

BTR-3720G / BTR-3720-SPG / BTR-3720AG / BTR-3720A-SPG

1550 nm TX / 1310 nm RX , 3.3V / 155 Mbps **RoHS Compliant** Single-Fiber Transceiver

FEATURES

- Single Fiber Bi-Directional Transceiver
- 1550 nm LD Transmitter
- 1310 nm Receiver
- Distance up to 20 km
- Industry Standard 1 x 9 Footprint
- Single +3.3 V Power Supply
- RoHS Compliant
- PECL Differential Inputs and Outputs
- 0 to 70°C Operating Temperature: BTR-3720G
- -20 to 85°C Operating Temperature: BTR-3720AG
- Wave Solderable
- 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 BTR-3720G series are high performance modules for single fiber communications by using 1550 nm transmitter and 1310 nm receiver. The transmitter section uses a multiple quantum well laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated 1310 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 |
|-------------------|-----------------|---------------|---------|---------|-------------|---------|------------------|----------------|----------------|----------------|
| BTR-3720G | 125 / 155 | 20 | 1550 | 1310 | 3.3 | 1X9 | 0 to 70 | -8 to -14 | -33 | Yes |
| BTR-3720AG | 125 / 155 | 20 | 1550 | 1310 | 3.3 | 1X9 | -20 to 85 | -8 to -14 | -33 | Yes |

Note: 1. BTR-XXXXXG is 1X9 SC receptacle type package.

2. BTR-XXXXX-APBBBG is 1X9 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 | 70 | °C | BTR-3720G |
| | | -20 | 85 | | BTR-3720AG |
| 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 | | 70 | °C / BTR-3720G |
| | | -20 | | 85 | °C / BTR-3720AG |
| Data Rate | | | 155 | 170 | Mb/s |
| Power Supply Current | Icc | | | 260 | mA |

| Transmitter Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V) | | | | | | |
|---|--|------|-----|-------|---------|-------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| Optical | | | | | | |
| Optical Transmit Power | Po | -14 | --- | -8 | dBm | 1 |
| Output Center Wavelength | λ | 1480 | | 1580 | nm | |
| Output Spectrum Width | $\Delta\lambda$ | --- | --- | 3 | nm | RMS(σ) |
| Extinction Ratio | E _R | 8.2 | --- | --- | dB | |
| Output Eye | Compliant with Bellcore GR-253-CORE and ITU recommendation G.957 | | | | | |
| Optical Rise Time | t _r | | | 2 | ns | 10% to 90% Values |
| Optical Fall Time | t _f | | | 2 | ns | 10% to 90% Values |
| Relative Intensity Noise | RIN | | | -116 | dB/Hz | |
| Total Jitter | TJ | | | 1 | ns | 2 |
| Electrical | | | | | | |
| Data Input Current – Low | I _{IL} | -350 | | | μ A | |
| Data Input Current – High | I _{IH} | | | 350 | μ A | |
| Differential Input Voltage | V _{IH} - V _{IL} | 300 | | | mV | |
| Data Input Voltage – Low | V _{IL} - V _{CC} | -2.0 | | -1.58 | V | 3 |
| Data Input Voltage -- High | V _{IH} - V _{CC} | -1.1 | | -0.74 | V | 3 |

- Notes: 1. Output power is power coupled into a 9/125 μ m single mode fiber.
 2. Measured with a 2²³-1 PRBS with 72 ones and 72 zeros.
 3. These inputs are compatible with 10K, 10KH and 100K ECL and PECL inputs.

| Receiver Specifications (0°C < Topr < 70°C, 3.13V < Vcc < 3.47V) | | | | | | |
|--|-----------------------------------|------|-----|-------|-------|-------------------------|
| Parameter | Symbol | Min | Typ | Max | Units | Notes |
| Optical | | | | | | |
| Sensitivity | --- | --- | --- | -33 | dBm | 1 |
| Maximum Input Power | Pin | -3 | | --- | dBm | |
| Signal Detect -- Asserted | Pa | --- | --- | -33 | dBm | Transition: low to high |
| Signal Detect -- Deasserted | Pd | -43 | --- | --- | dBm | Transition: high to low |
| Signal detect -- Hysteresis | | 1.0 | --- | 4.0 | dB | |
| Wavelength of Operation | | 1260 | --- | 1360 | nm | 2 |
| Electrical | | | | | | |
| Data Output Voltage – Low | V _{OL} - V _{CC} | -2.0 | | -1.58 | V | 3 |
| Data Output Voltage – High | V _{OH} - V _{CC} | -1.1 | | -0.74 | V | 3 |
| SD Output Voltage -- Low | V _{OL} - V _{CC} | -2.0 | | -1.58 | V | 3 |
| SD Output Voltage -- High | V _{OH} - V _{CC} | -1.1 | | -0.74 | V | 3 |

- Notes: 1. Minimum sensitivity and saturation levels at BER=1E-10 for a 2²³-1 PRBS with 72 ones and 72 zeros.
 2. At least 30 dB optical isolation for the wavelength 1480 to 1580 nm.
 3. These outputs are compatible with 10K, 10KH and 100K ECL and PECL outputs.

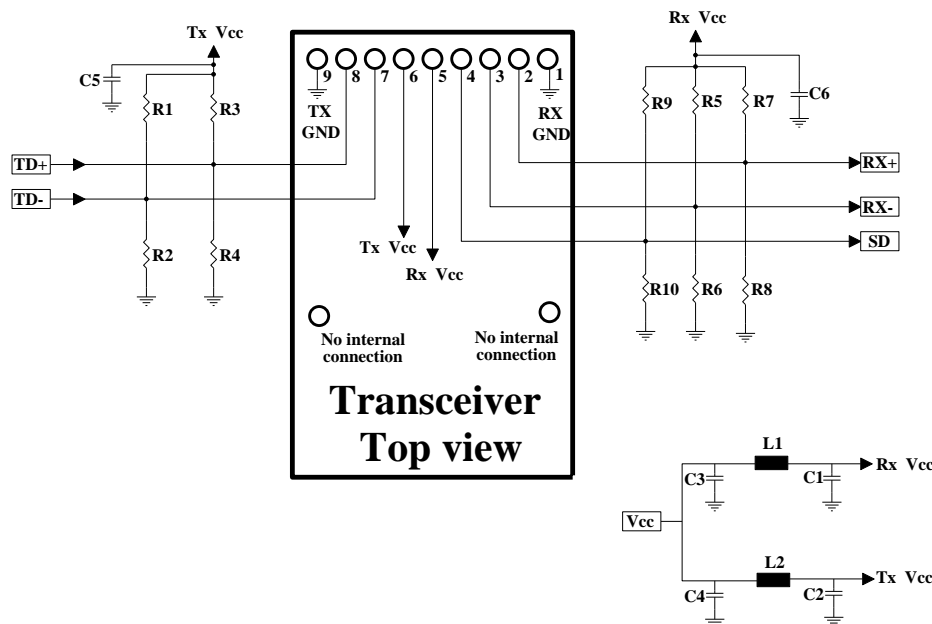
CONNECTION DIAGRAM

| | | |
|---------------------------|------------|-----|
| Receiver Signal Ground | 1 (Rx GND) | ○ |
| Receiver Data Out | 2 (RD+) | N/C |
| Receiver Data Out Bar | 3 (RD-) | |
| Signal Detect | 4 (SD) | |
| Receiver Power Supply | 5 (Rx Vcc) | |
| Transmitter Power Supply | 6 (Tx Vcc) | |
| Transmitter Data In Bar | 7 (TD-) | |
| Transmitter Data In | 8 (TD+) | N/C |
| Transmitter Signal Ground | 9 (Tx GND) | ○ |

TOP VIEW

| PIN | Symbol | Notes |
|-----|--------|---|
| 1 | Rx GND | Directly connect this pin to the receiver ground plane |
| 2 | RD+ | See recommended circuit schematic |
| 3 | RD- | See recommended circuit schematic |
| 4 | SD | Active high on this indicates a received optical signal |
| 5 | Rx Vcc | +3.3V dc power for the receiver section |
| 6 | Tx Vcc | +3.3V dc power for the transmitter section |
| 7 | TD- | See recommended circuit schematic |
| 8 | TD+ | See recommended circuit schematic |
| 9 | Tx GND | Directly connect this pin to the transmitter ground plane |

RECOMMENDED CIRCUIT SCHEMATIC



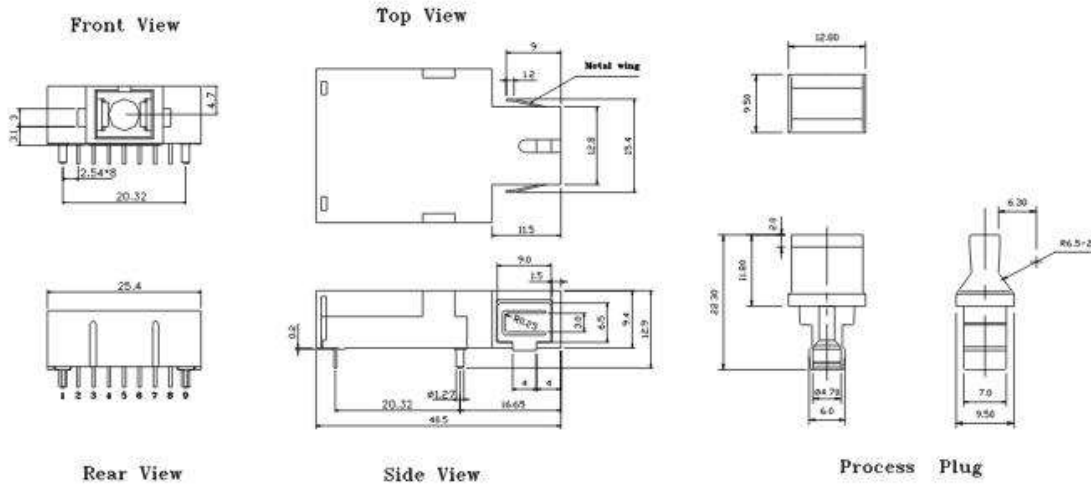
R1=R3=R5=R7=R9=130 ohm
R2=R4=R6=R8=R10=82 ohm
C1=C2=C3=C5=C6=0.1 Uf
C4=10uF L1=L2=1uH

The split-load terminations for ECL signals need to be located at the input of devices receiving those ECL signals. The power supply filtering is required for good EMI performance. Use short tracks from the inductor L1/L2 to the module Rx Vcc and Tx Vcc. A GND plane under the module is required for good EMI and sensitivity performance.

PACKAGE DIAGRAM

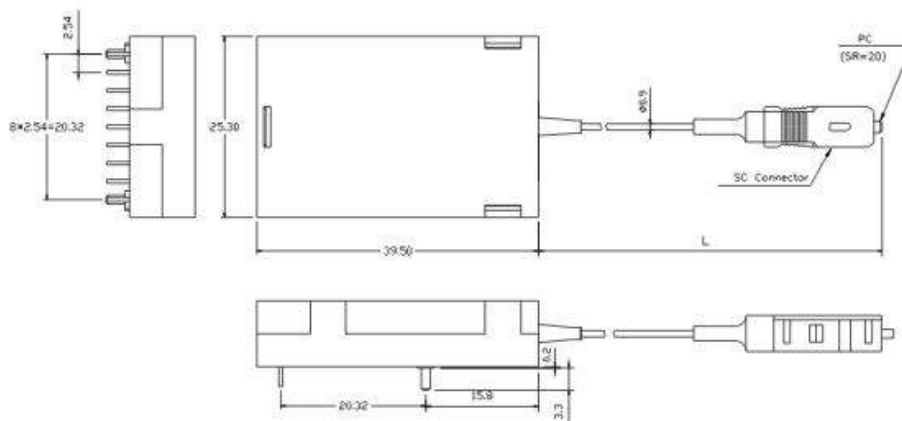
Units in mm

1) Receptacle Type



BTR-3720G / BTR-3720AG

2) Pigtail Type



BTR-3720-SP50G / BTR-3720A-SP50G

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

Note: Specifications subject to change without notice.