Signetics

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Status	Product Specification
FAST Products	

FAST 74F5302

Fiber Optic Dual LED /Clock Driver

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F5302	2.5 ns	8.0mA

FEATURES

- TTL inputs
- Output enable control
- High current source and sink capability
- Matched propagation delay times (t_{PLH}, t_{PHL})
- Symmetrical rise and fall times
- ESD protection greater than 2000 volts
- Single +5V supply
- Surface mount package

APPLICATIONS

- High speed serial data communication
- Fiber optic data links
- Local area and metropolitan area networks
- Digital Television
- PBX systems

ASSOCIATED PRODUCTS

- NE 5210/11/12 transimpedance amplifiers
- NE5214/5217 postamplifiers with link status indicator
- 74F5300 fiber optic LED driver

DESCRIPTION

The 74F5302 is a dual LED/ Clock driver designed for use in fiber optics links. The 74F5302 is ideally suited for use in high speed optical high transmitter systems. It is also ideal for use as a clock driver.

ORDERING INFORMATION

PACKAGES	COMMERCIAL RANGE V_{CC} = 5V±10%; T_A = 0°C to +70°C
14-Pin Plastic DIP	74F5302N
14-Pin Plastic SO	74F5302D

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

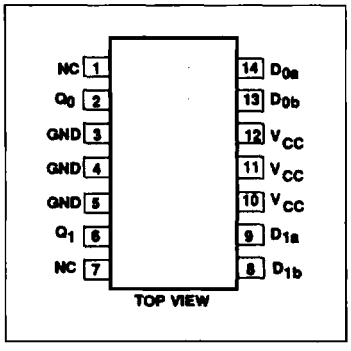
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D_{na}, D_{nb}	Data inputs	1.0/1.0	20µA/0.6mA
Q_n	Current driver outputs	8000/266.6	160mA/160mA

NOTE:
One (1.0) FAST Unit Load is defined as: 20µA in the High state and 0.6mA in the Low state.

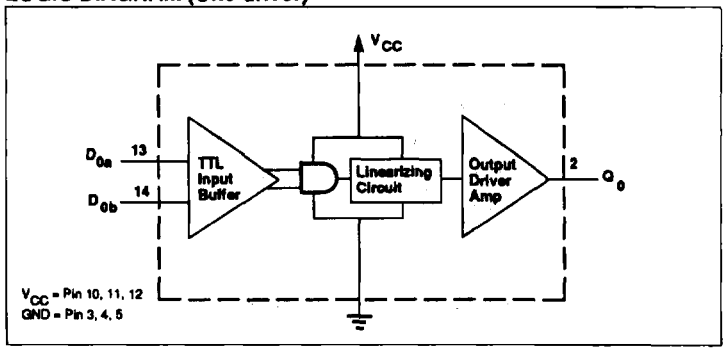
The TTL input buffer accepts TTL data. The Linearizing Circuit ensures a constant propagation delay for t_{PLH} and t_{PHL}, and controls the rise and fall times. The output driver amplifier is capable of sourcing more than 160 mA and sinking more than 160 mA at low impedances. The high current output driver has been designed to deal with transmission line effects of high speed switching systems with fast rising and falling edges. The performance of the system can be enhanced by matching impedance at the output for proper termination. It exhibits closely matched propagation delays (t_{PHL}, t_{PLH}) and symmetrical rise and fall times. The resulting optical waveform has minimal Duty Cycle Distortion (DCD). When used with the external pre-bias and pre-charging circuits, the response can be tailored to a specific LED to eliminate any overshoot and to minimize the long fall response.

Additionally, this part can be used as the transmiter in a complete fiber optic system when combined with any of the NE5210/5211/5212 preamplifiers and NE5214/5217 preamplifiers for the optical receiver. Please refer to applications note AN1121 in the Signetics Fiber Optic Communication Data Book for more specific applications information.

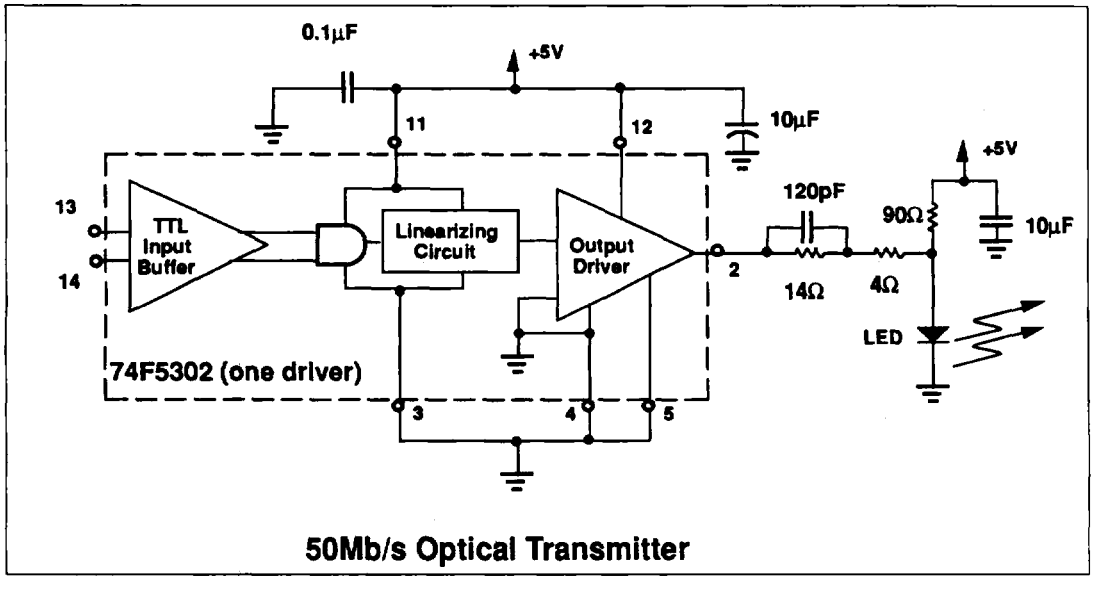
PIN CONFIGURATION



LOGIC DIAGRAM (One driver)



APPLICATION



ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	-0.5 to +7.0	V
V_{IN}	Input voltage	-0.5 to +7.0	V
I_{IN}	Input current	-30 to +5	mA
V_{OUT}	Voltage applied to output in High output state	-0.5 to +V_{CC}	V
I_{OUT}	Current applied to output in Low output state	240	mA
T_A	Operating free-air temperature range	0 to +70	°C
T_{STG}	Storage temperature	-65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		Min	Nom	Max	
V_{CC}	Supply voltage	4.5	5.0	5.5	V
V_{IH}	High-level input voltage	2.0			V
V_{IL}	Low-level input voltage			0.8	V
I_{IK}	Input clamp current			-18	mA
I_{OH}	High-level output current			-160	mA
I_{OL}	Low-level output current			160	mA
T_A	Operating free-air temperature range	0		70	°C

DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER		TEST CONDITIONS[1]			LIMITS			UNIT
						Min	Typ[2]	Max	
V_{OH}	High-level output voltage		V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN		±10%V_{CC}	2.5			V
				I_{OH}= -80mA	±5%V_{CC}	2.8	3.3	3.9	V
					V_{CC} = 5V	3.0	3.3	3.6	V
				I_{OH}= -160mA	±10%V_{CC}	2.0			V
V_{OL}	Low-level output voltage		V_{CC} = MIN, V_{IL} = MAX, V_{IH} = MIN	I_{OL}= 100mA	±10%V_{CC}		0.42	0.55	V
				I_{OL}= 120mA	±10%V_{CC}		0.45	0.60	V
				I_{OL}= 160mA	±10%V_{CC}		0.55	0.80	V
V_{IK}	Input clamp voltage		V_{CC} = MIN, I_I = I_{IK}				-0.73	-1.2	V
I_I	Input current at maximum input voltage		V_{CC} = MAX, V_I = 7.0V					100	µA
I_{IH}	High-level input current		V_{CC} = MAX, V_I = 2.7V					20	µA
I_{IL}	Low-level input current		V_{CC} = MAX, V_I = 0.5V					-0.6	mA
I_{CC}	Supply current (total)	I_{CCH}	V_{CC} = MAX				5.0	12	mA
		I_{CCL}					18	25	mA

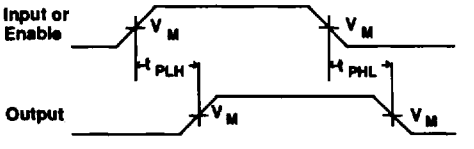
NOTES:
1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_A = 25°C.
3. The device is not short circuit protected.

AC ELECTRICAL CHARACTERISTICS

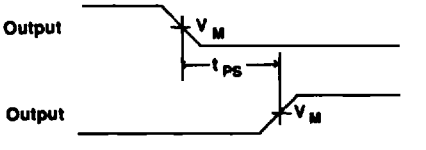
SYMBOL	PARAMETER	TEST CONDITION	LIMITS					UNIT
			T_A = +25°C, V_{CC} = 5V, C_L = 50pF, R_L = 100Ω			T_A = 0°C to +70°C, V_{CC} = 5V ±10%, C_L = 50pF, R_L = 100Ω		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay D_{na}, D_{nb} to Q_n	Waveform 1	1.0 1.0	2.0 2.5	4.5 5.0	1.0 1.0	4.5 5.0	ns
D_{tpw}	Pulse width distortion[1]	Frequency = 10MHz		0.8	1.2		1.8	ns
t_{PS}	Propagation delay Skew[2,4]	Waveform 2		0.8	1.2		1.3	ns
t_{RFS}	Rise and Fall time Skew[3,4]			0.3	1.5		2.0	ns
t_{OS}	Output to output Skew[4]			0.9	1.3		1.6	ns
t_{THL} t_{TLH}	Fall time 90% to 10% Rise time 10% to 90%	Test circuits and Waveforms	1,0 1.0	1.5 1.8	3.0 3.0	0.5 0.5	4.0 4.5	ns

NOTES:
1. D_{tpw} is defined as the difference between input pulse width and output pulse width (0 to 3 volt input swing and 50% duty cycle).
2. $|t_{PLH}$ actual - t_{PHL} actual $|$.
3. $|t_{TLH}$ actual - t_{THL} actual $|$.
4. Skew times are valid only under same test conditions (temperature, V_{CC}, loading, etc.,).

AC WAVEFORMS



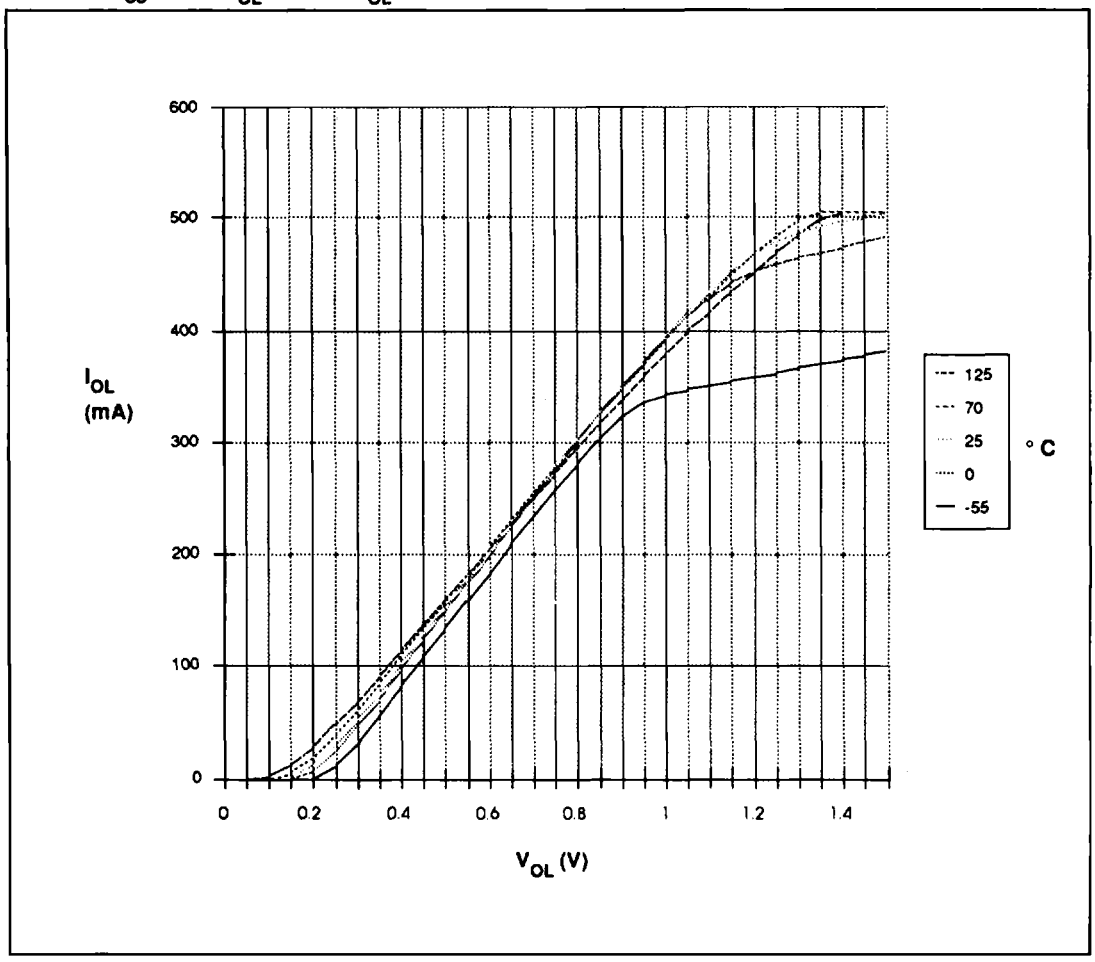
Waveform 1. Propagation Delay for Input to Output



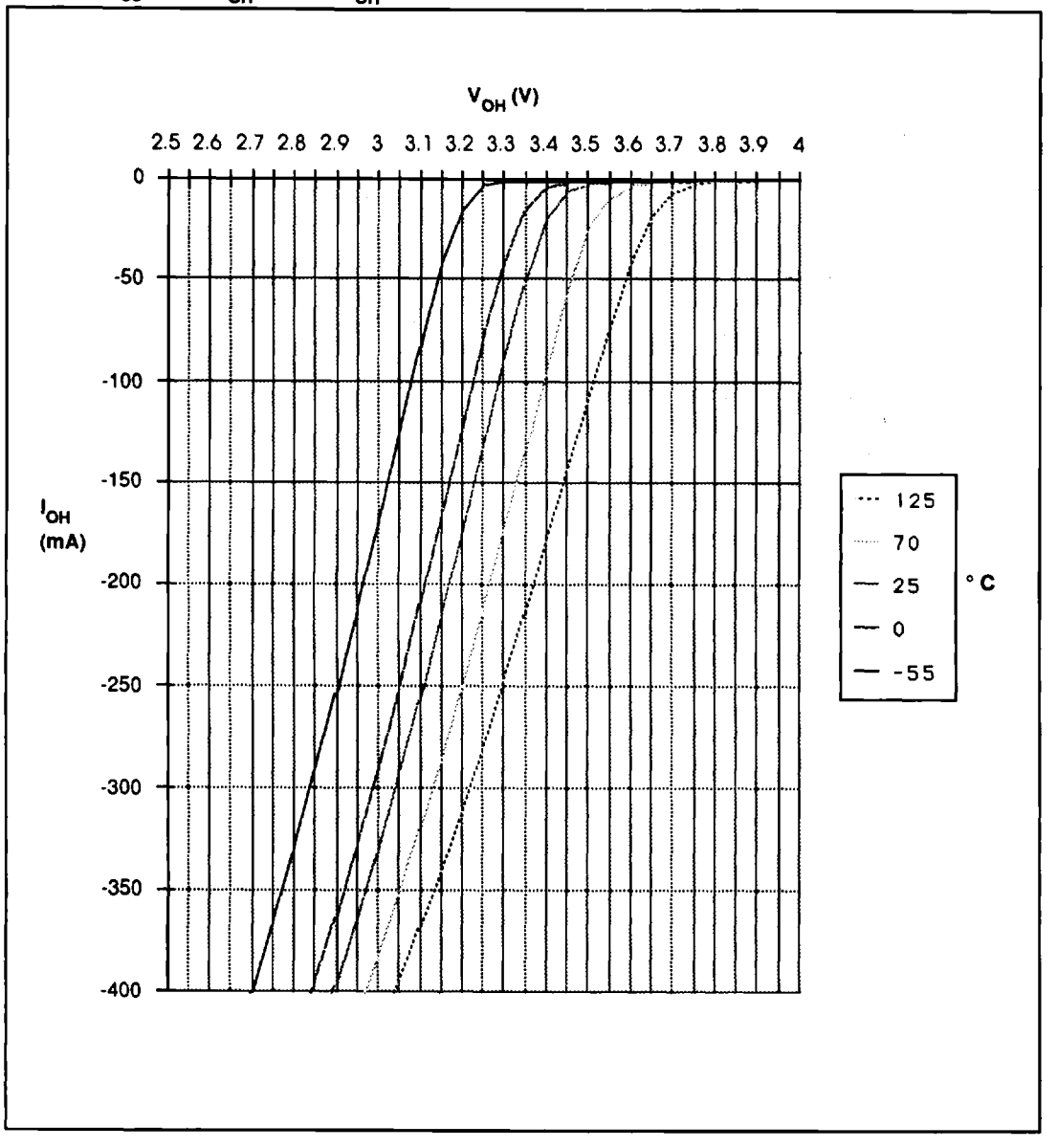
Waveform 2. Propagation Delay Skew

NOTE: For all waveforms, V_M = 1.5V.

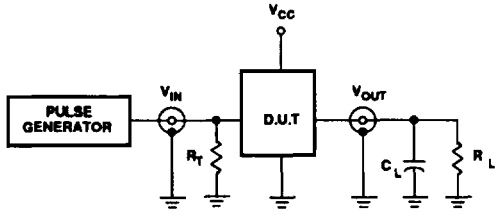
TYPICAL (V_{CC} =5.0V) V_{OL} VERSUS I_{OL} FOR VARIOUS TEMPERATURES



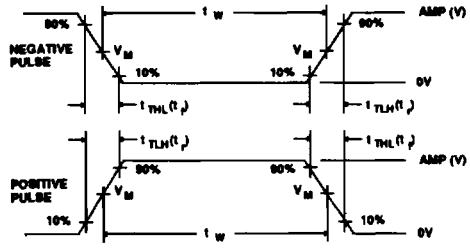
TYPICAL (V_{CC} =5.0V) V_{OH} VERSUS I_{OH} FOR VARIOUS TEMPERATURES



TEST CIRCUIT AND WAVEFORMS



Test Circuit For Totem-Pole Outputs



V_M = 1.5V

Input Pulse Definition

DEFINITIONS

R_L = Load resistor; see AC CHARACTERISTICS for value.

C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_{TLH}	t_{THL}
74F	3.0V	1MHz	500ns	2.5ns	2.5ns