# OC-12/STM-4 Receiver with Clock Recovery

## SRC12 Series

### Product Description

The SRC12 is a Receiver Module with internal clock recovery designed to meet or exceed the SONET/SDH optical interface requirements at OC-12/STM-4 (622 Mb/s) data rate. Highly reliable InGaAs/InP PIN photodiodes are used to cover the entire long wavelength range from 1100 nm to 1550 nm.

The receiver features a low noise GaAs transimpedance IC with AGC capability to provide an extremely wide dynamic range and high sensitivity. A Phase Lock Loop (PLL) circuit is included to perform the clock recovery function and resampling of the data.

The SRC12 receiver requires a single +5 V supply. The DATA & CLOCKinterface signals are differential PECL while the SIGNAL DETECT outputs have TTL interface.

The SRC12 module can operate over an operating temperature range of 0°C to +70°C ("H" option) or -40°C to +85°C ("I" option). It is housed in a 20-pin dual-in-line metal package with integral ST, FC or SC connector receptacle or fiber pigtail (50 µm multimode fiber). The fiber pigtail is terminated with ST, FC or SC connector.

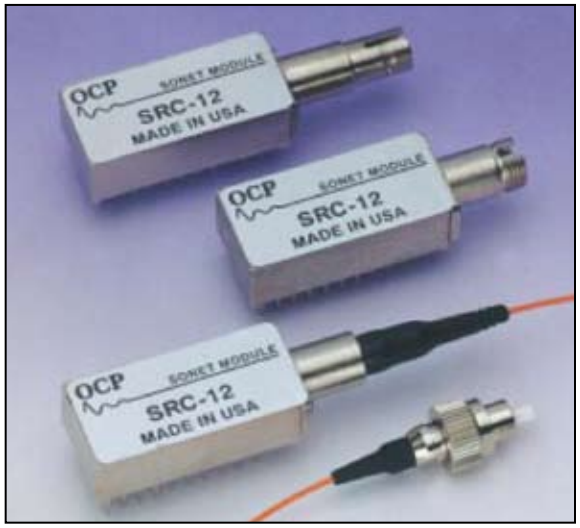
**Related OC-12/STM-4 transmitters & receivers**

STX-12: 20-pin laser transmitter

SRX-12: 20-pin receiver without clock recovery (PECL SIGNAL DETECT)

SRX-12-L: 20-pin receiver without clock recovery (TTL SIGNAL DETECT)

SRC-12-S: 24-pin receiver with clock recovery




### Features

- ☑ Full compliance with SONET/SDH OC-12/STM-4 specifications
- ☑ Long Reach and Intermediate Reach
- ☑ Phase-Lock-Loop (PLL) Clock Recovery
- ☑ - 40°C to +85°C Operating Temperature ("I" option)
- ☑ Multi-sourced 20-pin DIP metal package
- ☑ FC, ST, SC-connectorized fiber pigtails or Integral FC, SC or ST connector receptacle
- ☑ PECL DATA & CLOCK interface
- ☑ TTL SIGNAL DETECT interface

### Absolute Maximum Ratings

| Parameter | | Symbol | Minimum | Maximum | Units |
|---|---|---|---|---|---|
| Storage Temperature | | $T_{ST}$ | - 40 | + 85 | °C |
| Operating Temperature | "I" option | $T_{OP}$ | - 40 | + 85 | °C |
| | "H" option | | 0 | + 70 | |
| Operating & Storage Humidity | | - | - | 85 | % |
| Supply Voltage | | $V_{CC}$ | 0 | + 6.0 | V |
| Lead Soldering Temperature & Time | | - | - | 260°C, 10 sec | |

## Receiver Electrical Interface (Over Operating Case Temperature)

| Parameter | Symbol | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | 4.75 | 5.0 | 5.25 | V |
| Supply Current | $I_{CC}$ | - | 160 | 210 | mA |
| Output HIGH Voltage (DATA & CLOCK) [1] | $V_{OH}$ | $V_{CC}$ - 1.11 | - | $V_{CC}$ - 0.67 | V |
| Output LOW Voltage (DATA & CLOCK) [1] | $V_{OL}$ | $V_{CC}$ - 2.00 | - | $V_{CC}$ - 1.50 | V |
| Output HIGH Voltage (SIGNAL DETECT) | $V_{OH}$ | 2.7 | - | $V_{CC}$ | V |
| Output LOW Voltage (SIGNAL DETECT) | $V_{OL}$ | 0 | - | 0.5 | V |

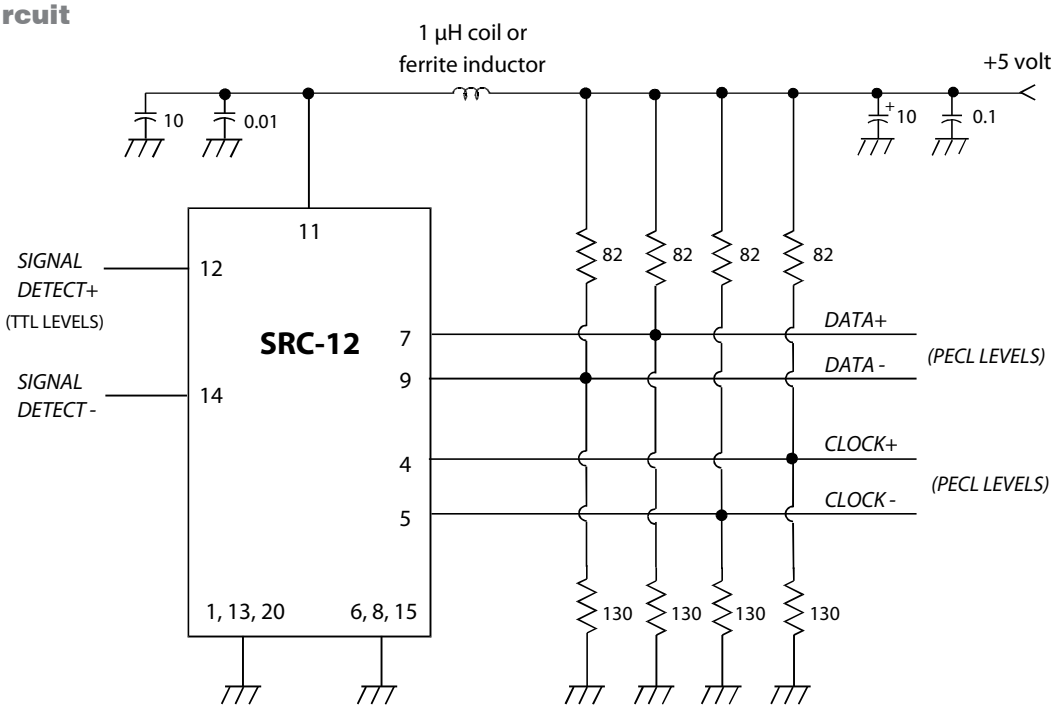
[1] With termination of 50 ohm to $V_{CC}$ - 2V.

## Receiver Performance Characteristics (Over Operating Case Temperature)

| Parameter | | Symbol | Minimum | Typical | Maximum | Units |
|---|---|---|---|---|---|---|
| Data Rate | | $B$ | 622.08 - 200ppm | 622.08 | 622.08 + 200ppm | Mb/s |
| Receiver Sensitivity ($10^{-10}$ BER) [1] | | $P_{min}$ | - 28.0 | - 30.0 | - | dBm |
| Maximum Input Optical Power ($10^{-10}$ BER) [1] | | $P_{max}$ | - 7.0 | 0 | - | dBm |
| Signal Detect Thresholds | Increasing Light Input | $P_{sd+}$ | - | - | - 28.0 | dBm |
| | Decreasing Light Input | $P_{sd-}$ | - 40.0 | - | - | dBm |
| Signal Detect Hysteresis | | | - | 0.5 | - | dB |
| Wavelength of Operation | | $\lambda$ | 1100 | - | 1600 | nm |
| Output Clock Jitter | | $CLK_J$ | - | - | 0.01 | UIrms |
| Jitter Tolerance & Transfer Function | | compliant with ITU Recommendation G.958 | | | | |

[1] Specified in Average Optical Input Power with single mode fiber and measured at 1300 nm wavelength with $2^{23}$-1 PRBS.

## Interface Circuit




RESISTOR VALUES ARE IN OHM, CAPACITOR VALUES ARE IN µF UNLESS OTHERWISE INDICATED

## Application Notes

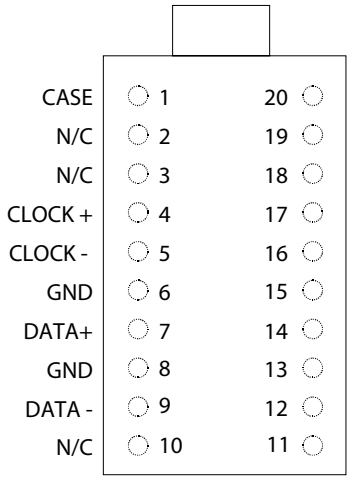
**Receiver Circuit:** The receiver converts the incident optical power to a photocurrent via a high performance PIN photodiode. The photocurrent is converted to a voltage signal by a transimpedance amplifier. This signal is then amplified by additional gain stages and processed through a shaping filter and a comparator to generate the data to the clock recovery circuit. The clock recovery circuit uses a Phase Lock Loop (PLL) to recover the clock from the data and resamples the data to generate clean and reshaped differential DATAoutputs. Also provided are differential recovered CLOCK outputs.

Both differential DATA+ and DATA- as well as CLOCK+ and CLOCK- outputs are open emitter PECL levels requiring termination (50 ohms to $V_{cc}$ - 2 volts or 510 ohms to *GND* is recommended). For optimum performance, both outputs should be terminated in the same manner, even if only one is used.

The Signal Detect circuit monitors the level of the incoming optical signal and generates a logic LOW (TTL) signal when insufficient photocurrent is produced. When this happens, the CLOCK+ and CLOCK- outputs are locked to an internal reference frequency of 622.08 ± 0.2 MHz, the DATA+ output is held at logic HIGH and the DATA- output is held at logic LOW.

**Interface Circuit:** The power supply line should be wellfiltered. The power supply should be bypassed by 0.01 or 0.1 µF ceramic chip capacitors placed as close to the receiver module as possible. If the receiver outputs drive long traces or multiple loads, the use of an ECL buffer gate to isolate the receiver from transmission line reflections is recommended.

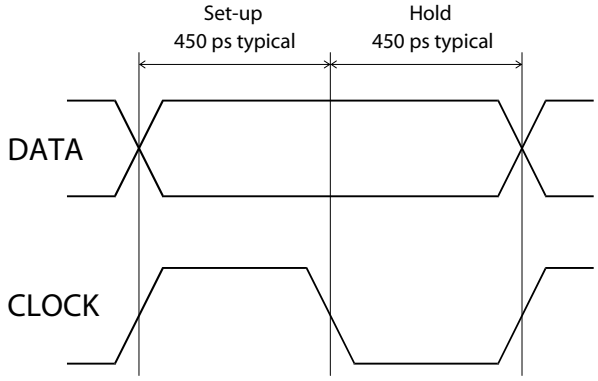
## Pin Assignments (Top View)



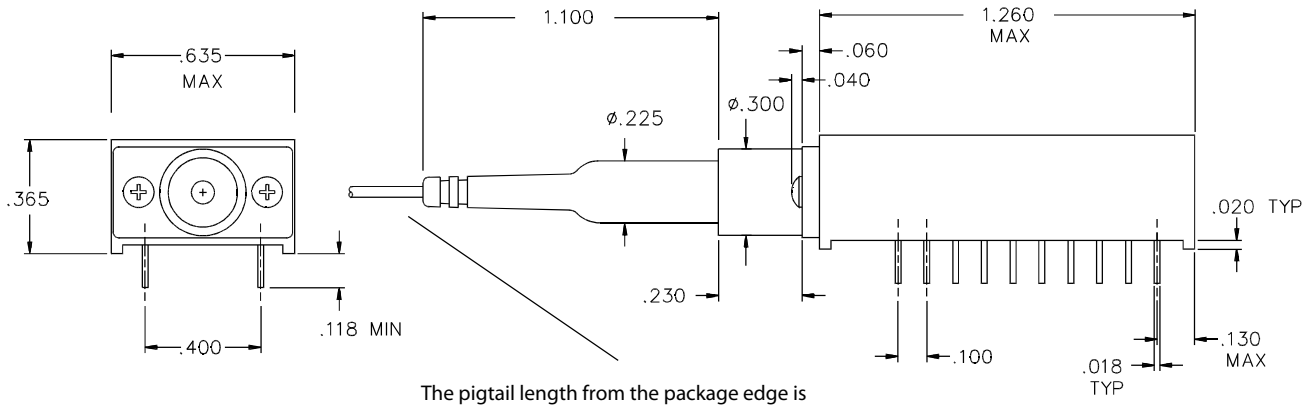

N/C: No internal connection

All CASE pins should be grounded

## DATA & CLOCK Timing Diagram



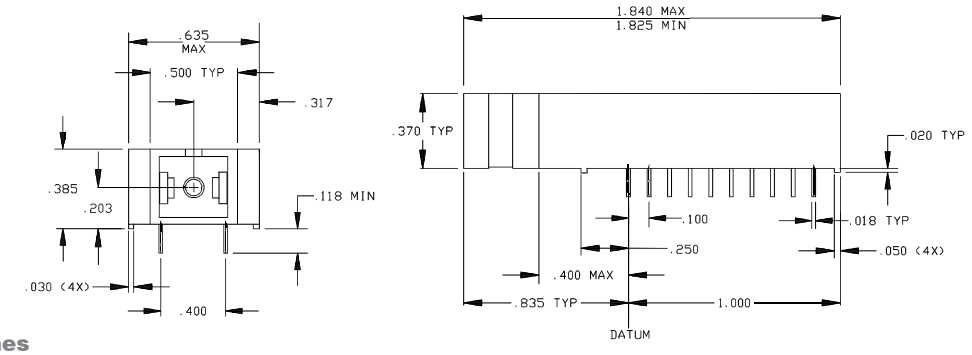

## Pigtail Package




The pigtail length from the package edge is 1.0 meter minimum, 1.1 meter typical.

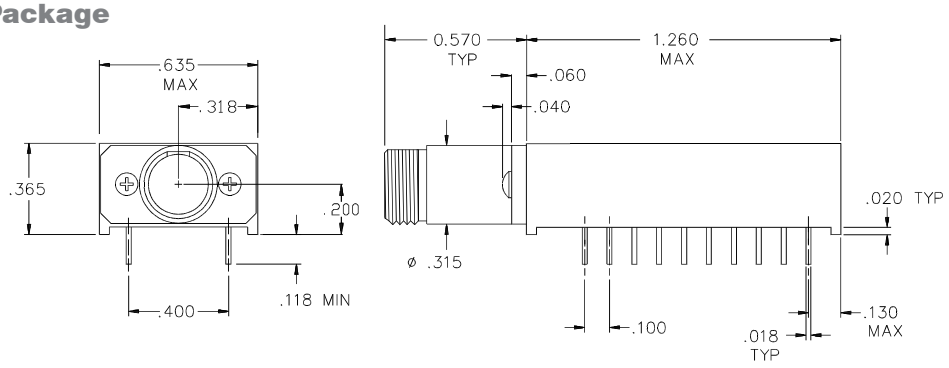
**Dimension in inches**

## SC-receptacled Package



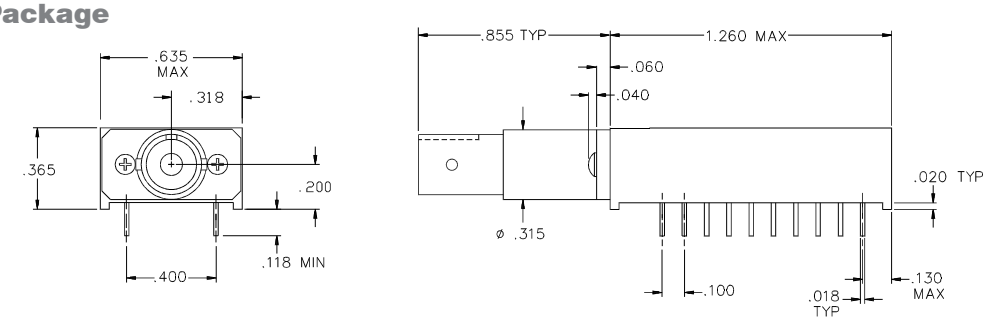

Dimension in inches

## FC-receptacled Package




Dimension in inches

## ST Receptacle Package




Dimension in inches

## Ordering Information

| SRC | 8 | 1 | 2 | X | R | 1 | | 0 | 0 | 0 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Supply Voltage**
RX only 5V= 8

**Receivers**

**Wavelength Range**
1100~1600nm PIN

**Temperature Range**
-40 ~85˚C= I
0~70˚C= H

**Connector Type & Option**
Pigtail FC= P1
Pigtail ST= P2
Pigtail SC= P3
ST Connector= C1
FC Connector= C2
SC Connector= C3





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