

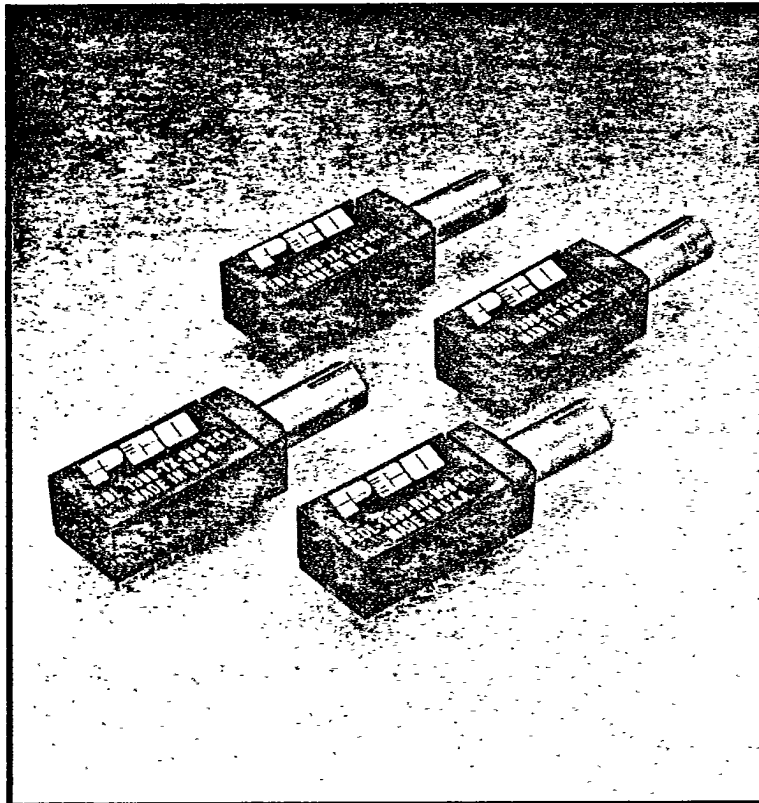


Digital Data Link

Preliminary

EDL-1300-ECL Series**Low Cost 1300 nm Transmitter/Receiver Modules**

T-41-91

**Features**

- Data Rates From 1 to 125 Mbaud
- Single 5 V Power Supply (+5 V or -5.2 V)
- Standard 16-Pin Footprint
- Low Cost Dual-in-Line Plastic Package
- 0 °C to +70 °C Operating Temperature Range
- Integral ST™ Connector Coupling
- 2 km Link Length over Multimode Fiber
- Differential ECL Logic Interfaces
- ESD Protection Integral to Connector

Description

The EDL-1300-ECL Series Fiber Optic Transmitter and Receiver Data Links are designed for use in local area networks or point-to-point data communications applications using emitter coupled logic interconnections.

Highly reliable PCO-manufactured 1300 nm surface-emitting LEDs are utilized in the transmitters. The receivers incorporate a PCO fabricated InGaAs/InP PIN photodiode and high speed transimpedance amplifier to meet the sensitivity and dynamic range requirements for high performance data communications. The

receiver post-amplifier features a Signal Detect function and differential emitter coupled logic (ECL) outputs. The transmitter and receiver are housed in a cost-effective 16-pin dual-in-line plastic package with integral ST™ connector and operate on either +5 volt or -5.2 volt power supplies.

Transmitter and receiver versions for operation over both the 1 to 50 Mbaud or 1 to 125 Mbaud speed ranges are available. All models are pin compatible with the PCO DTL-1300 Series hermetic data links.

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Transmitter Operation

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The transmitter behaves logically as a differential input gate which controls a 1300 nm light emitting diode. When the DATA input voltage is greater than the $\overline{\text{DATA}}$ input voltage, the LED is ON. When the

$\overline{\text{DATA}}$ signal is greater than the DATA input voltage, the LED is OFF. In a single-ended application, the unused input pin should be biased to $V_{CC} - 1.29$ volts.

Receiver Operation

The receiver converts optical energy to a photocurrent using a high performance PIN photodiode. The photocurrent is converted to a proportional analog voltage by a transimpedance amplifier. This low level analog signal is amplified by additional gain stages and processed through a shaping filter and a comparator to generate the differential ECL output signals. Both outputs (DATA and $\overline{\text{DATA}}$) are open emitters requiring termination to $V_{CC} - 2.0$ volts with 50 ohms or to V_{EE} with 510 ohms. For optimum performance both outputs should be terminated identically, even if only one output is used.

The Signal Detect circuit monitors the level of incoming optical signal and outputs a logic LOW signal when insufficient photocurrent is produced to ensure proper operation. The Signal Detect controls an internal squelch circuit which gates off spurious outputs generated by the receiver when no optical input is available by forcing DATA to the low state and $\overline{\text{DATA}}$ to the high state. The Signal Detect output is open emitter ECL requiring termination (510 ohms to V_{EE} is recommended).

Data Encoding

The receiver circuit utilizes capacitive interstage coupling which limits the permissible duty cycle variations in the serial data. A DC balanced optical signal generated by a scrambling or encoding

circuit is optimal for this type of data link. Unrestricted NRZ or bursty transmissions require special precautions.

PCB Layout Considerations

The differential inputs to the transmitter and the differential outputs from the receiver are high speed emitter coupled logic signals. Printed circuit board interconnections should be configured in accordance with ECL design rules. The *MECL System Design Handbook* from Motorola, Inc. is an excellent reference. Board layouts created by CAD autorouting techniques should be reviewed

carefully. Special care should be taken with the receiver, since it is a very sensitive analog device. 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. A solid ground plane and low impedance power supply traces are highly recommended.

EMI Susceptibility

The transmitter power supply leads should be bypassed with RF quality capacitors (0.1 microfarad) close to the package. Recommended power supply filtering circuits for the receiver are shown elsewhere in this document.

The receiver circuit contains sensitive analog circuitry and is housed in a plastic package. While shielding is provided internally to the package, it is recommended that the receiver be located away from strong sources of radiated EMI.

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Transmitter Performance Characteristics ($T_a = 0^\circ\text{C}$ to 70°C)

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Transmitter Electrical Interface

Parameter		Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	ECL	V_{EE}	-5.7	-5.2	-4.7	V
	Pseudo ECL	V_{CC}	4.7	5.0	5.7	V
Supply Current		I	-	110	150	mA
Power Dissipation		P	-	550	850	mW
Input HIGH Voltage (Data/ $\overline{\text{Data}}$)		V_{IHS}	$V_{CC} - 1.15$	-	$V_{CC} - 0.73$	V
Input LOW Voltage (Data/ $\overline{\text{Data}}$)		V_{ILS}	$V_{CC} - 1.87$	-	$V_{CC} - 1.45$	V
Differential Input Voltage		V_{DIF}	0.3	-	1.1	V
Input Common Mode Voltage ¹		V_{ICM}	-	-	1.0	V

¹ Permissible $\pm V_{ICM}$ with respect to $V_{BB} = V_{CC} - 1.29$ volts.

Transmitter Optical Interface

Center Wavelength	λ_c	1250	1320	1380	nm
Temp. Coeff. of λ_c	-	-	+0.3	-	nm/ $^\circ\text{C}$
Extinction Ratio (pl/ph) x 100%	-	-	-	10	%
Transmit OFF Power	P_{off}	-	-45.0	-	dBm
Spectral Width	$\Delta\lambda$	-	150	200	nm
Temp. Coeff. of $\Delta\lambda$	-	-	+0.4	-	nm/ $^\circ\text{C}$
Temp. Coeff. of Optical Output Power	-	-	-0.4	-0.8	%/ $^\circ\text{C}$
EDL-1300-TX-050-ECL					
Data Rate	B	DC	-	50	Mbaud
Rise/Fall Time	t_r, t_f	-	4.0	5.0	nsec
Optical Output Power ¹	\overline{P}_o	-20	-16	-13	dBm
EDL-1300-TX-125-ECL					
Data Rate	B	DC	-	125	Mbaud
Rise/Fall Time	t_r, t_f	-	3.0	3.5	nsec
Optical Output Power ¹	\overline{P}_o	-20	-16	-13	dBm

¹ Measured into 62.5/125 micron fiber (.29 NA).

Receiver Performance Characteristics ($T_a = 0^\circ\text{C}$ to 70°C)

Preliminary

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Receiver Electrical Interface

Parameter		Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	ECL	V_{EE}	-5.7	-5.2	-4.7	V
	Pseudo ECL	V_{CC}	4.7	5.0	5.7	V
Supply Current		I	-	75	90	mA
Power Dissipation		P	-	375	515	mW
Output HIGH Voltage		V_{OH}	$V_{CC} - 1.035$	-	$V_{CC} - 0.70$	V
Output LOW Voltage		V_{OL}	$V_{CC} - 1.90$	-	$V_{CC} - 1.50$	V

Receiver Performance

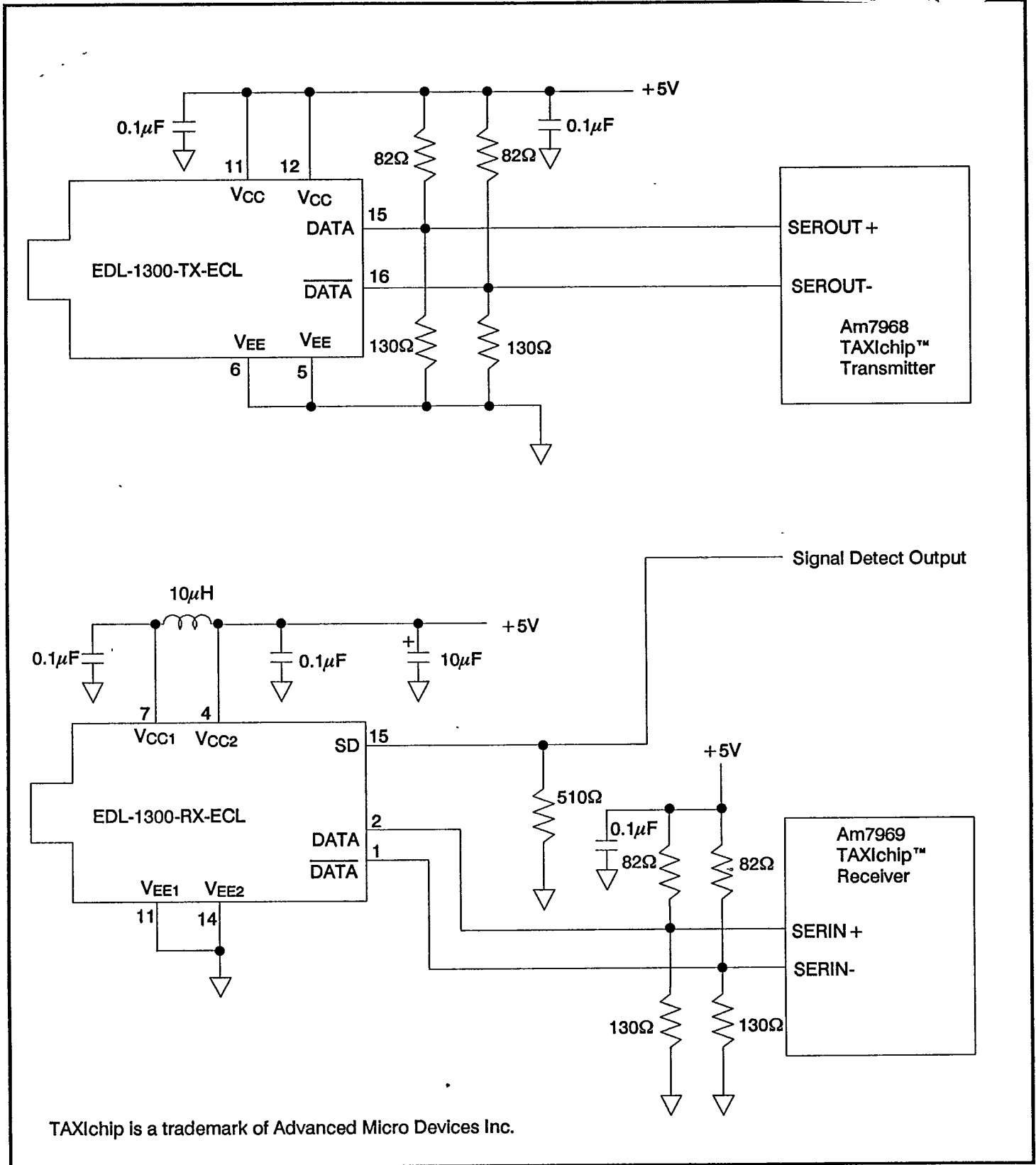
Parameter	Symbol	Minimum	Typical	Maximum	Units
Signal Detect Thresholds	P_{sd}	-39.0	-	-30.0	dBm
Signal Detect Hysteresis	-	0.2	1.0	-	dB
Wavelength of Operation	-	1100	1320	1600	nm
EDL-1300-RX-050-ECL					
Data Rate	B	1	-	50	Mbaud
Optical Input Power ¹ (BER = 1×10^{-12})	\bar{P}_{in}	-29.0	-	-13.0	dBm
EDL-1300-RX-125-ECL					
Data Rate	B	1	-	125	Mbaud
Optical Input Power ¹ (BER = 1×10^{-12})	\bar{P}_{in}	-29.0	-	-13.0	dBm
¹ Average Incident power using a 2^7-1 PRBS test pattern.					

Absolute Maximum Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-40	+100	$^\circ\text{C}$
Operating Temperature	-40	+85	$^\circ\text{C}$
Supply Voltage ¹	0	+6.0	V
Input Voltage ²	0	+6.0	V
Lead Soldering	-	240 $^\circ\text{C}$, 10 sec	-
¹ Measured from V_{CC} to V_{EE} .			
² Measured with respect to V_{EE} .			

Connections with AMD TAXIchip™ Set

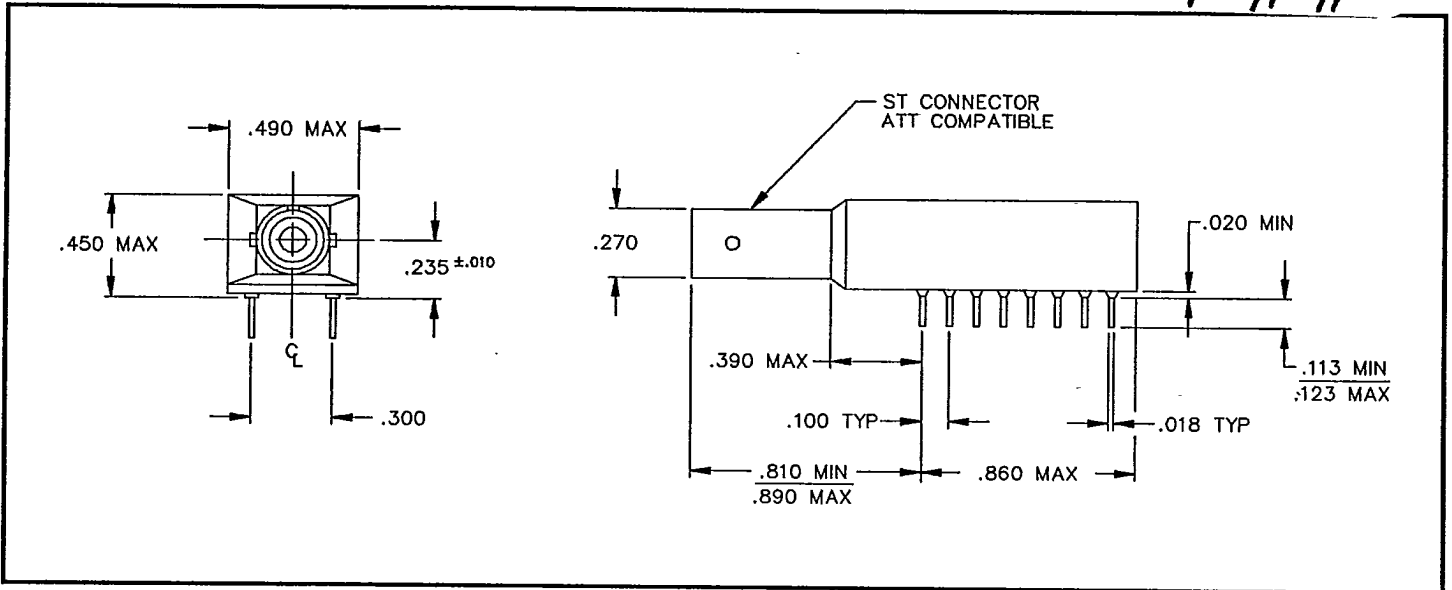
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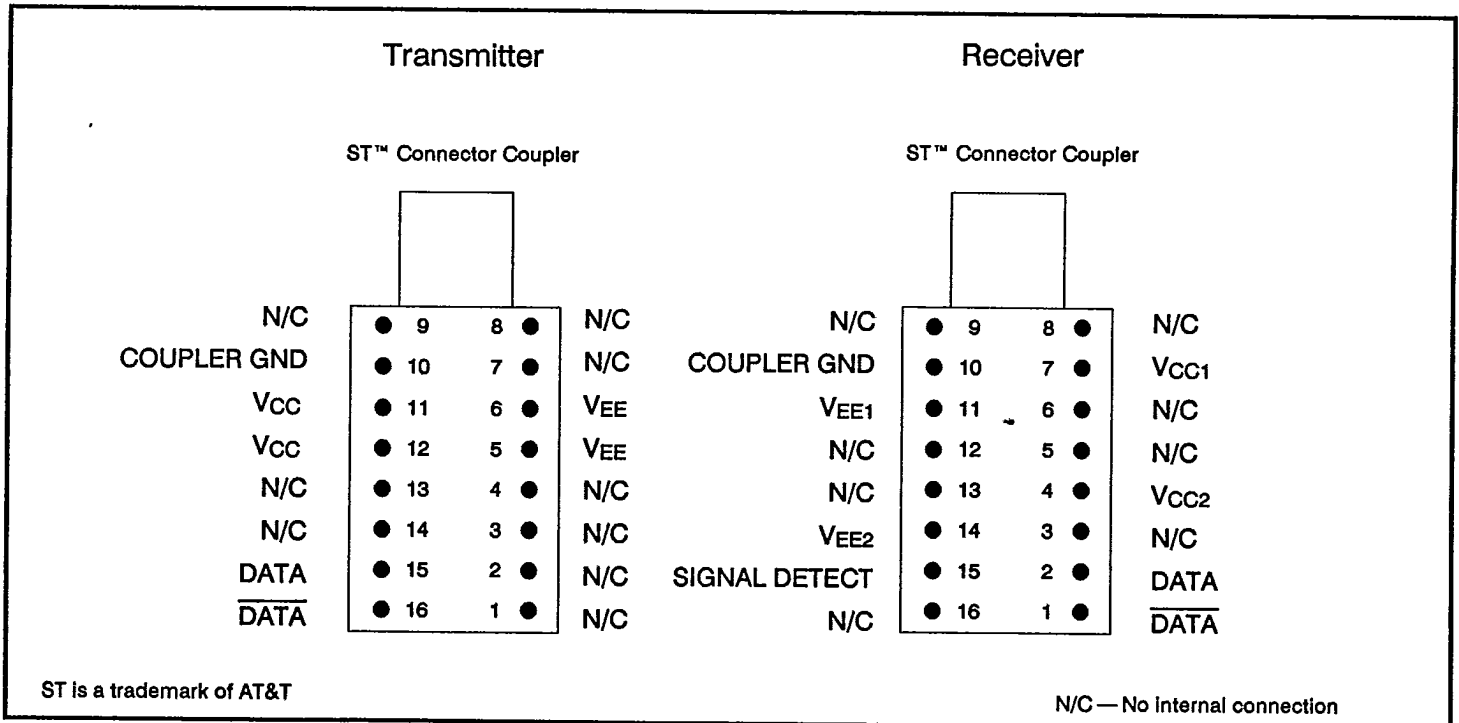
EDL-1300-ECL Outline Drawing

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The package provides molded-in standoffs to allow for proper cleaning beneath the part after soldering. Parts are shipped with a plastic cap to protect the optical interface during attachment to the printed circuit boards.

EDL-1300-ECL Pin Assignments (Top View)



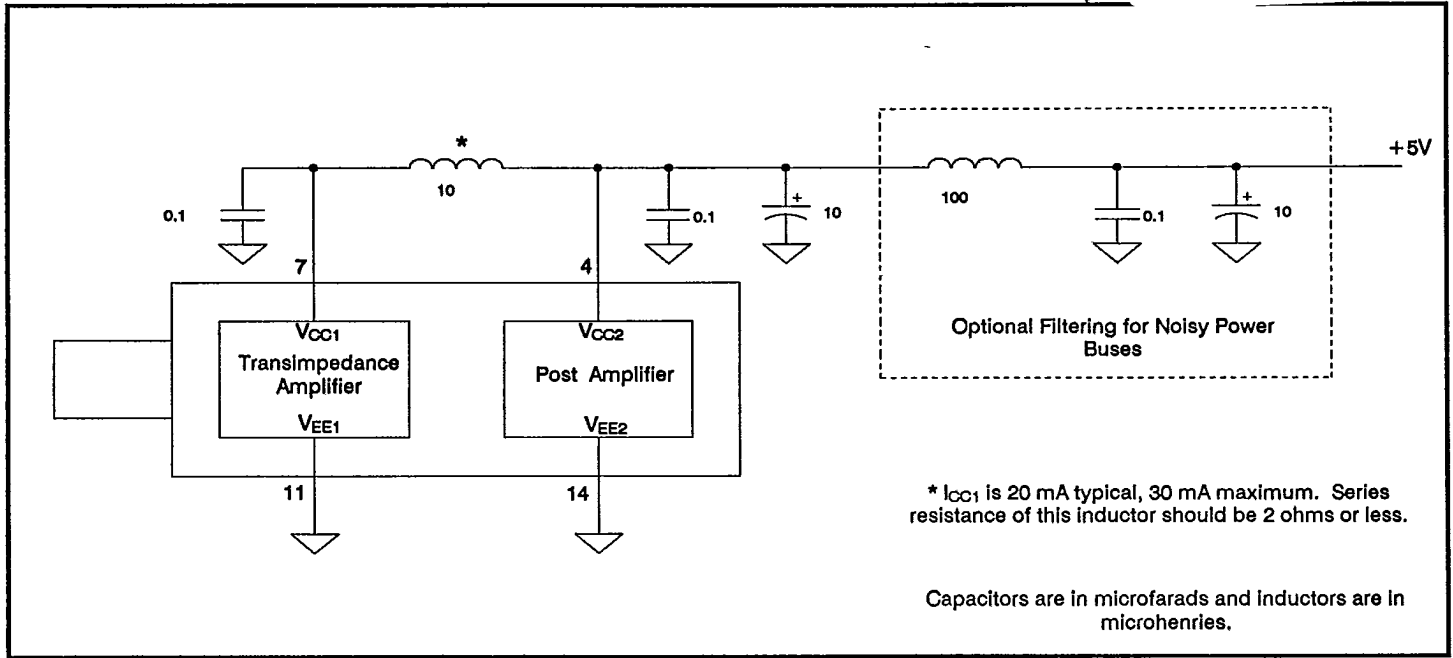
Pin 10 on both the transmitter and receiver is internally connected to the metal ST™ connector coupler. Depending on application, Pin 10 should be connected to chassis or circuit ground. The data links are designed to withstand a 15 kV pulse

to the connector in accordance with IEC 801-2 without evidence of flash-over or breakdown to the circuit if Pin 10 is connected to chassis ground.

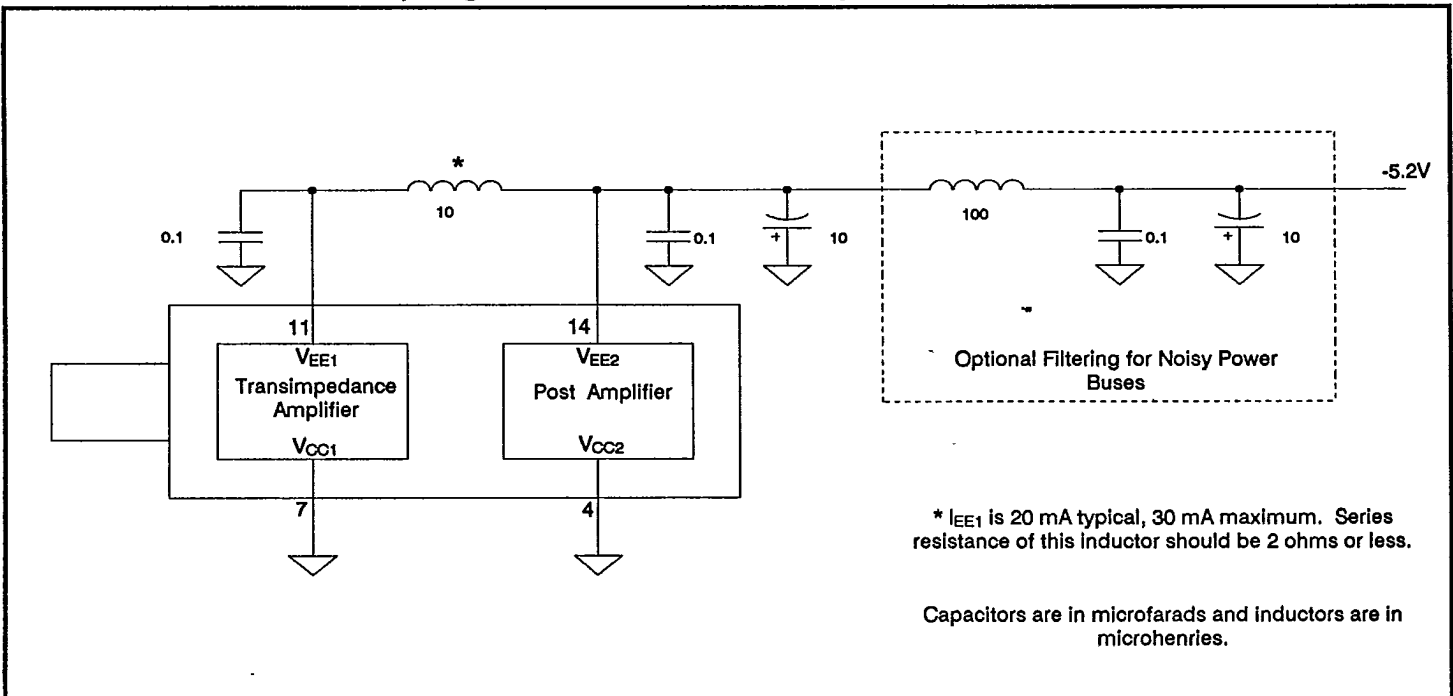
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Recommended De-Coupling Circuit for +5.0 Volt Operation

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Recommended De-Coupling Circuit for -5.2 Volt Operation



Ordering Information

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EDL - 1300 - XX - XXX - ECL		T-41-91
PRODUCT CODE	WAVELENGTH	LOGIC FAMILY SPEED RANGE 050: 1 to 50 Mbaud 125: 1 to 125 Mbaud FUNCTION TX: Transmitter RX: Receiver

HANDLING PRECAUTIONS

Normal handling precautions for electrostatic-sensitive devices should be taken.

PRELIMINARY DATA

This data sheet contains preliminary data. Supplementary data will be published at a later date. PCO, Incorporated reserves the right to make changes at any time without notice.



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