

| | |
|---------------|-----------------------|
| Document No. | 853-1157 |
| ECN No. | 97652 |
| Date of issue | September 15, 1989 |
| Status | Product Specification |
| FAST Products | |

FAST 74F30240, 74F30244 30Ω Line Drivers

'F30240 Octal 30Ω Line Driver With Enable, Inverting
(Open Collector)

'F30244 Octal 30Ω Line Driver With Enable, Non-Inverting
(Open Collector)

FEATURES

- Ideal for driving transmission lines or backplanes. 160mA I_{OL}
Ideal for applications with impedance as low as 30Ω
- Guaranteed threshold voltages on the incident wave while driving line as low as 30Ω.
- High impedance NPN base inputs for reduced loading (20μA in High and Low states)
- Ideal for applications which require high output drive and minimal bus loading
- Octal Interface
- 'F30240 Inverting
- 'F30244 Non-Inverting
- Open-Collector outputs sink 160mA
- Multiple side pins are used for V_{CC} and GND to reduce lead inductance (Improves speed and noise immunity)
- Available in 24-pin standard slim DIP (300mil) plastic, SOL or CERDIP packages

DESCRIPTION

The 74F30240/'F30244 are high current open collectors octal buffers composed of eight inverters. The 'F30240 has inverting data paths and the 'F30244 has non-inverting paths. Each device has eight inverters with two Output Enables ($\overline{OE}_0, \overline{OE}_1$) each controlling four outputs. Both drivers are designed to deal with the low-impedance trans-

| TYPE | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|----------|---------------------------|--------------------------------|
| 74F30240 | 9.5ns | 62.5mA |
| 74F30244 | 10.5ns | 69mA |

ORDERING INFORMATION

| PACKAGES | COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$; $T_A = 0^\circ C$ to $+70^\circ C$ |
|-----------------------------------------------|---------------------------------------------------------------------------------|
| 24-Pin Cerdip (300 mil) | N74F30240F, N74F30244F |
| 24-Pin Plastic Slim DIP(300 mil) ¹ | N74F30240N, N74F30244N |
| 24-Pin Plastic SOL ² | N74F30240D, N74F30244D |

NOTE:

1. Thermal mounting techniques are recommended. See SMD Process Applications (page 17) for a discussion of thermal consideration for surface mounted devices.
2. Because of the high current sinking capability of these parts, the SOL package should only be used under the following conditions: a) 50% duty cycle AND b) 3/5 of remaining 50% driving ≤ 100 mA (leaving the remaining 2/5 of the to drive ≤ 160 mA) OR c) use ≥ 450 linear feet per minute forced air or other thermal mounting techniques.

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

| PINS | DESCRIPTION | 74F(U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-------------------------------------|-----------------------------------|--------------------|---------------------|
| $D_0 - D_7$ | Data inputs | 1.0/0.033 | 20μA/20μA |
| $\overline{OE}_0 - \overline{OE}_1$ | Output Enable inputs (active Low) | 1.0/0.033 | 20μA/20μA |
| $\overline{Q}_0 - \overline{Q}_7$ | Data outputs (OC) for 'F30240 | OC/266.7 | OC/160mA |
| $Q_0 - Q_7$ | Data outputs (OC) for 'F30244 | OC/266.7 | OC/160mA |

NOTE:

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

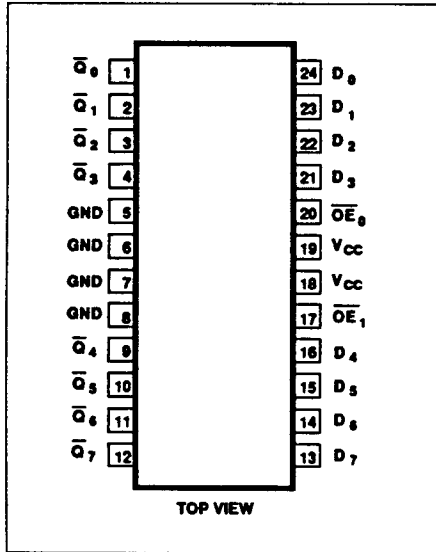
sion line effects found on printed circuit boards when fast edge rates are used. The 160 mA I_{OL} provides ample power to

achieve TTL switching voltages on the incident wave.

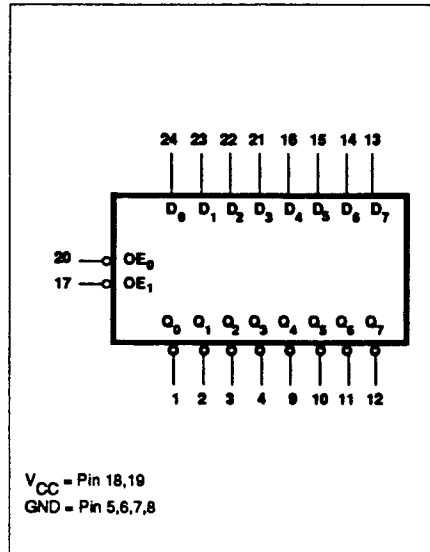
30Ω Line Drivers

FAST 74F30240, 74F30244

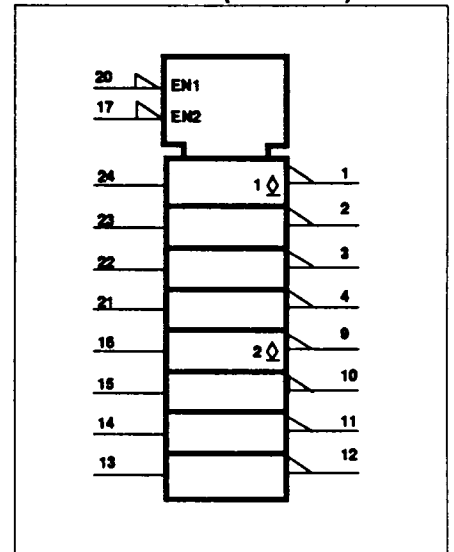
PIN CONFIGURATION



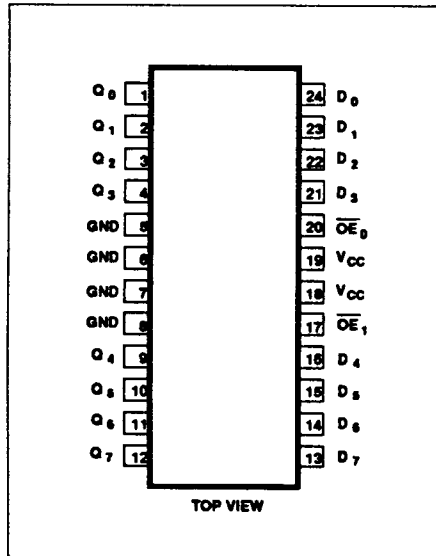
LOGIC SYMBOL



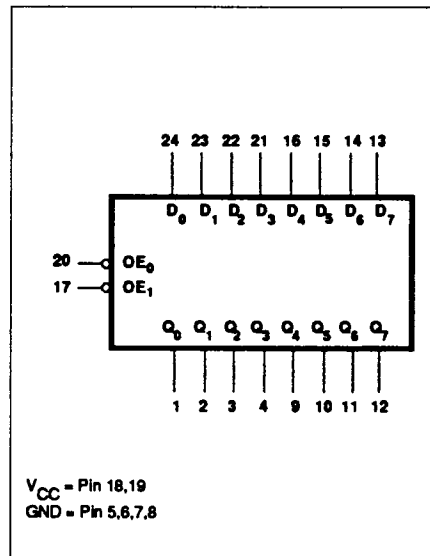
LOGIC SYMBOL(IEEE/IEC)



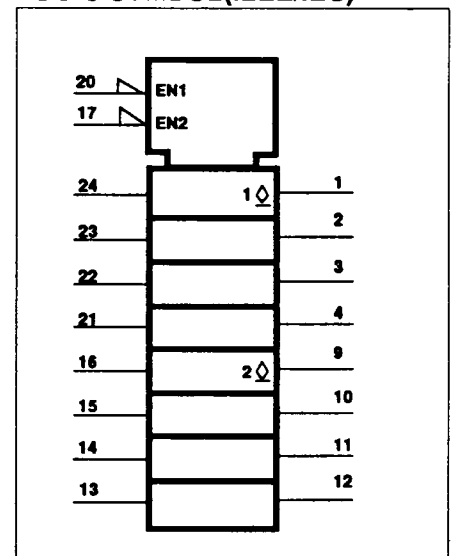
PIN CONFIGURATION



LOGIC SYMBOL



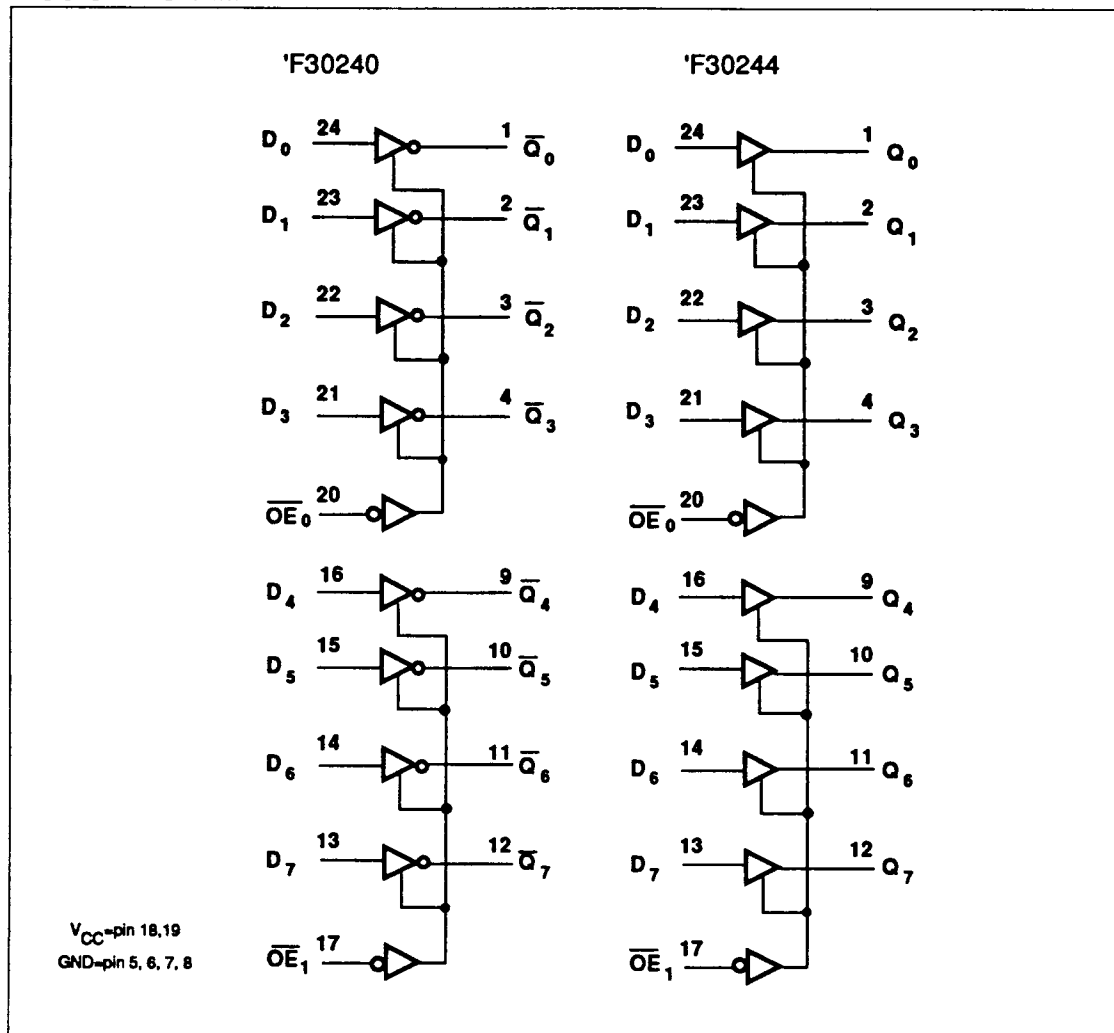
LOGIC SYMBOL(IEEE/IEC)



30Ω Line Drivers

FAST 74F30240, 74F30244

LOGIC DIAGRAM



FUNCTION TABLE

| INPUTS | | OUTPUTS | |
|-------------------|-------|------------------|---------|
| | | 'F30240 | 'F30244 |
| \overline{OE}_n | D_n | \overline{Q}_n | Q_n |
| L | L | H | L |
| L | H | L | H |
| H | X | OFF | OFF |

H=High voltage level
 L=Low voltage level
 X=Don't care
 OFF=Pulled up through resistor (open collector)

30Ω Line Drivers

FAST 74F30240, 74F30244

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 +5.5 | V |
| I_{OUT} | Current applied to output in Low output state | 320 | 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_H | High-level input voltage | 2.0 | | | V |
| V_L | Low-level input voltage | | | 0.8 | V |
| I_{IK} | Input clamp current | | | -18 | mA |
| V_{OH} | High-level output voltage | | | 4.5 | V |
| 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 | | | | | |
| I_{OH} | High-level output current | $V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, V_{IH} = \text{MIN}, V_{OH} = \text{MAX}$ | | | 250 | μA | | | | |
| V_{OL} | Low-level output current | $V_{CC} = \text{MIN}$ $V_{IL} = \text{MAX}$ $V_{IH} = \text{MIN}$ | $I_{OL} = 100\text{mA}$ | $\pm 10\%V_{CC}$ | .42 | .55 | V | | | |
| | | | $I_{OL} = 160\text{mA}^3$ | $\pm 5\%V_{CC}$ | | .80 | V | | | |
| V_{IK} | Input clamp voltage | $V_{CC} = \text{MIN}, I_1 = I_{IK}$ | | | -0.73 | -1.2 | V | | | |
| I_1 | Input current at maximum input voltage | $V_{CC} = 0.0\text{V}, V_1 = 7.0\text{V}$ | | | | 100 | μA | | | |
| I_{IH} | High-level input current | $V_{CC} = \text{MAX}, V_1 = 2.7\text{V}$ | | | | 20 | μA | | | |
| I_{IL} | Low-level input current | $V_{CC} = \text{MAX}, V_1 = 0.5\text{V}$ | | | | -20 | μA | | | |
| I_{CC} | Supply current [total] | $V_{CC} = \text{MAX}$ | | | | | I_{CCH} | 13 | 23 | mA |
| | | | | | | | I_{CCL} | 70 | 95 | mA |
| | | | | | | | I_{CCH} | 19 | 27 | mA |
| | | | | | | | I_{CCL} | 70 | 100 | mA |

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at $V_{CC} = 5\text{V}, T_A = 25^\circ\text{C}$.
- I_{OL1} is the current necessary to guarantee the High to Low transition in a 30Ω transmission line on the incident wave.

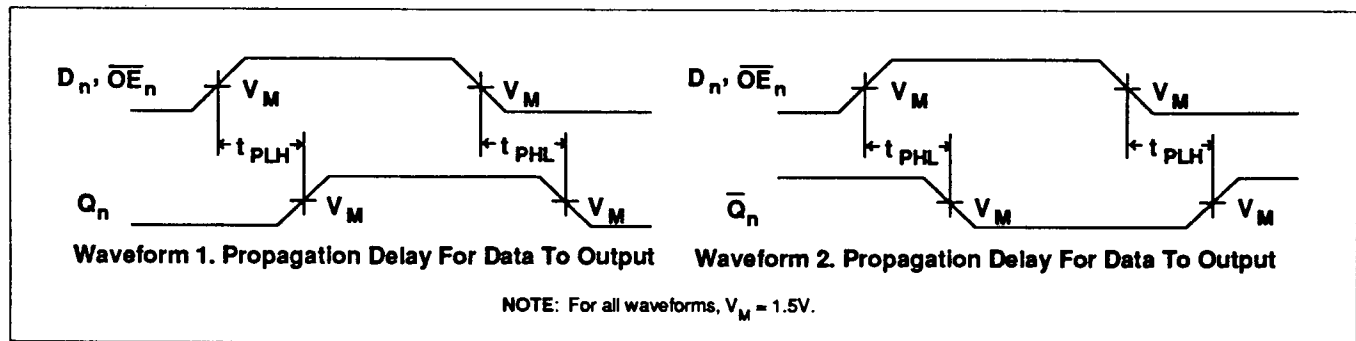
30Ω Line Drivers

FAST 74F30240, 74F30244

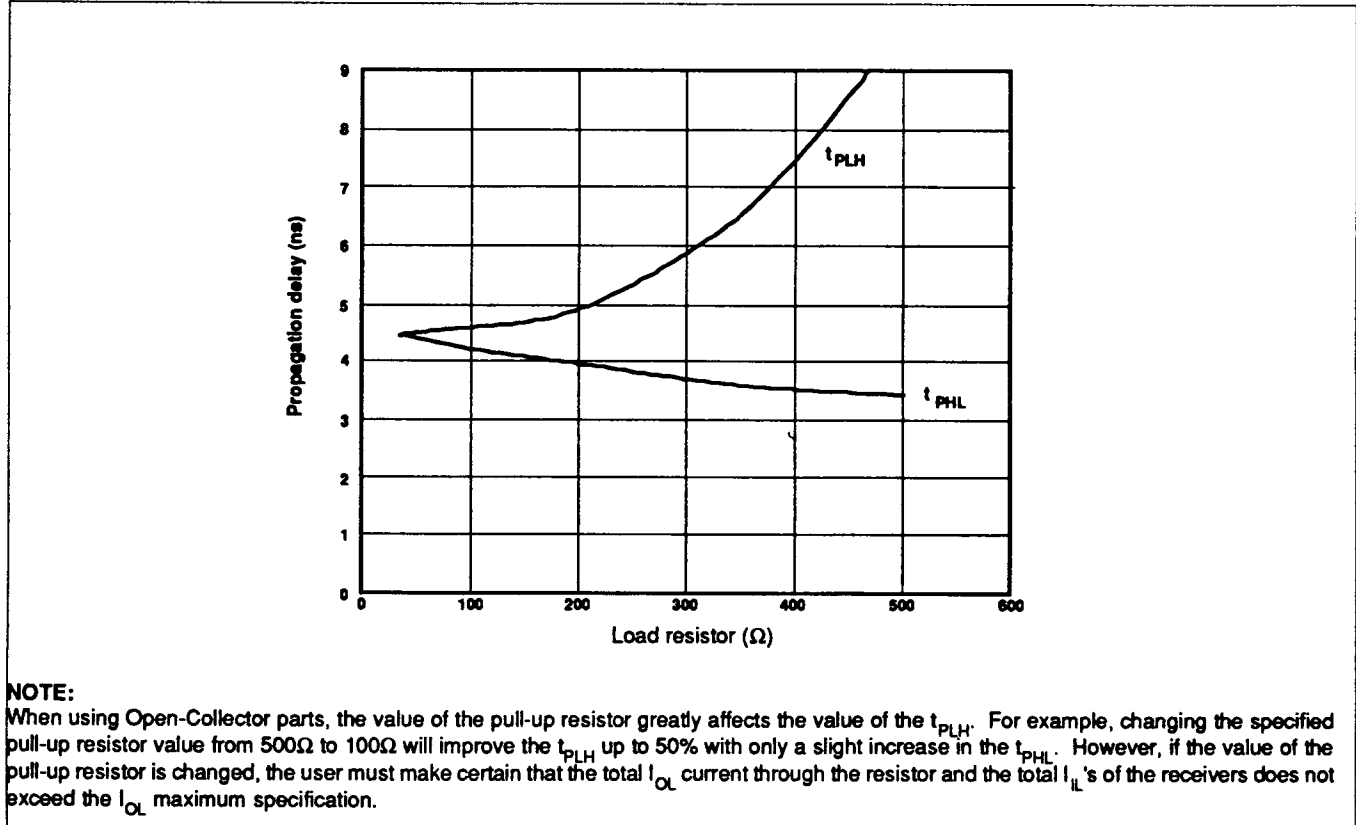
AC ELECTRICAL CHARACTERISTICS

| SYMBOL | PARAMETER | TEST CONDITION | LIMITS | | | | | UNIT | |
|--------------------------------------|--------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------|------------|-------------|--------------------------------------------------------------------------------------------------------------|------------|--------------|----|
| | | | T _A = +25°C V _{CC} = 5V C _L = 50pF R _L = 500Ω | | | T _A = 0°C to +70°C V _{CC} = 5V ±10% C _L = 50pF R _L = 500Ω | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} t _{PHL} | Propagation delay D _n to Q _n | 'F30240 | Waveform 2 | 4.0 1.0 | 10.0 2.0 | 14.5 5.0 | 4.0 1.0 | 15.0 5.5 | ns |
| t _{PLH} t _{PHL} | Propagation delay OE _n to Q _n | | Waveform 1,2 | 4.0 3.5 | 10.0 6.0 | 14.0 9.0 | 4.0 3.5 | 14.5 10.5 | ns |
| t _{PLH} t _{PHL} | Propagation delay D _n to Q _n | 'F30244 | Waveform 1 | 4.0 3.0 | 10.5 5.5 | 14.5 9.0 | 4.0 3.0 | 15.0 9.5 | ns |
| t _{PLH} t _{PHL} | Propagation delay OE _n to Q _n | | Waveform 1,2 | 4.0 3.5 | 9.5 6.0 | 14.0 9.0 | 4.0 3.5 | 14.5 10.5 | ns |

AC WAVEFORMS



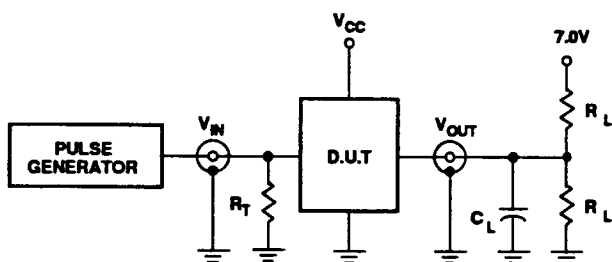
TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS



30Ω Line Drivers

FAST 74F30240, 74F30244

TEST CIRCUIT AND WAVEFORMS



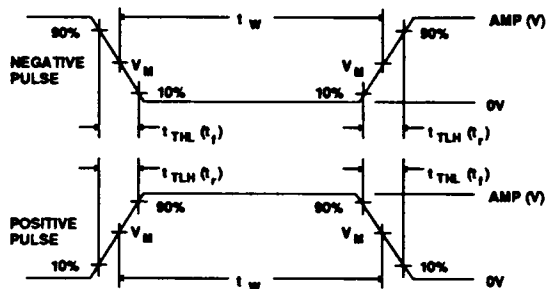
Test Circuit For Open Collector Outputs

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.



$V_M = 1.5V$
Input Pulse Definition

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