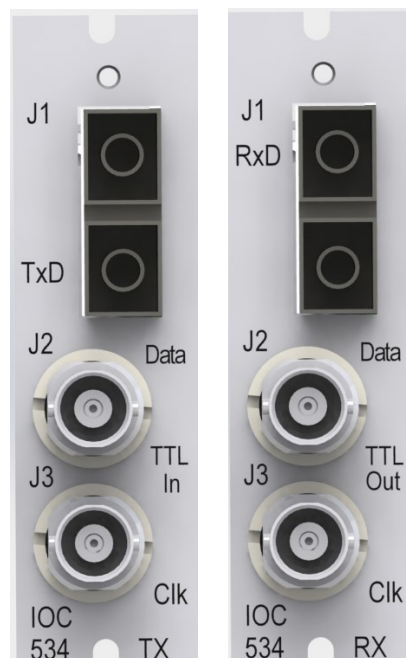




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INSTRUCTION MANUAL
FOR
MODEL IOC534
LOW LATENCY
FIBER OPTIC
TRANSMIT / RECEIVE MODULE



TO THE CUSTOMER

Thank you for purchasing this equipment from APOGEE LABS, Inc. Our intention is that the equipment meets your requirements and exceeds your expectations and you find our documentation adequately describes its operation and use. We continue to strive for higher levels of quality in our products, services and customer support and look forward to hearing from you if you have any comments or questions regarding these areas. We sincerely believe that the customer comes first.

WARRANTY

APOGEE LABS, Inc. warrants its products to be free from defects in materials and workmanship for a period of 18 months from the date of shipment to the original purchaser. APOGEE LABS Inc. obligation for any defect shall be limited to repair or replacement at our discretion of defective equipment. APOGEE LABS, Inc. assumes no liability if defects result from improper use, repairs not made by APOGEE LABS, Inc., negligence, accident, mishandling or misapplication of the equipment. No other warranty is expressed or implied and APOGEE LABS, Inc. assumes no liability for consequential damages. Should a warranty repair be required, please contact APOGEE LABS, Inc. for a Return Authorization Number.

EXTENDED WARRANTY

APOGEE LABS, Inc. offers an extended warranty plan to cover equipment beyond the normal Eighteen (18) month warranty plan. Under the extended warranty, APOGEE LABS will repair or replace equipment and/or components which have failed under normal use at its sole discretion. This extended warranty does not cover repair or replacement of equipment or components that failed because of improper use, repairs not made by APOGEE LABS, Inc., negligence, accident, misapplication of the equipment, or mishandling. A one-year or multi-year Extended Warranty may be purchased. Please contact our sales department for a price quotation.

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FEATURES

- IOC534TX — serial TTL data and clock input (fiber out)
- IOC534RX — serial TTL data and clock output (fiber in)
- 100 bps to 20 Mbps data rate
- Asynchronous Data only mode up to 9 Mbps
- Less than 1/2 bit period plus 100 ns latency input to output using 1 meter fiber cable
- Channel to channel skew <20ns
- Less than 1ns induced jitter
- Instantaneous acquisition
- Multiple fiber mode and connectors available
- Single fiber moves both data and clock signals
- Provides electrically isolated link
- Input code - NRZ-L, NRZ-M, NRZ-S, RNRZ-L
- Input Clock, 0 degree or 180 degree clock
- Output Code - NRZ-L, NRZ-M, NRZ-S, RNRZ-L (same as input—does not translate)
- Output Clock: 0 degree clock

OVERVIEW

The IOC534 Pluggable Interface Module (PIM) provides the ability to transfer serial signals over a fiber optic cable with very low latency. These modules may be used to provide a DC isolated data link, a medium length (up to 10km standard) data path, and also to reduce radiated emissions. The transmitter accepts a serial synchronous data stream (data and clock) and converts it to an optical signal for transmission over single mode fiber optic cable. The encoded data is received by the receiver module, which converts the optical signal back to its original data and clock form. The IOC534 uses industry standard BNC connectors. Both operate from 100 bps to 20 Mbps and requires one of the 14 available slots in the 2073 or 2873 chassis. These modules are also supported by the single-slot AL2073-SL chassis.

CONFIGURATION

When installed in the AL2073/AL2873 chassis, the system functions as a NRZ input to NRZ output system. The data and clock polarity is automatically detected and adjusted to ensure that the data is sampled at a stable portion of the bit period.

The IOC534 modules have jumpers that allow the inversion of the input data and clock.

The Clock input and output can act as a low to medium rate data transport without the need for a synchronous clock. Connect the asynchronous data signal input to the IOC534TX Clock input connector and connect the clock output connector on the IOC534RX to the data signal destination This provides for a maximum data rate of 9Mbps.

INPUT TERMINATION

The IOC534TX provides input termination options for both the data and clock signals. This is done through jumper configuration on the module. See the table below for configuration:

Jumper	Signal	Assignment
JP4	Data In	1-2: 50 Ohm Termination 2-3: 75 Ohm Termination 3-4: Hi-Z Termination (~30K)
JP5	Clock In	1-2: 50 Ohm Termination 2-3: 75 Ohm Termination 3-4: Hi-Z Termination (~30K)

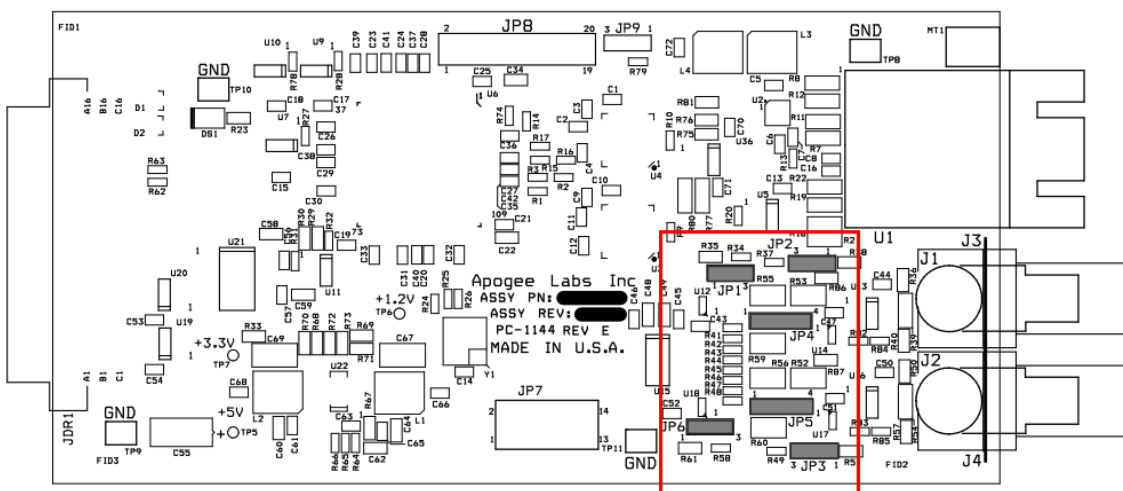
INPUT / OUTPUT POLARITY

The IOC534TX provides the ability to invert the incoming data and clock signals. The IOC534RX provides the ability to invert the outgoing data and clock signals. This is done through jumper configuration on the module. See the table below for configuration:

Model	Jumper	Signal	Assignment
IOC534TX	JP1	Data In	1-2: Normal Data Polarity 2-3: Inverted Data Polarity
IOC534RX	JP2	Data Out	1-2: Normal Data Polarity 2-3: Inverted Data Polarity
IOC534TX	JP6	Clock In	1-2: Normal Clock Polarity 2-3: Inverted Clock Polarity
IOC534RX	JP3	Clock Out	1-2: Normal Clock Polarity 2-3: Inverted Clock Polarity

The default jumper position from the factory is to have all installed jumpers at location 1-2.

Refer to diagram below for jumper location.



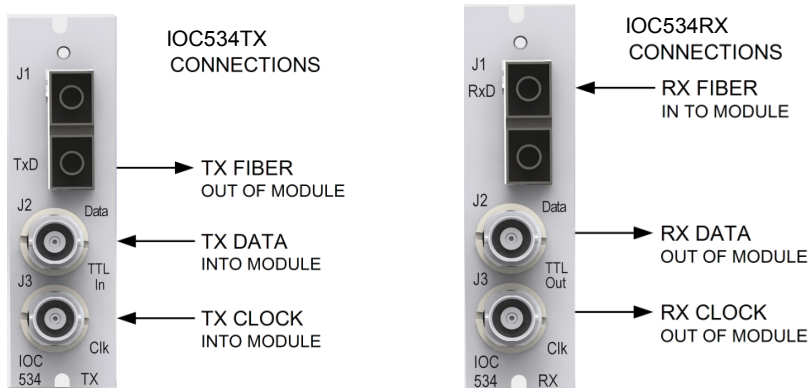
OPERATION

The IOC534 modules are simple plug and play modules. When placed in a chassis and powered on, they only need to be connected to their proper cable and let them transport their data.

IOC534 TX/RX CABLING

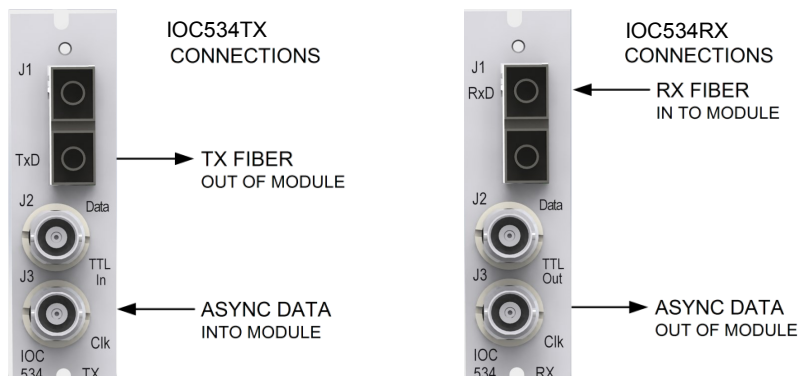
Synchronous mode

In synchronous mode, both the data and clock are transmitted by the user over the fiber optic cable. In this mode the user connects the data and clock to the IOC534TX module's inputs. The fiber optic cable is connected to the TxD port. The fiber optic cable is then run to the IOC534RX module's RxD fiber input. The data and clock are output on the IOC534RX Data and Clk connectors respectively.



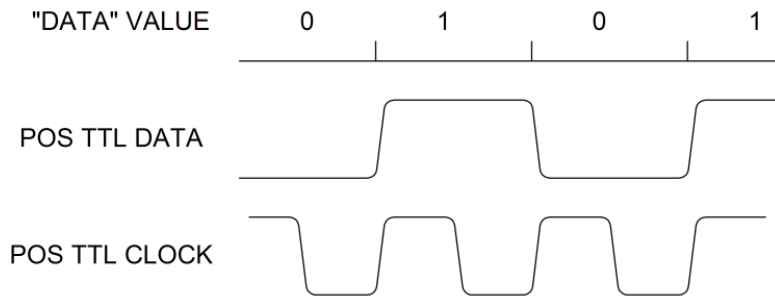
Asynchronous mode

In asynchronous mode, only the data is transmitted by the user over the fiber optic cable. In this mode the user connects the data to the IOC534TX module's clock (Clk) input. The fiber optic cable is connected to the TxD. The fiber optic cable is then run to the IOC534RX module's RxD fiber input. The data is output on the clock (Clk) connector.



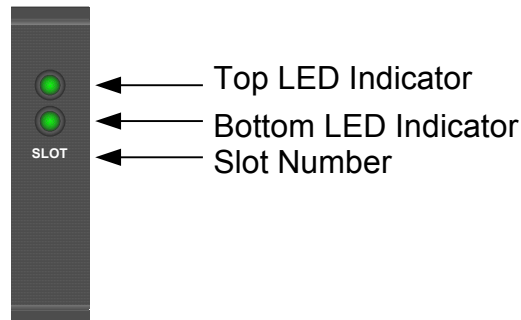
DATA / CLOCK RELATIONSHIP

The IOC534 modules operate on a 0 degree data and clock relationship. This means that the data transitions while the clock signal transitions from a “zero” to a “one” state (rising edge). This ensures the bit detection of the data is stable during the falling edge of the clock. The following image demonstrates this relationship. The IOC534 will detect if the edge alignment is improper and invert the clock to ensure clean data transmission.



LED STATUS INDICATORS

The AL2073 chassis has status LEDs to indicate status of signals and give an indication of the operation status of the modules. On the AL2073 chassis each slot has two status indicators.



Module	LED	Status	Definition
IOC534TX	Top LED	ON	Data transitions are seen on the data input connector
	Bottom LED	ON	Clock transitions are seen on the data input connector
IOC534RX	Top LED	ON	The fiber optic signal is detected on the fiber RX input
	Bottom LED	ON	Data and clock signals are being output
		BLINKING	Only clock signals are being output (no data transitions are seen)

SPECIFICATIONS

GENERAL

- IOC534: BNC connectors
- 1 Slot Module (3" x 6" x 0.9")
- Requires single slot in AL2073/AL2873 chassis

ELECTRICAL SIGNAL INPUT

- IOC534TX: TTL with 50/75Ω termination
- Supports NRZ Input codes
- Maximum Data rate 20Mbps (at 50% duty cycle)
 - Min clock edge-edge time: 25ns
- Automatically detects input data clock relationship

ELECTRICAL SIGNAL OUTPUT

- IOC534RX: TTL (90mA sink/source)
- Supports NRZ Output codes
 - Output code same as input

OPTICAL SIGNAL I/O

- SC or ST type connector*
 - Single-mode or multi-mode fiber*
 - 1310 nm wavelength
 - 10 km range
 - Minimum optical output power: -9.5dB
 - Maximum receiver sensitivity: -20dB
 - contact sales for longer distances
- * contact sales for fiber configuration

POWER CONSUMPTION

- IOC534TX: 225mA (at 20 Mbps)
- IOC534RX: 430mA (at 20 Mbps)

ENVIRONMENTAL

- Operating temperature: 0° to 40° C
- Relative Humidity: 0 to 95% non-condensing

APPLICATION INFORMATION

The IOC534 modules transport data over long distances (10km or greater) of fiber optic cable. The IOC534 modules do this with very low latency allowing user data to get to its end point with minimal delay thus removing the variable of delay from being a data transport concern.

The IOC534 utilizes industry standards for both the electrical and optical signal interfaces. The units are self adjusting to any data rate within its specified range requiring no operator setup.