

**BTRS-37120-1510G / BTRS-37120-1510-SPG / BTRS-37120A-1510G / BTRS-37120A-1510-SPG**  
**1510 nm TX / 1590 nm RX , 3.3V / 155 Mbps RoHS Compliant SFF Single-Fiber Transceiver**

**FEATURES**

- | Single Fiber SFF Bi-Directional Transceiver
- | 1510 nm DFB LD Transmitter
- | 1590 nm Receiver
- | Distance Up to 120 km
- | Single +3.3 V Power Supply
- | RoHS Compliant
- | PECL Differential Inputs and Outputs
- | 0 to 70°C Operating: BTRS-37120-1510G
- | -20 to 85°C Operating: BTRS-37120A-1510G
- | Wave Solderable and Aqueous Washable
- | Class 1 Laser International Safety Standard IEC-60825 Compliant

**APPLICATIONS**

- | WDM 155 Mb/s Links
- | SONET/SDH Equipment Interconnect
- | Fast Ethernet 100 Mb/s Links

**DESCRIPTION**

The BTRS-37120-1510G series is high performance module for single fiber communications by using 1510 nm transmitter and 1590 nm receiver. The transmitter section uses a multiple quantum well 1510 nm DFB laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated 1590 nm detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. A PECL logic interface simplifies interface to external circuitry.

**LASER SAFETY**

This single mode transceiver is a Class 1 laser product. It complies with IEC-60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

**ORDER INFORMATION**

| P/No.             | Bit Rate (Mb/s) | Distance (km) | TX (nm)  | RX (nm) | Voltage (V) | Package | Temp (°C) | TX Power (dBm) | RX Sens. (dBm) | RoHS Compliant |
|-------------------|-----------------|---------------|----------|---------|-------------|---------|-----------|----------------|----------------|----------------|
| BTRS-37120-1510G  | 125/155         | 120           | 1510 DFB | 1590    | 3.3         | 2X5 SC  | 0 to 70   | 3 to -2        | -35            | Yes            |
| BTRS-37120A-1510G | 125/155         | 120           | 1510 DFB | 1590    | 3.3         | 2X5 SC  | -20 to 85 | 3 to -2        | -35            | Yes            |

- Note: 1. BTRX-XXXXXG is receptacle type package with standard case  
 2. BTRX-XXXXXEG is receptacle type package with extended case  
 3. BTRX-XXXXX-APBBBG is pigtail type package with different connector, A=S is SC connector, A=F is FC connector, A=T is ST connector, A=L is LC connector, A=M is MU connector; BBB is the length of fiber in cm.

| Absolute Maximum Ratings |        |          |          |       |                                                          |
|--------------------------|--------|----------|----------|-------|----------------------------------------------------------|
| Parameter                | Symbol | Min      | Max      | Units | Notes                                                    |
| Storage Temperature      | Tstg   | -40      | 85       | °C    |                                                          |
| Operating Temperature    | Topr   | 0<br>-20 | 70<br>85 | °C    | BTRS-37120-1510G<br>BTRS-37120A-1510G<br>Air flow 1m/sec |
| Soldering Temperature    | ---    |          | 260      | °C    | 10 seconds on leads only                                 |
| Power Supply Voltage     | Vcc    | 0        | 4.5      | V     |                                                          |
| Input Voltage            | ---    | GND      | Vcc      | V     |                                                          |
| Output Current           | Iout   | 0        | 30       | mA    |                                                          |

| Recommended Operating Conditions |        |          |     |          |                                                                    |
|----------------------------------|--------|----------|-----|----------|--------------------------------------------------------------------|
| Parameter                        | Symbol | Min      | Typ | Max      | Units / Notes                                                      |
| Power Supply Voltage             | Vcc    | 3.13     | 3.3 | 3.47     | V                                                                  |
| Operating Temperature            | Topr   | 0<br>-20 |     | 70<br>85 | °C / BTRS-37120-1510G<br>°C / BTRS-37120A-1510G<br>Air flow 1m/sec |
| Data Rate                        |        |          | 155 | 170      | Mb/s                                                               |
| Power Supply Current             | Icc    |          |     | 280      | mA                                                                 |

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| Transmitter Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V) |                                                                    |                       |     |                 |       |                    |
|---------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------|-----|-----------------|-------|--------------------|
| Parameter                                                           | Symbol                                                             | Min                   | Typ | Max             | Units | Notes              |
| <b>Optical</b>                                                      |                                                                    |                       |     |                 |       |                    |
| Optical Transmit Power                                              | P <sub>O</sub>                                                     | -2                    |     | 3               | dBm   | 1                  |
| Output Center Wavelength                                            | λ                                                                  | 1480                  |     | 1520            | nm    |                    |
| Output Spectrum Width                                               | σ <sub>λ</sub>                                                     |                       |     | 1               | nm    | -20 dB Width       |
| Extinction Ratio                                                    | E <sub>R</sub>                                                     | 10                    |     |                 | dB    |                    |
| Output Eye                                                          | Compliant with Bellcore TR-NWT-000253 and ITU recommendation G.957 |                       |     |                 |       |                    |
| Optical Rise Time                                                   | t <sub>r</sub>                                                     |                       |     | 2               | ns    | 10% to 90% Values  |
| Optical Fall Time                                                   | t <sub>f</sub>                                                     |                       |     | 2               | ns    | 10% to 90% Values  |
| Relative Intensity Noise                                            | RIN                                                                |                       |     | -116            | dB/Hz |                    |
| Total Jitter                                                        | TJ                                                                 |                       |     | 1               | ns    | 2                  |
| <b>Electrical</b>                                                   |                                                                    |                       |     |                 |       |                    |
| Data Input Current – Low                                            | I <sub>IL</sub>                                                    | -350                  |     |                 | μA    |                    |
| Data Input Current – High                                           | I <sub>IH</sub>                                                    |                       |     | 350             | μA    |                    |
| Differential Input Voltage                                          | V <sub>IH</sub> - V <sub>IL</sub>                                  | 300                   |     | 1600            | mV    |                    |
| Data Input Voltage – Low                                            | V <sub>IL</sub> - V <sub>CC</sub>                                  | -2.0                  |     | -1.58           | V     | 3                  |
| Data Input Voltage -- High                                          | V <sub>IH</sub> - V <sub>CC</sub>                                  | -1.1                  |     | -0.74           | V     | 3                  |
| Disable Input Voltage -- Low                                        | V <sub>TDIS,L</sub>                                                | 0                     |     | 0.8             | V     | TX Output Enabled  |
| Disable Input Voltage -- High                                       | V <sub>TDIS,H</sub>                                                | V <sub>CC</sub> - 1.3 |     | V <sub>CC</sub> | V     | TX Output Disabled |
| Shut Off Time for TxDis                                             | t <sub>DIS</sub>                                                   |                       |     | 1               | ms    |                    |

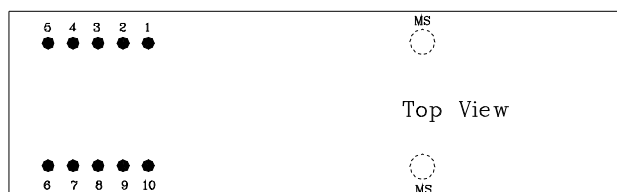
- Notes: 1. Output power is power coupled into a 9/125 μm single mode fiber.  
 2. Measured with a 2<sup>23</sup>-1 PRBS with 72 ones and 72 zeros.  
 3. These inputs are compatible with 10K, 10KH and 100K ECL and LVPECL inputs.

| Receiver Specifications (0°C < Topr < 70°C, 3.13 V < Vcc < 3.47V) |                                   |      |     |       |       |                         |
|-------------------------------------------------------------------|-----------------------------------|------|-----|-------|-------|-------------------------|
| Parameter                                                         | Symbol                            | Min  | Typ | Max   | Units | Notes                   |
| <b>Optical</b>                                                    |                                   |      |     |       |       |                         |
| Sensitivity                                                       | ---                               | ---  | --- | -35   | dBm   | 1                       |
| Maximum Input Power                                               | P <sub>in</sub>                   | -3   | --- | ---   | dBm   |                         |
| Signal Detect -- Asserted                                         | P <sub>a</sub>                    | ---  | --- | -35   | dBm   | Transition: low to high |
| Signal Detect -- Deasserted                                       | P <sub>d</sub>                    | -43  | --- | ---   | dBm   | Transition: high to low |
| Signal detect -- Hysteresis                                       |                                   | 1.0  | --- | 4.0   | dB    |                         |
| Wavelength of Operation                                           |                                   | 1580 |     | 1620  | nm    | 2                       |
| Optical Return Loss                                               | ORL                               | 14   |     |       | dB    |                         |
| <b>Electrical</b>                                                 |                                   |      |     |       |       |                         |
| Data Output Voltage – Low                                         | V <sub>OL</sub> - V <sub>CC</sub> | -2.0 |     | -1.58 | V     | 3                       |
| Data Output Voltage – High                                        | V <sub>OH</sub> - V <sub>CC</sub> | -1.1 |     | -0.74 | V     | 3                       |
| SD Output Voltage -- Low                                          | V <sub>OL</sub> - V <sub>CC</sub> | -2.0 |     | -1.58 | V     | 3                       |
| SD Output Voltage -- High                                         | V <sub>OH</sub> - V <sub>CC</sub> | -1.1 |     | -0.74 | V     | 3                       |
| Signal Detect Assert Time                                         | A <sub>S</sub> MAX                |      |     | 100   | μs    | OFF to ON               |
| Signal Detect Deassert Time                                       | A <sub>N</sub> S <sub>MAX</sub>   |      |     | 300   | μs    | ON to OFF               |

- Notes: 1. Minimum sensitivity and saturation levels at BER 1E-10 for a 2<sup>23</sup>-1 PRBS with 72 ones and 72 zeros.  
 2. At least 30 dB optical isolation for the wavelength 1480 to 1520 nm.  
 3. These outputs are compatible with 10K, 10KH and 100K ECL and LVPECL outputs.

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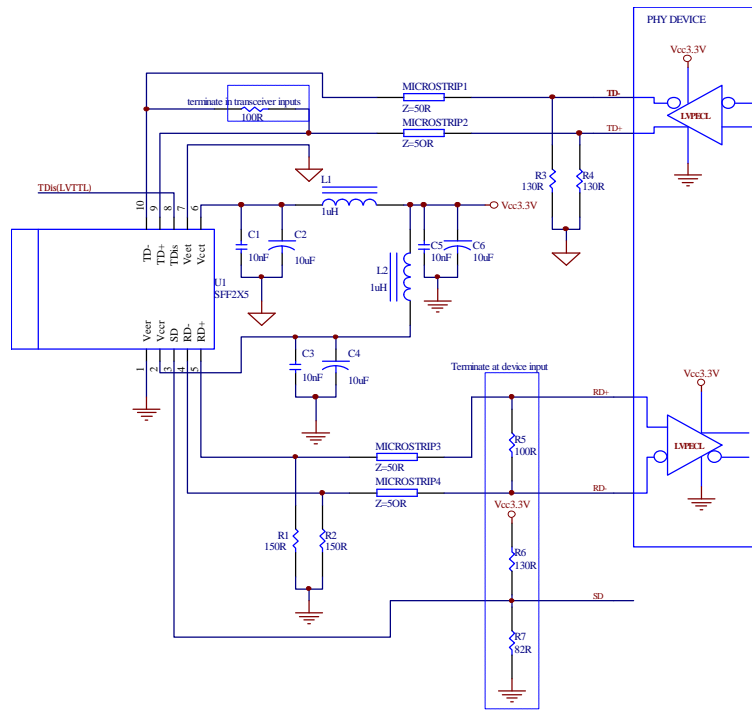
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**CONNECTION DIAGRAM**  
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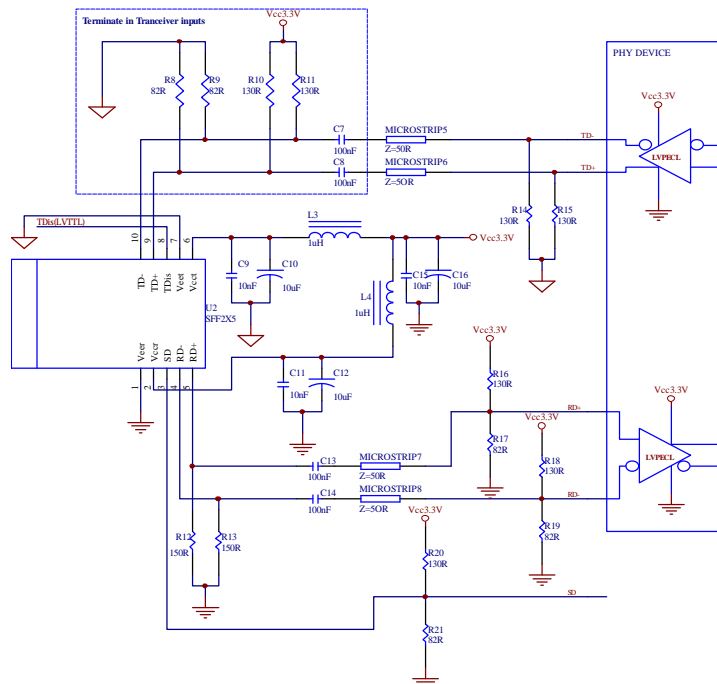
| PIN | Symbol    | Notes                                                                                                                           |
|-----|-----------|---------------------------------------------------------------------------------------------------------------------------------|
| 1   | $V_{EEr}$ | Directly connect this pin to the receiver ground plane                                                                          |
| 2   | $V_{CCr}$ | +3.3V dc power for the receiver section                                                                                         |
| 3   | SD        | Active high on this indicates a received optical signal.                                                                        |
| 4   | RD-       | Receiver Dataout Bar. See recommended circuit schematic                                                                         |
| 5   | RD+       | Receiver Dataout. See recommended circuit schematic                                                                             |
| 6   | $V_{CCt}$ | +3.3V dc power for the transmitter section                                                                                      |
| 7   | $V_{EEt}$ | Directly connect this plan to the transmitter ground plane                                                                      |
| 8   | TxDis     | Transmitter Disable. Connect this pin to +3.3V TTL logic "1" to disable module<br>To enable module connect to TTL logic low "0" |
| 9   | TD+       | Transmitter Data In. See recommended circuit schematic                                                                          |
| 10  | TD-       | Transmitter Data In Bar. See recommended circuit schematic                                                                      |
| MS  | MS        | Mounting Studs. Connect to Chassis Ground                                                                                       |

## RECOMMENDED CIRCUIT SCHEMATIC

### 1) Recommended DC Coupled Interface Circuit



### 2) Recommended AC Coupled Interface Circuit

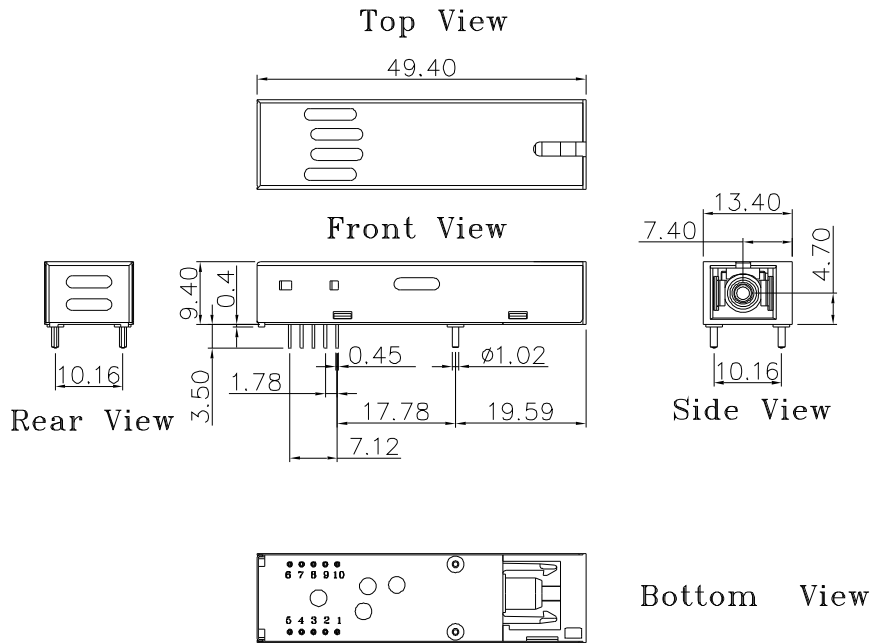


PACKAGE DIAGRAM

Units in mm

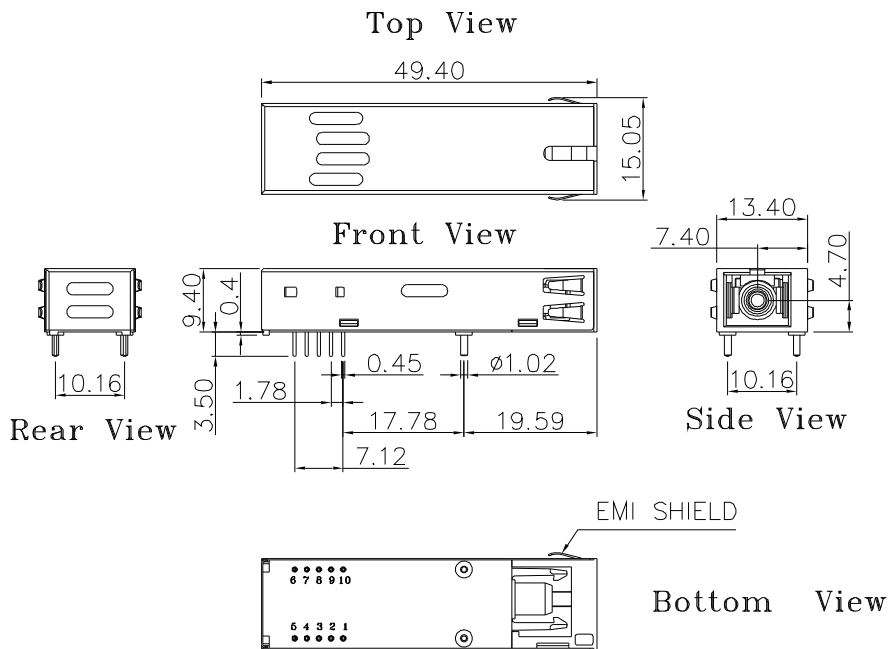
1) SC Receptacle

A) Standard Case



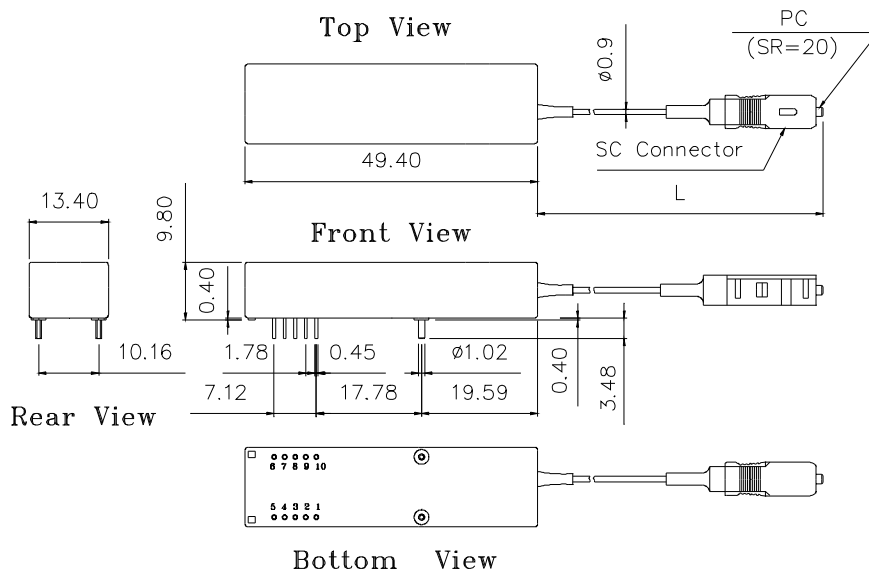
BTRS-37120-1510G / BTRS-37120A-1510G

B) Extended Case



BTRS-37120E-1510G / BTRS-37120AE-1510G

## 2) Pigtail



BTRS-37120-1510-SP50G / BTRS-37120A-1510-SP50G

Note: Length L is  $50 \pm 3$  cm. Other pigtail's length is available upon request.

**Note:** Specifications subject to change without notice.