LTX-551X Analog/Digital Fiber Optic Link

Manual

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Topic Page

GENERAL INFORMATION

INTRODUCTION

The LTX-551X Electrical to Optical and Optical to Electrical Converter system comprise a convenient product that is intended to transmit analog and digital information to a remote location via fiber optic cable. Its primarily designed to be used in those situations where the signal of interest has a high common mode voltage with respect to the measurement equipment. Such situations arise in plasma physics experiments, power transmission equipment, and high power laser systems. Trigger information from electrically noisy sources such as high current discharge laser systems may be transmitted without conducting Electro-Magnetic Interference, (EMI) to the measurement or control equipment.

These systems transmit an analog signal plus four digital input channels simultaneously. The input analog signal may range in frequency from DC to 12.5 MHz (-3 dB point) for the LTX5510 and DC to 25 MHz (-3 dB point) for the LTX5515. The digital signals may switch at up to 12 MHz rates for the LTX5510 and at up to 25 MHz rates for the LTX5515, and are independent. The analog input may be terminated at 1 Megohm or 50 Ohms depending on the front panel switch. The output impedance is always 50 ohms. Analog signals may range from -5 to +5 volts. The output signal will have a one-to-one correspondence, i.e. a gain of +1. When the front panel selector switch is set to +/- 1V F.S. The gain is +5, ie. a 1 volt input signal will result in a five volt output signal. The digital inputs accept TTL, CMOS or LVTTL levels and output LVTTL levels, i.e. 0 to 3.3V for a logic zero and logic one respectively. The sense is non-inverting.

FEATURES AND BENEFITS

- One analog plus up to four digital channels
- DC to 25 MHz analog bandwidth
- Input ranges of ± 1 V and ± 5 V
- Analog signal digitized to 12 or 14 bit precision
- DC to 48 Mb/s data rate (each channel)

MADE IN THE USA

LTX-551X-Specifications		
	LTX-5510	LTX-5515
Analog Signal Bandwidth	DC to 12.5 MHz (-3 dB)	DC to 25 MHz (-3 dB)
Input Voltage Ranges	+/- 1 V or +/- 5 V (selectable)	
Resolution	12 or 14 bit	
Transfer Accuracy	+/- 0.1% Full Scale, +/- 20 mV offset	
Signal Latency (with one meter of fiber)	Approximately 300 nS	
A/D Sampling Rate	50 Megasamples/S	100 Megasamples/S
Input Impedance	50 Ohms or 1 Megohm || 20 pF, (selectable)	
Output Drive Capability	+/- 5 V open circuit, +/- 2 V into 50 ohm load	
Output Impedance	50 Ohms	
Digital Inputs	TTL, LVTTL, CMOS compatible	
Digital Outputs	LVTTL (0 - 3.3 V)	
Digital switching Rates	0 - 12 MHz	0 - 24 MHz
Digital Signal Edge Uncertainty	0 - 20 nS	0 - 10 nS
Laser Wavelength	850 nm+/- 20 nm or 1310 nm +/- 20 nm	
Optical Transmission Rate	1.0 Gb/S	2.0 Gb/S
Loss Budget	15 dB max	
Optical Return Loss	> 15 dB	
Laser Safety Classification	Class I safety per FDA/CDRH and IEC-825-1 regulations	
Typical Trans. Distances MM	500 M - 50/125µ and 300 M - 62.5/125µ	250 M - 50/125µ and 150 M - 62.5/125µ
Typical Trans. Distances SM	10 KM with 9/125 micron fiber	
Fiber Optic Connectors	ST standard, FC optional	
LED Annunciators Provided	Input Overload (TX), Optical Signal (RX)	
Power Requirements	9 - 24V DC, 500mA	
Power Supply Included	95 - 260 VAC, 50 - 60 Hz, 16 VA Max - Output 9VDC/.67A with Universal, US, UK, Continental Europe and Australian plugs included	
Fiber Optic Connectors	ST standard, FC available upon request	
LED Annunciators Provided	Input Overload (transmitter), Optical Signal - ON (receiver)	
Tx and Rx Dimensions	6.89L x 4.1W x 1.6H in. (175L x 105 W x 40 H mm)	
Operating Temperature	0 - 40 C	
Weight (each)	16.2 oz. (0.46 Kg)	
Standard Warranty	Two Years, Components and Workmanship, 30 day Satisfaction Guarantee	
Accessories Supplied	5 pin DIN DB25 Connectors for Digital Inputs/Outputs and Power Supply With International Mains	

UNPACKING AND INSPECTION

Prior to shipment this instrument was inspected and found to be free of mechanical and electrical defects. Upon acceptance by the carrier he assumes responsibility for its safe arrival. After unpacking, examine the unit for any evidence of shipping damage. Should you receive this instrument in a damaged condition, apparent or concealed, it must be noted on the freight bill or express receipt and signed by the carrier's agent. Failure to do so could result in the carrier refusing to honor the claim. Upon filing a claim TREND Networks should be notified.

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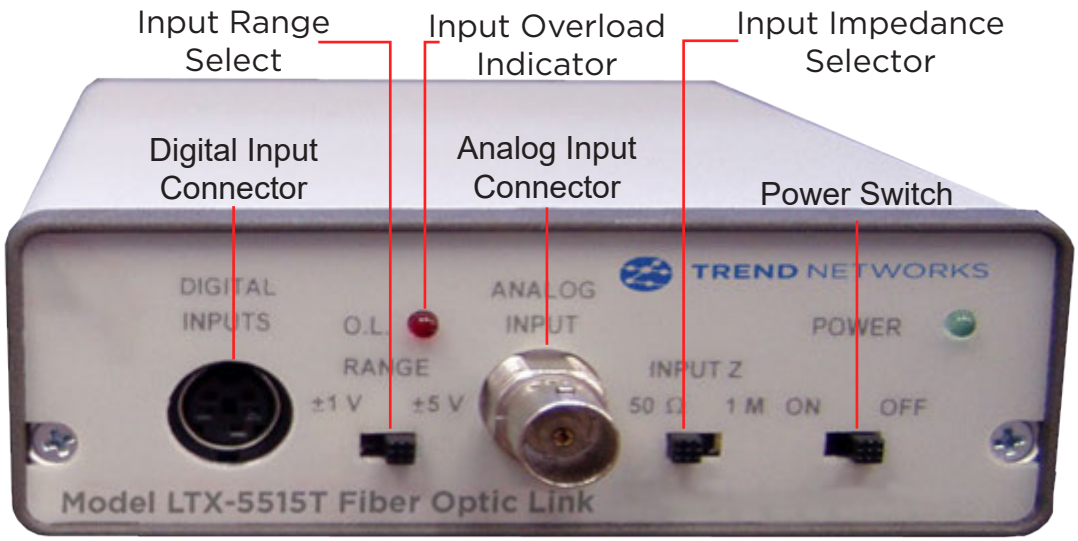
POWER CONSIDERATIONS

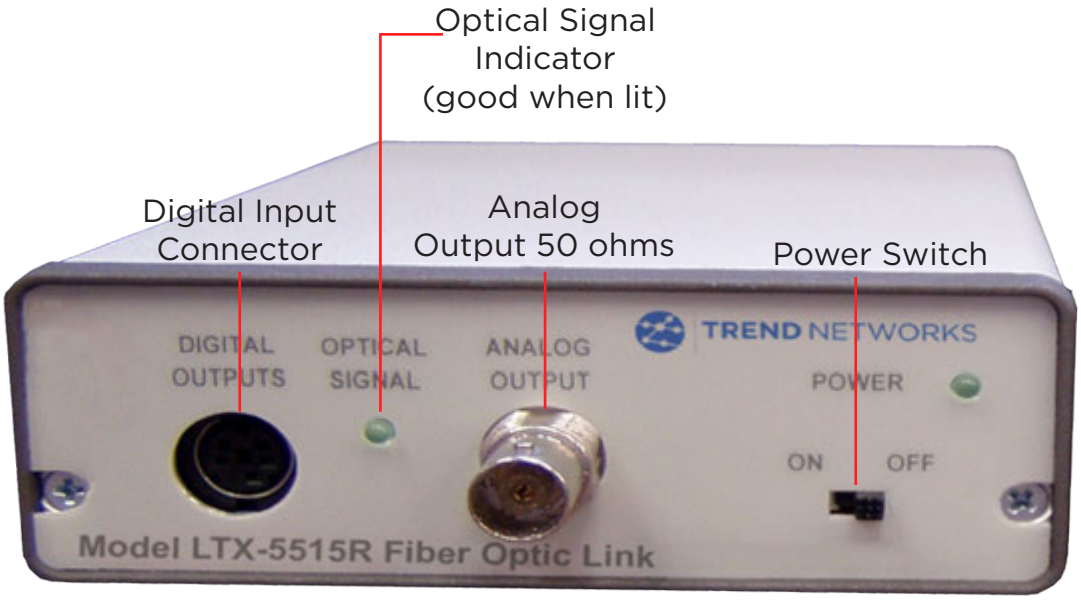
The LTX-551X Transmitter and Receiver operate from a regulated 9 VDC wall-mount power supply. These power supplies operate with line voltages ranging from 95 to 260 VAC, 50-60 Hz. Four interchangeable power line connectors are supplied that are compatible with connectors used in North America, Continental Europe, Australia, and the United Kingdom. Do not use with any other wall-mount supply or damage may result.

DESCRIPTION/FEATURES

LTX551X Transmitter



LTX551X Receiver



THEORY OF OPERATION

The LTX-5510T amplifies, filters and digitizes the input analog signal to 12-bit precision at a 50 MS/s rate and the LTX5515T at 100MS/s. The twelve bit digital data from each sample is combined with the state of the four digital input channels to form a sixteen bit word. This word is converted to an 8b/10b code and transmitted as a twenty bit word. This process is repeated at a 50 MHz for the LTX5510, resulting in a 1 Gb/s data stream and at a 100 MHz rate for the LTX5515 resulting in a 2 Gb/s data stream. This data is converted to an optical bitstream and transmitted via a user-supplied optical fiber to the LTX-551XR receiver.

The LTX-551XR receives the optical bitstream and converts it to a digital signal. It then decodes and de-multiplexes this data. Twelve bits are presented to a fast D/A converter and post amplifier which drives the analog output port and four bits are latched and presented at the digital output ports. The system is intended to be used with 50/125 uM or 62.5/125 uM fiber optic cable. (The LTX-551XSM is intended for use with single mode fiber).

Upon energizing the LTX-551XT, it transmits framing characters for a few seconds so that the receiver can determine where a valid word in the data stream begins and ends. The receiver is phase-locked to the transmitters data rate and will remain so unless the optical signal is disrupted in some fashion such as removing an optical fiber or power to one of the units.

OPERATIONAL CONSIDERATIONS

The LTX-551X system may be used to transmit signals from a source that is distant or at a different ground potential with respect to measuring devices such as an oscilloscope. The input signal must be in the range of 0 - ± 1 V or 0 - ± 5 V depending on the range selected. Digital signals may be transmitted as well. TTL, CMOS or LVTTL level signals are acceptable. The output signals are LVTTL (0-3.3 V).

For high speed signals transmitted via any significant amount (electrical length comparable to rise/fall times) of coaxial cable, a 50 ohm termination may be switched in to preclude distortion and reflections from a mismatched transmission line.

The power supply for the unit must be at roughly the same potential of the signal common mode voltage. For example, using the unit at a 10 000 V potential while it is utilizing the wall mount power supply at conventional line potential will result in a hazardous situation and certain damage to the equipment. An isolation transformer with sufficient isolation voltage rating must be used to power the wall mount supply.

The length of fiber optic cable that may be used with the LTX5510 is typically 300 M for 62.5/125um fiber or 500 M for 50/125um fiber and for the LTX5515 the typical distance is 150M for 62.1/125um fiber and 300 M for 50/125um fiber. Fiber bandwidth and not loss

is typically the limiting factor for range with multimode units. The single mode version is limited by loss. Typical ranges of 10 km may be achieved with this model using single mode fiber.

When setting up the LTX-551X system, note that the transmitter must be turned on last! This allows the receiver to detect the synchronizing framing characters. Meaningless signals will otherwise be generated. Should sync be lost by disconnecting the optical fiber, simply turn the transmitter off and on.

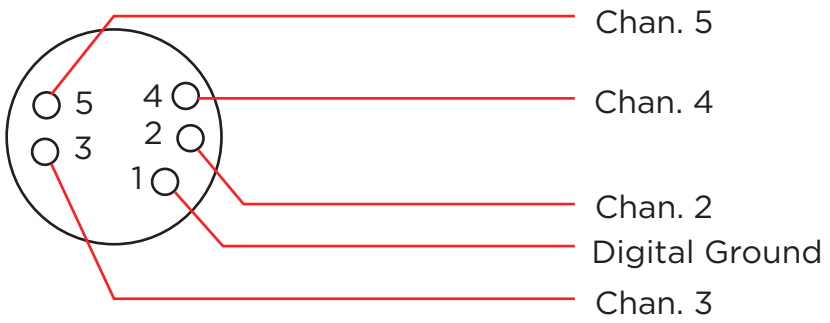
The red LED labeled O.L. indicates that the input signal exceeds the maximum input voltage for the range in use.

The green LED on the receiver indicates that the receiver is operating with an adequate optical input signal. If the indicator goes out, the transmitter has lost power or the connecting fiber is disconnected or broken.

The controls and their functions are indicated on the following pages.

The output signal from the receiver has a 10 V peak to peak output into an open circuit. The maximum output into a fifty ohm load is 4 V peak to peak.

DIGITAL INPUT/OUTPUT CONNECTIONS



WARRANTY AND REPAIR INFORMATION

REPAIR INFORMATION

Products manufactured by TREND Networks are designed and manufactured to provide reliable performance. However, in the event that service is required, both telephone technical assistance and factory repair services are available.

For IN-WARRANTY REPAIRS, call us to obtain a Returned Material Authorization number, (RMA Number). All products are to be returned to TREND Networks with freight charges pre-paid. Those products sent under warranty will be returned to our customers pre-paid. We cannot be responsible for returned products that do not reference the TREND Networks RMA number.

For OUT-OF-WARRANTY repairs, services are billable for both time and materials.

LIMITED WARRANTY

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