

PRELIMINARY PRODUCT SPECIFICATION

## Industrial OptoLock™ IDL300T

### 650 nm 250 Mbps 85°C Fiber Optic Transceiver with Termination for Bare POF



#### FEATURES

- Simple low-cost termination solution for 2.2mm jacketed POF cables without a plug
- Mechanically interchangeable with Firecomms-enabled SMI connectors
- Compatible with 8b/10b encoding schemes: 250 Mbps is the NRZ symbol rate
- Resonant Cavity LED at red 650 nm with small emission aperture suitable for POF
- Resonant Cavity LED reliability tested to over 400,000 hours lifetime
- Integrated CMOS driver IC for RCLED
- High sensitivity CMOS receiver IC and PIN diode for one-step light to digital conversion
- Integrated optics to efficiently focus and direct light
- Low power consumption with power saving features
- -20° to +85°C operating range
- RoHS compliant

#### DESCRIPTION

Firecomms Industrial OptoLock™ transceiver combines a pair of Firecomms fiber optic components within a miniature housing to provide instant termination for bare Plastic Optical Fiber (POF). This POF port significantly quickens and simplifies the connection and maintenance industrial equipment.

This version of OptoLock carries a pair of IDL Fiber Optic Transceivers (FOTs) designed to provide fast data links over POF in industrial environments. The FOTs are compatible with low-voltage differential signaling for seamless integration into existing logic bus structures. The transceiver has electrical power saving features. In the transmitter, the driver IC goes into a sleep state and the RCLED is switched off if there is no data or toning on the input bus. Similarly if there is no optical signal present, the RX IC will switch into sleep mode and power consumption is reduced to approximately 40uA.



#### APPLICATIONS

Application	Standard	Distance	Speed
Fast Industrial and Robotic Links	LVDS Bus	50 meters 0.3NA POF <sup>[1]</sup>	250 Mbps

<sup>[1]</sup> Depending on installation conditions.

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## TERMINATION STEPS

To terminate the POF cable into OptoLock, the end of the cable is cut cleanly, and the two strands are separated. One strand is inserted into each of two holes in the termination housing, which is then pressed closed to hold the POF in place. These steps are shown here.



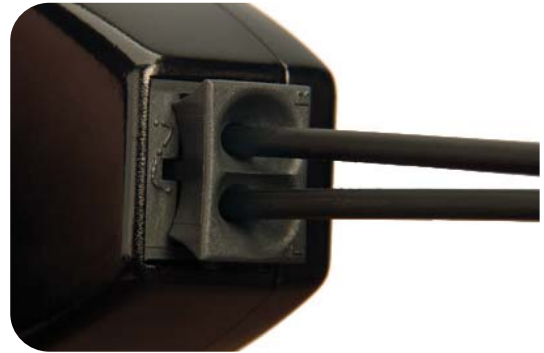
*Figure 1. Slice the POF cable.*



*Figure 2. Split the POF strands.*



*Figure 3. Insert POF into OptoLock.*



*Figure 4. Press OptoLock to hold POF into place.*

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**SPECIFICATIONS****ABSOLUTE MAXIMUM RATINGS<sup>[1]</sup>**

Parameter	Symbol	Minimum	Maximum	Unit
Storage Temperature	$T_{stg}$	-40	+85	°C
Operating Temperature <sup>[1]</sup>	$T_{op}$	-20	+85	°C
Soldering Temperature <sup>[2]</sup>	$T_{sld}$		+260	°C
Supply Voltage	$V_R$	-0.5	4.5	V

**TRANSMITTER ELECTRICAL CHARACTERISTICS<sup>[3]</sup>**

Parameter	Symbol	Minimum	Typical	Maximum	Unit
DC Supply Voltage	$V_{cc}$	3.0	3.3	3.6	V
Operating Current Consumption	$I_{cc}$		40	55	mA
Sleep State Current Consumption	$I_{sleep}$		20	40	nA
Data Rate		10		250	Mbps
Data Input Capacitance	$C_{IN}$			5	pF
Data Input Resistance (Single-ended)	$R_{IN}$		5		k $\Omega$
Input Common-Mode Range	$V_{IN-BIAS}$	GND+0.8		$V_{cc}-0.8$	v
Input Voltage Swing	$V_{IN-SWING}$	100		1200	mV
Minimum Differential Voltage Swing to Ensure Wake-Up		50			mV
Wake-Up Time Delay			5	80	$\mu$ s
Optical Power OFF Delay		0.02		20	$\mu$ s

**Notes:**

1. These are absolute maximum ratings at or beyond which the transceiver may be damaged.
2. 260°C, 5s 3 times, at least 2.2 mm away from lead root.
3. Unless otherwise stated,  $T_A = +25^\circ\text{C}$ .

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### TRANSMITTER PIN DESCRIPTION

Pin	Name	Symbol
1	Data Input (Negative)	TD-
2	Data Input (Positive)	TD+
3	Ground Pin <sup>[1]</sup>	GND
4	Input DC Power Pin	V <sub>CC</sub>
5	Ground Pin <sup>[1]</sup>	GND

### TRANSMITTER OPTICAL CHARACTERISTICS<sup>[2]</sup>

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Test Condition
Peak Wavelength	$\lambda$	640	660	670	nm	-20 to 85°C
Spectral FWHM	$\Delta\lambda$		23	30	nm	
Average Output Optical Power <sup>[3]</sup>	P	-10		-2.0	dBm	-20 to 85°C
Optical Rise Time	t <sub>R</sub>		2.0	2.8	ns	
Optical Fall Time	t <sub>F</sub>		0.5	1.2	ns	
Extinction Ratio	R <sub>E</sub>	10	15		dB	
Maximum Systematic Jitter <sup>[4]</sup>				1	ns	250 MBd
Maximum Random Jitter <sup>[4]</sup>				1	ns	250 MBd

#### Notes:

- Both ground pins must be connected to the ground plane on the PCB. These pins are not connected internally..
- Unless otherwise stated, T<sub>A</sub>= +25°C.
- Optical power coupled into 1mm diameter, 0.5 NA plastic fiber.
- Measured after a minimum of 50 cm of POF.

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### RECEIVER CHARACTERISTICS

Parameter	Symbol	Minimum	Typical	Maximum	Unit
DC Supply Voltage	V <sub>cc</sub>	3.0	3.3	3.6	V
Operating Current Consumption	I <sub>cc</sub>	34	36	45	mA
Sleep State Current Consumption	I <sub>sleep</sub>		20	40	uA
Output Impedance Between D and $\bar{D}$			100		Ohm
Offset Common Mode Voltage	V <sub>ocm</sub>		1.2		V
Output Differential Voltage Swing <sup>[1]</sup>		300	350	400	mV
Receivable Optical Power Sensitivity (SD on)		-22	-24		dBm
Maximum Allowed Optical Power				-2	dBm
Rise Time (10%-90%)			1.0	2.5	ns
Fall Time (10%-90%)			1.0	2.0	ns
Wake Up Time from Sleep State			10	100	us

1. A larger differential voltage swing of minimum 500mV, typical 550mV and maximum 600mV is available upon request.

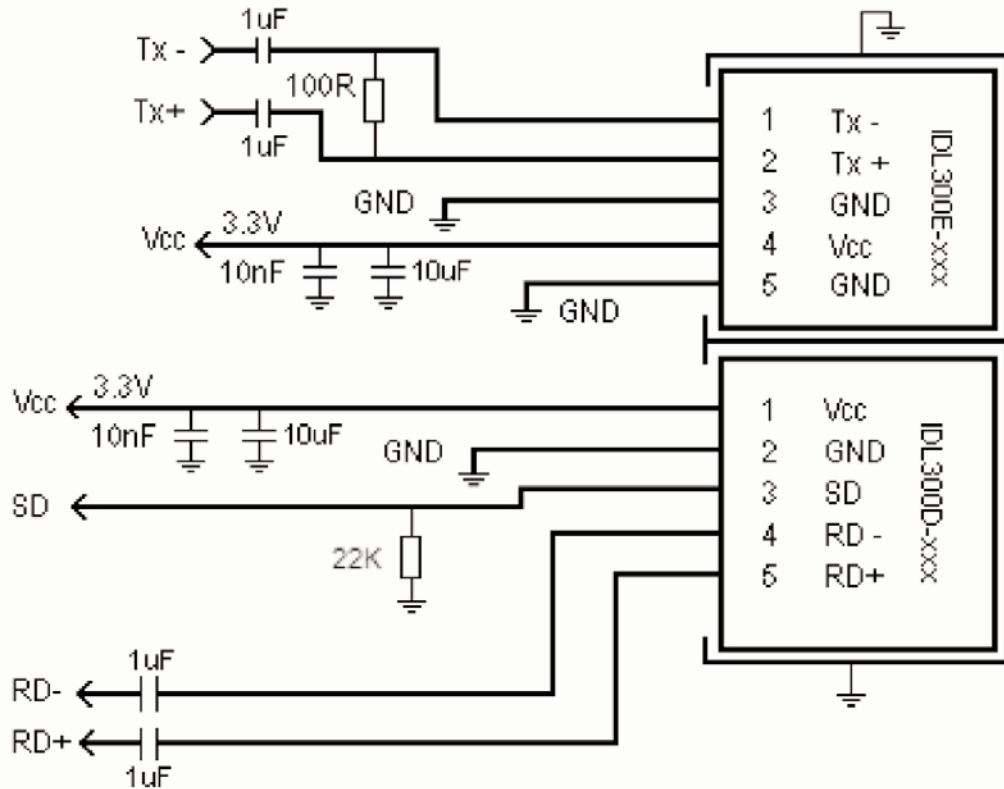
### RECEIVER PIN DESCRIPTION

Pin	Name	Symbol
1	Input DC Power Pin	V <sub>cc</sub>
2	Ground Pin	GND
3	Output Signal Detect	SD
4	Data Input (Negative)	RD-
5	Data Input (Positive)	RD+

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## APPLICATION CIRCUIT



**Figure 5. Interface circuit schematic to AC couple IDL300E/D to a PHY, FPGA or ASIC IC where the IC will not accept a common mode voltage of 1.2V.**

## Application Circuit Notes:

- The IDL300E (transmitter TX) and IDL300D (receiver RX) must be electrically shielded from each other to prevent crosstalk. This shield must be grounded. Please see the application note for recommendations on connector options and the PCB layout for connectors.
- Both GND pins of the TX FOT must be connected to GND (they are not connected internally).
- Power line capacitors should be located as close as possible to the FOT's DC power pins.
- The data lines are impedance-matched differential pairs. The PCB layout for these tracks must comply to high-speed data standards for impedance matching.

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MECHANICAL DATA

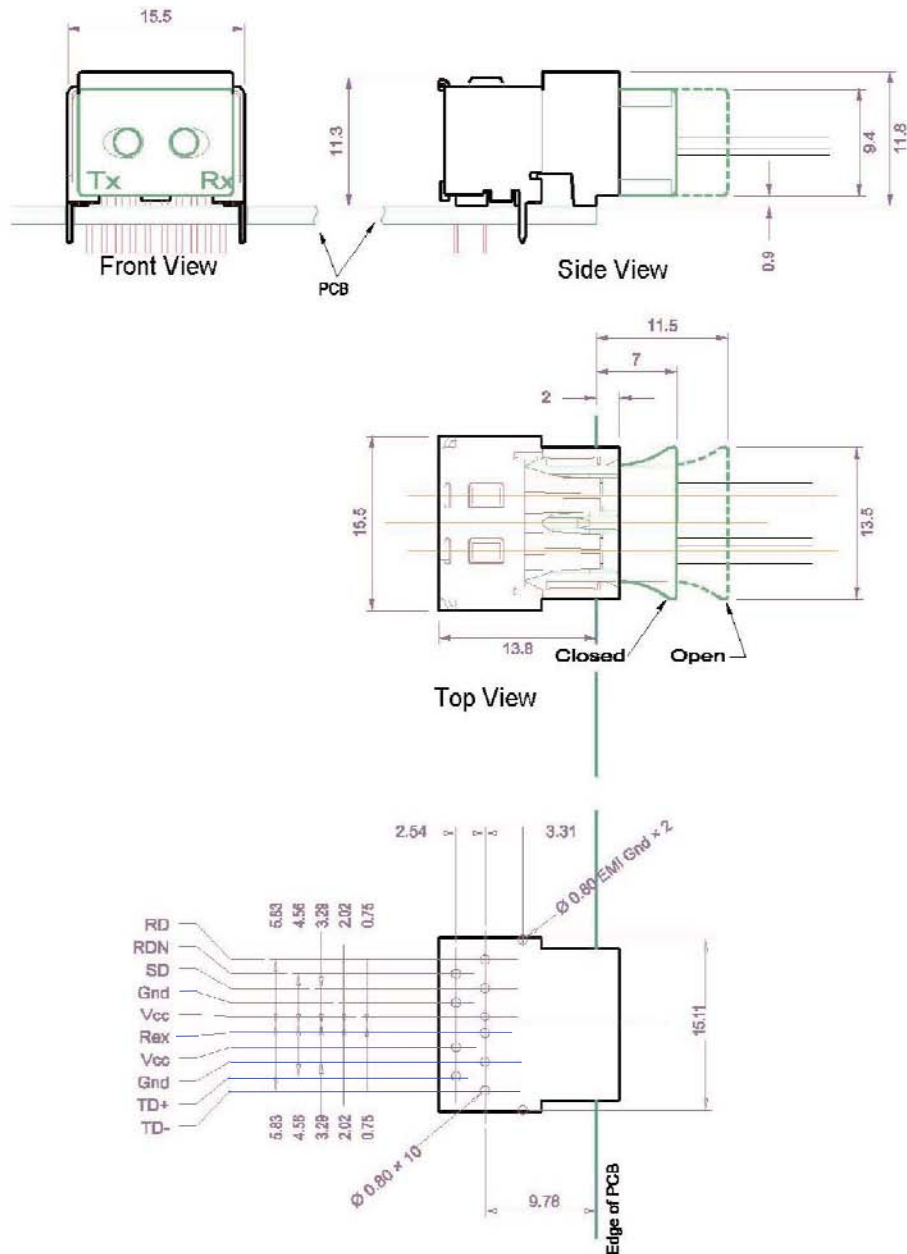


Figure 6. PCB layout (top view, looking down) for the Firecomms transceiver IDL300T.

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**PACKING INFORMATION**

Components are packed in PVC anti-static tubes in moisture barrier bags. Bags should be opened only in static-controlled locations, and standard procedures should be followed for handling moisture sensitive components.

**PACKING INFORMATION**

Components per Tube	25
Tube Length	440 mm
Tube Height	20 mm
Tube Depth	31 mm
Tubes per Bag	10
Bags per Inner Carton	1
Inner Carton Length	590 mm
Inner Carton Height	85 mm
Inner Carton Depth	145 mm
Weight per Inner Carton, Complete	1.8 Kg
Components per Inner Carton	250
Inner Cartons per Outer Carton	4
Outer Carton Length	600-640mm
Outer Carton Height	300 mm
Outer Carton Depth	200-285 mm
Weight per Outer Carton, Complete	8.6 Kg
Components per Outer Carton	1000

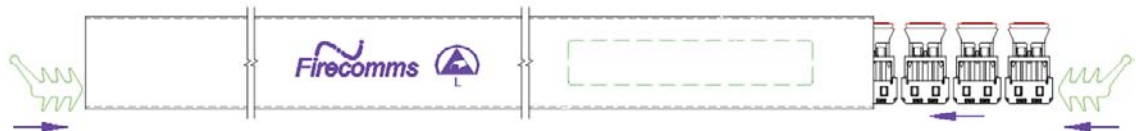


Figure 7.  
Packing Tube for the Firecomms transceiver IDL300T.

**ORDERING INFORMATION**

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Part Number	Name	Description
IDL300T-220	Industrial OptoLock Transceiver, 2.2mm POF, Black	650 nm RCLED-Based Transceiver, Color Black, with Termination for Bare POF Cable 2.2mm Diameter

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