Fiber Optic LED Driver for TTL Links Up to 155 Mbps

Application Bulletin 220

OPF300 Series, OPF1414, OPF5020, OPF690 Series

Optek offers a wide range of 850nm LEDs, transmitters and transceivers for use in low cost, high performance fiber optic links. These devices are offered in a wide variety of package configurations which give the designer flexibility in system design. An important consideration in the overall link design is the LED drive circuit employed with an 850nm emitter. The driver should be capable of modulating the LED at a high rate of speed without impeding its performance. The driver should also provide a small amount current to the LED in the "off" state (pre-bias) so that the LED junction does not completely discharge. The schematic shown in Figure 1 is an LED drive circuit in a shunt configuration. A shunt drive configuration provides the best performance for LED transmitters as it reduces pulse width distortion by providing a low impedance path for charge stored in the LED junction. The circuit in this document uses 74ACT logic gates to implement the shunt drive. Ordinary TTL gates do not have the capability of sinking and sourcing the required 60mA of drive current needed in typical applications. The 74ACT series gates have low impedance MOSFET transistors which have a high current rating. These transistors allow the circuit to rapidly modulate the LED drive current without impeding performance.

Figure 1: TTL LED Driver Schematic

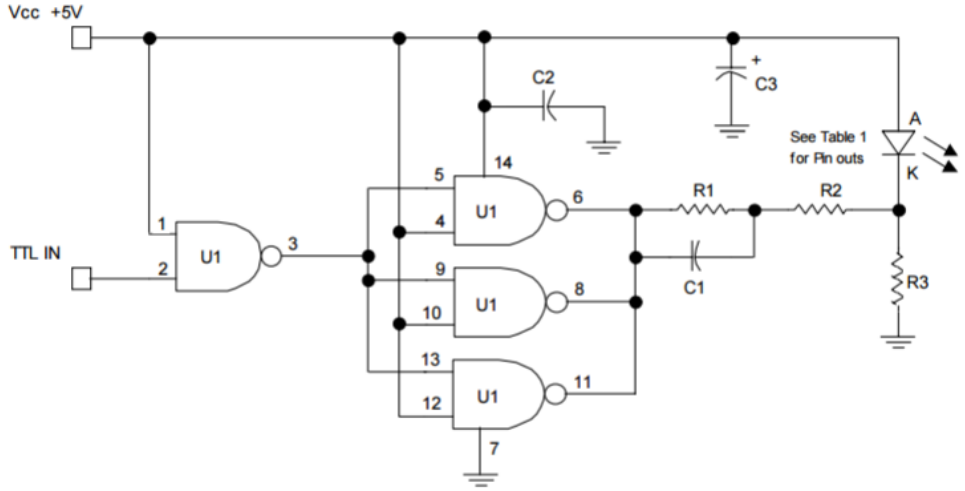

Table 1: Fiber Optic LED Pin-outs

Part Number	Anode (A) Pin	Cathode (K) Pin
OPF1412, OPF1414	2, 6, 7	3
OPF5020	7	6
OPF300 Series, OPF692	Refer to Product Datasheet	

Table 2: Materials List

Part	Description	Value/Type	Symbol	Tolerance
C1	Capacitor, Ceramic	82	pF	10%
C2	Capacitor, Ceramic	100	pF	10%
C3	Capacitor, Electrolytic	10	µF	20%
R1	Resistor, 1/8 W	30	Ω	5%
R2	Resistor, 1/8 W	30	Ω	5%
R3	Resistor, 1/8 W	240	Ω	5%
U1	IC, Quad NAND	74ACTQ00	-	-

Design Rules

To establish the correct amount of pre-bias:

$$R1 = R2 = \frac{R3}{8} \qquad C1 = \frac{2.5ns}{R1}$$

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