

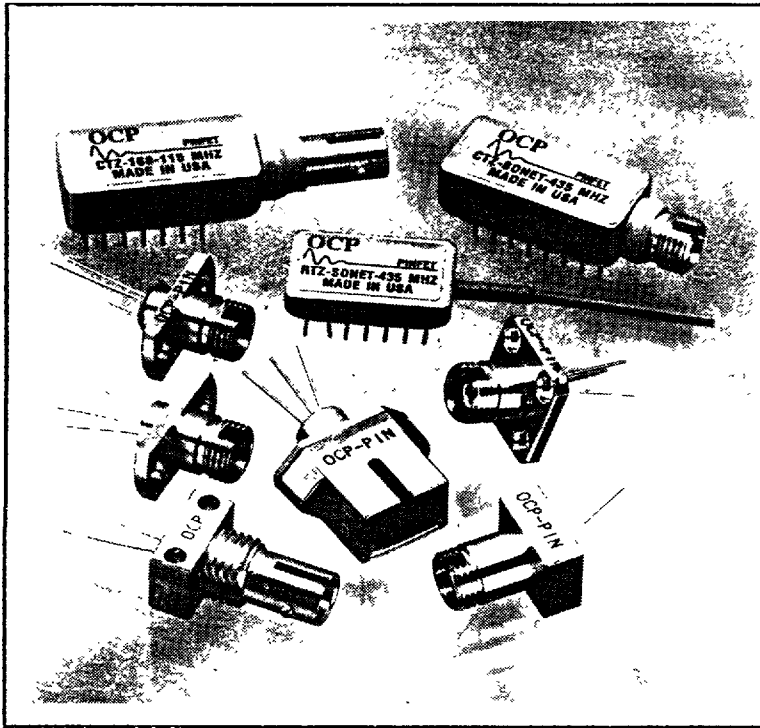
T-41-91

OCP



STZ SONET Transimpedance Receivers

OC-1 to OC-12



Features

- Long Wavelength (1100-1600 nm)
- Compliant with SONET OC-1 through OC-12 Standard
- High Detection Sensitivity
- Internal AGC Circuit for Wide Dynamic Range
- 50-ohm output interface
- Single +5 Volt Power Supply
- 3 or 4-pin ST™, FC and SC Connector Receptacle TO package
- 14-pin DIP package with defacto-standard PINFET pinout
- 40 to +85 °C Operation

Description

The STZ SONET Transimpedance Receiver series is a family of ultra-low noise front-end amplifiers utilizing advanced InGaAs PIN photodiodes and GaAs MESFET IC transimpedance amplifiers for operation at 1300 and/or 1550 nm wavelength. The PIN photodiode detects the incident optical signal, and the transimpedance amplifier converts the photo-generated current into an output signal voltage. The transimpedance amplifier IC incorporates an internal automatic-gain-control (AGC) circuitry so that a very wide dynamic range can be achieved for easy system configuration. The STZ series is compliant with the OC-1 through OC-12 data rates of the SONET (SDH) standard. It can also be used for any fiber optic receiver

operating between 5 Mb/s to 622 Mb/s.

The STZ series is available in two package styles: connector receptacle TO package or 14-pin dual-in-line (DIP) package.

The TO package style is available in three connector receptacles: ST, FC or SC as well as two different pinouts.

The 14-pin DIP package style is available with either a fiber pigtail or ST and FC connector receptacle. The standard fiber pigtail is 50/125 microns, with other fiber sizes available on special request. The 14-pin DIP package style is compatible to the de-factor PINFET pinout for easy system upgrade.

Optical Communication Products, Inc.

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AC Electrical & Optical Characteristics (25 °C)

Parameter	STZ-1		STZ-3		STZ-12		Units
	Min	Typ	Min	Typ	Min	Typ	
Data Rate	5	52	5	155	5	622	Mb/s
Bandwidth	50	60	150	200	415	450	MHz
Receiver Sensitivity ¹	-41	-43	-36.5	-38	-31	-33	dBm
Saturation Level	-2	0	-1.5	0	-3	0	dBm
Receiver Gain ²	13	18	4.5	7	1.7	2	mV/ μ W
AGC Threshold Power ³	-	5	-	20	-	50	μ W
Output Impedance	-	50	-	50	-	50	Ω

Notes

1. Receiver Sensitivity is quoted as average optical power in dBm at 1300 nm at the recommended bit rate for 10^{-10} BER and is calculated from measured noise power at the STZ output with a filter. Recommended filter bandwidth is about 70% of the bit rate.
2. At Input Optical Power below the AGC Threshold Power level (see note 3 below)
3. When the Input Optical power is above this value, the internal AGC circuit will be activated and the transimpedance gain is reduced with increasing optical power.

DC Electrical Characteristics

Parameter	Minimum	Typical	Maximum	Unit
Wavelength Range	1100	1300	1600	nm
Supply Voltage V_{dd}	4.5	5	6	V
Supply Current I_{dd}	-	35	50	mA
Output Offset Voltage	1.3	1.8	2.2	V

Absolute Maximum Ratings

Parameter	Minimum	Maximum	Unit
Supply Voltage V_{dd}	0	+7	V
Photodiode Bias Voltage	0	-15	V
Operating Temperature	-40	+85	°C
Storage Temperature	-40	+85	°C

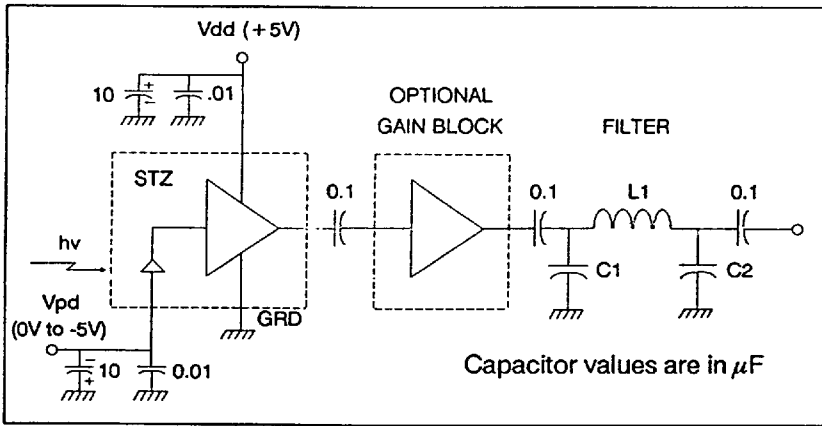
Application Notes

In order to maintain the high detection sensitivity of the STZ SONET transimpedance receiver, proper high speed PC board design practices should be observed. It is essential that the STZ have a solid "analog ground plane" free from large switching transients or digital circuit return currents. The power supplies should be properly bypassed as shown. The $0.01\mu\text{F}$ capacitors should be high quality ceramic type (chip capacitors preferable) and placed as close to the STZ leads as possible. It is also recommended that the circuitry following the STZ be placed as close to its output lead as possible. If this signal trace has to be long, proper $50\ \Omega$ microstrip matching is required. The STZ leads

should be trimmed as short as possible to minimize parasitic inductance.

The STZ circuitry is DC coupled internally. It is recommended that AC coupling be used as shown to avoid DC output voltage shifts due to temperature and power supply variations.

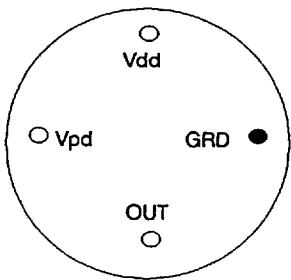
For optimum performance, the STZ should be followed by a filter to minimize the receiver noise bandwidth. The recommended filter is a 3-pole Butterworth filter with a bandwidth equal to 0.7 times the bit rate. The filter component values are shown for convenience.



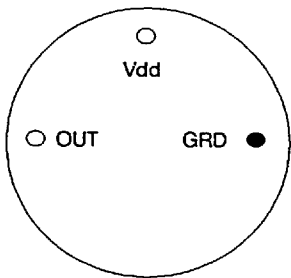
Filter Element Values
(50 Ω interface)

Bit rate (Mb/s)	C1 & C2 (pF)	L1 (nH)
52	90	440
155	30	150
622	7.5	38

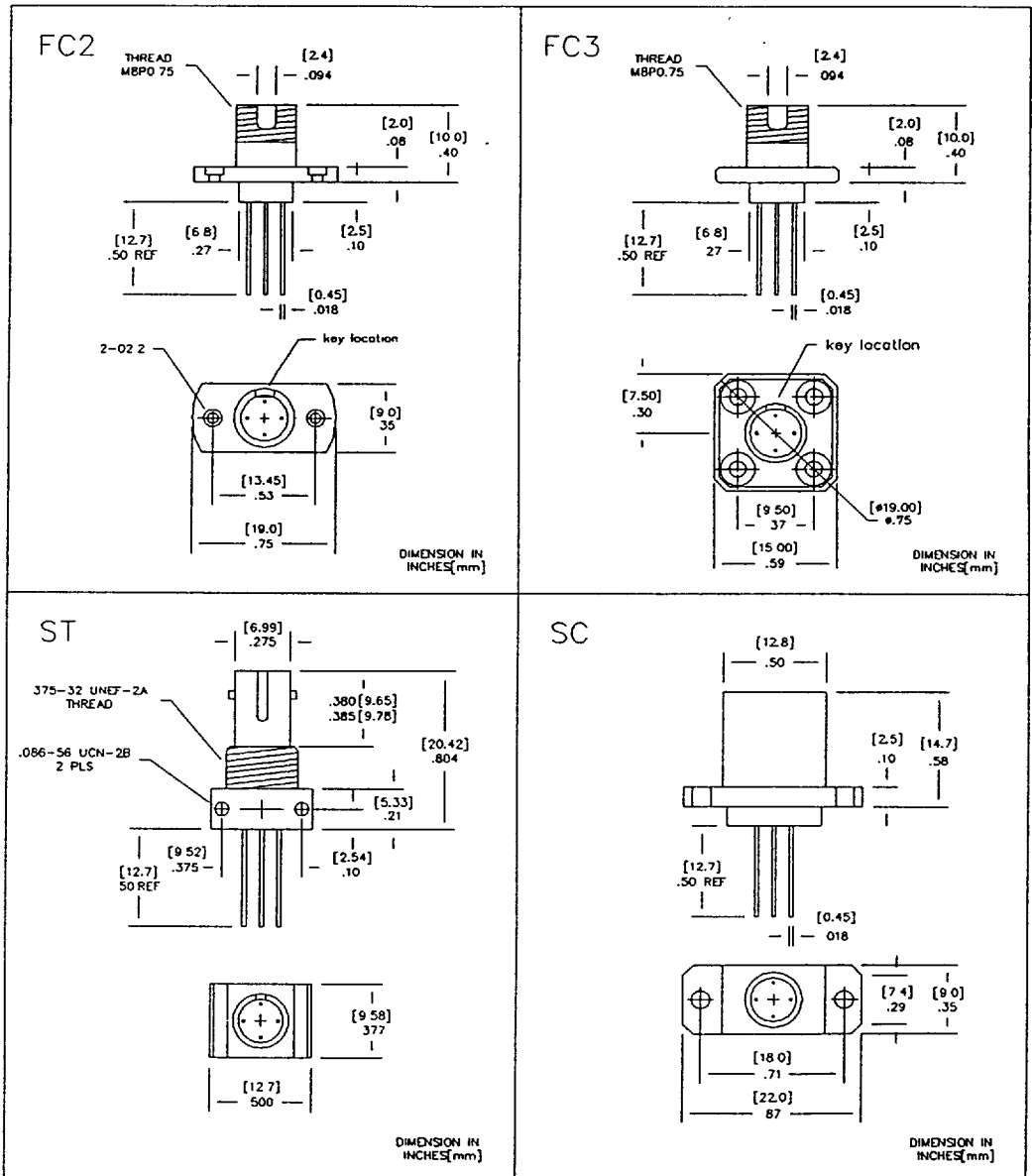
TO Package Outline and Pinout Options



BOTTOM VIEW
C4 style

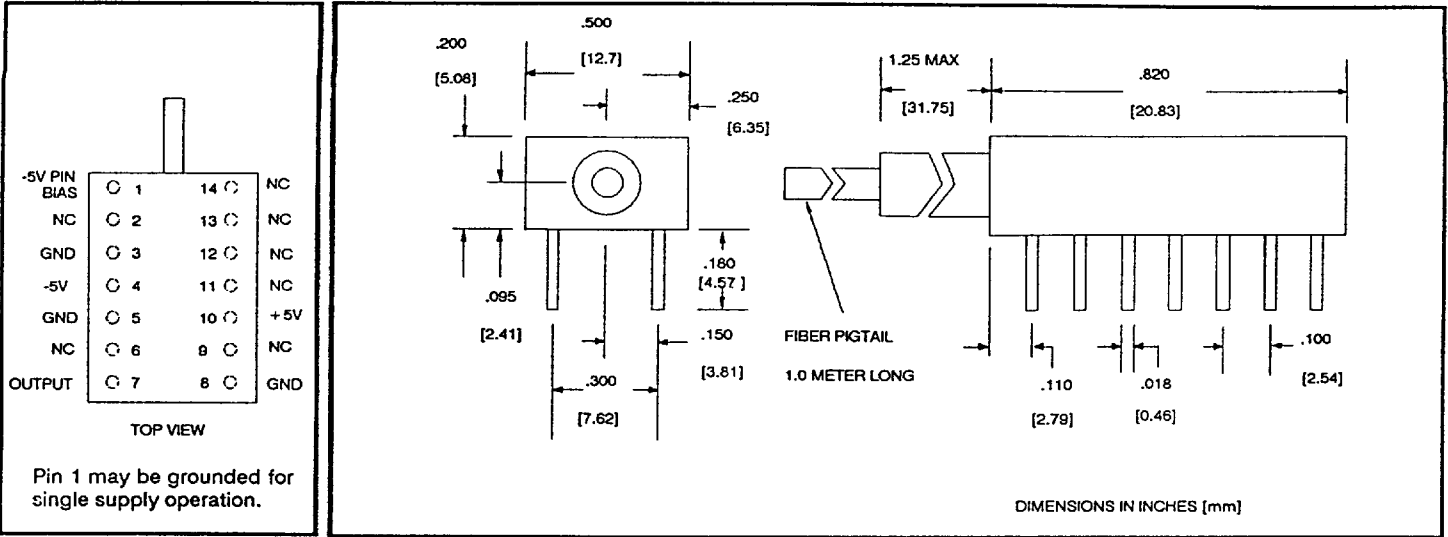


BOTTOM VIEW
C3 style

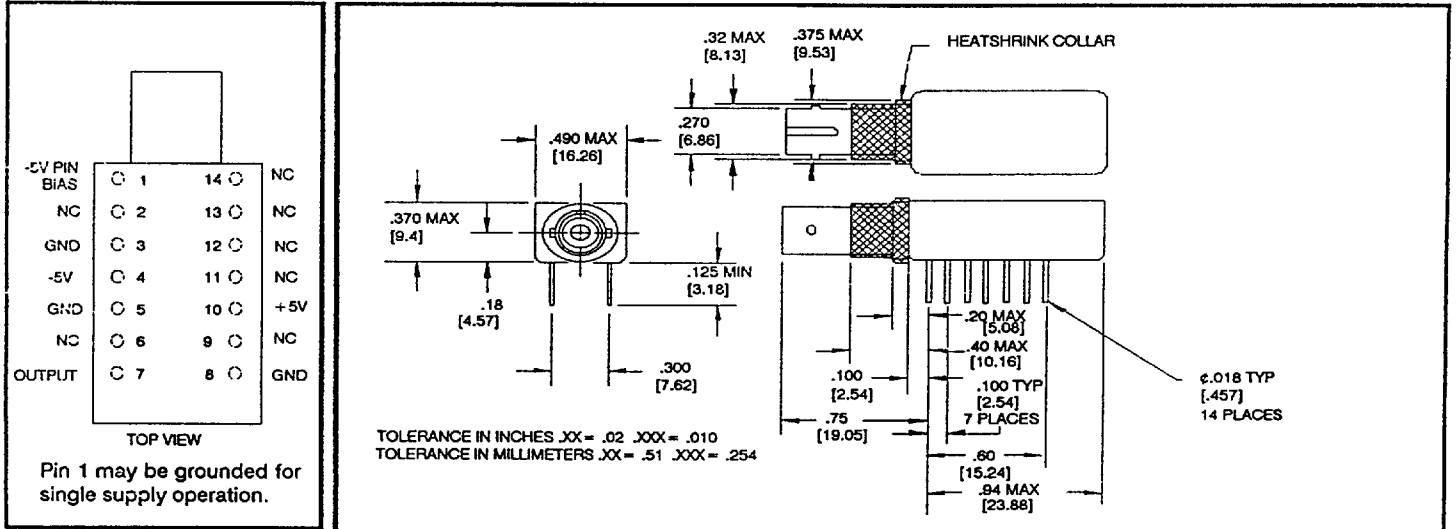


For the C4 pinout, Vpd is the photodiode bias and can be grounded externally for single supply operation. For the C3 pinout, the photodiode bias is internally connected to ground.

Pigtailed DIP Package Outline and Pinout



Connectorized DIP Package Outline and Pinout



Ordering Information

STZ-XX-YY-ZZZ

Bit Rate

- 01: OC1 (52 Mb/s)
- 03: OC3 (155 Mb/s)
- 12: OC12 (622 Mb/s)

Package Style

- C3: 3-pin TO receptacle
- C4: 4-pin TO receptacle
- DP: 14-pin DIP pigtail
- DC: 14-pin DIP receptacle

Connector Receptacle

- FC2: rectangular mount
- FC3: square mount
- ST
- SC

Example: STZ-03-C4-FC2

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