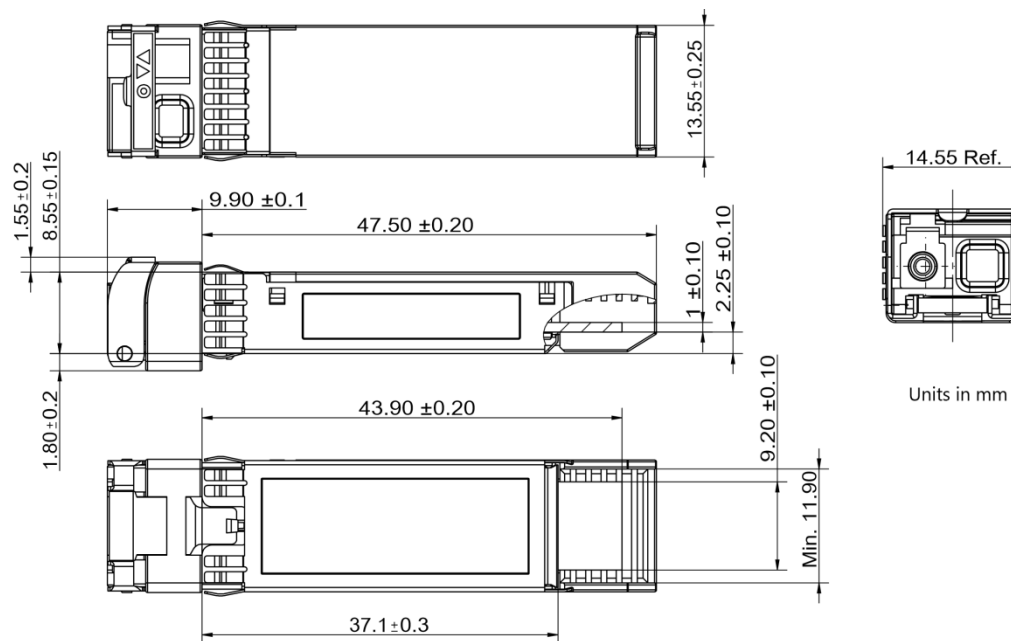


Figure2. Mechanical Outline

## IX. Revision History

| Version No. | Initiated  | Revised contents      | Release Date |
|-------------|------------|-----------------------|--------------|
| 1.0         | Andy Zhang | Preliminary datasheet | 2014-06-11   |
| 1.1         | Andy Zhang | Mechanical Change     | 2016-04-08   |

## X. Contact us

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