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|---------------|-----------------------|
| Document No.  | 853-0050              |
| ECN No.       | 95941                 |
| Date of issue | March 3, 1989         |
| Status        | Product Specification |
| FAST Products |                       |

# FAST 74F30

## Gate

### 8-Input NAND Gate

| TYPE  | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|-------|---------------------------|--------------------------------|
| 74F30 | 3.2 ns                    | 1.7 mA                         |

#### ORDERING INFORMATION

| PACKAGES           | COMMERCIAL RANGE<br>$V_{CC} = 5V \pm 10\%$ ; $T_A = 0^\circ C$ to $+70^\circ C$ |
|--------------------|---------------------------------------------------------------------------------|
| 14-Pin Plastic DIP | N74F30N                                                                         |
| 14-Pin Plastic SO  | N74F30D                                                                         |

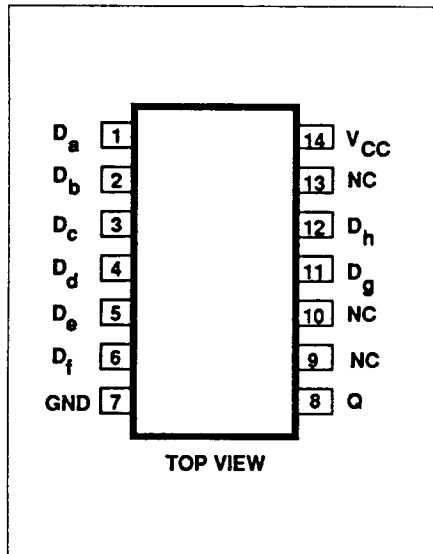
#### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

| PINS      | DESCRIPTION | 74F(U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-----------|-------------|--------------------|---------------------|
| $D_n$     | Data inputs | 1.0/1.0            | 20 $\mu$ A/0.6mA    |
| $\bar{Q}$ | Data output | 50/33              | 1.0mA/20mA          |

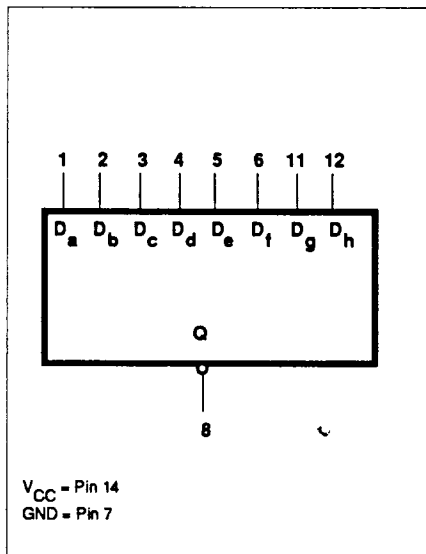
#### NOTE:

One (1.0) FAST Unit Load is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.

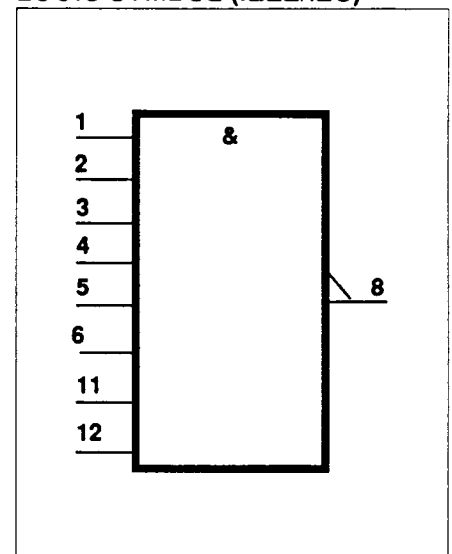
#### PIN CONFIGURATION



#### LOGIC SYMBOL



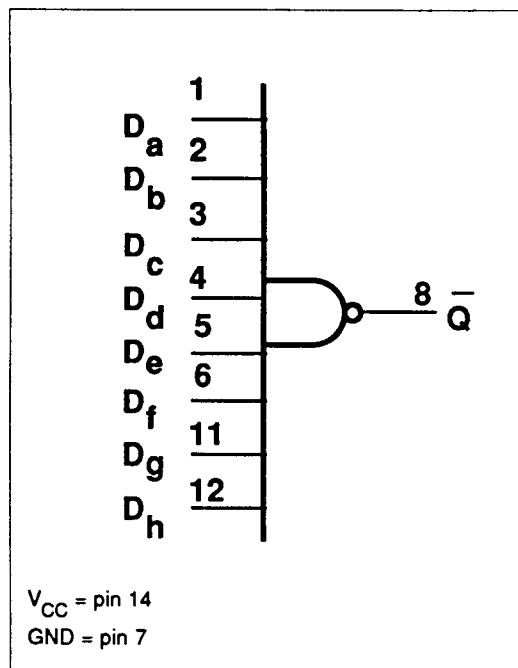
#### LOGIC SYMBOL (IEEE/IEC)



## Gate

## FAST 74F30

## LOGIC DIAGRAM



## FUNCTION TABLE

| INPUTS |       |       |       |       |       |       |       | OUTPUT    |
|--------|-------|-------|-------|-------|-------|-------|-------|-----------|
| $D_a$  | $D_b$ | $D_c$ | $D_d$ | $D_e$ | $D_f$ | $D_g$ | $D_h$ | $\bar{Q}$ |
| L      | X     | X     | X     | X     | X     | X     | X     | H         |
| X      | L     | X     | X     | X     | X     | X     | X     | H         |
| X      | X     | L     | X     | X     | X     | X     | X     | H         |
| X      | X     | X     | L     | X     | X     | X     | X     | H         |
| X      | X     | X     | X     | L     | X     | X     | X     | H         |
| X      | X     | X     | X     | X     | L     | X     | X     | H         |
| X      | X     | X     | X     | X     | X     | L     | X     | H         |
| X      | X     | X     | X     | X     | X     | X     | L     | H         |
| H      | H     | H     | H     | H     | H     | H     | H     | L         |

H = High voltage level

L = Low voltage level

X = Don't care

**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  | 40                 | 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            |        |     | -1  | mA   |
| $I_{OL}$ | Low-level output current             |        |     | 20  | mA   |
| $T_A$    | Operating free-air temperature range | 0      |     | 70  | °C   |

## Gate

## FAST 74F30

**DC ELECTRICAL CHARACTERISTICS** (Over recommended operating free-air temperature range unless otherwise noted.)

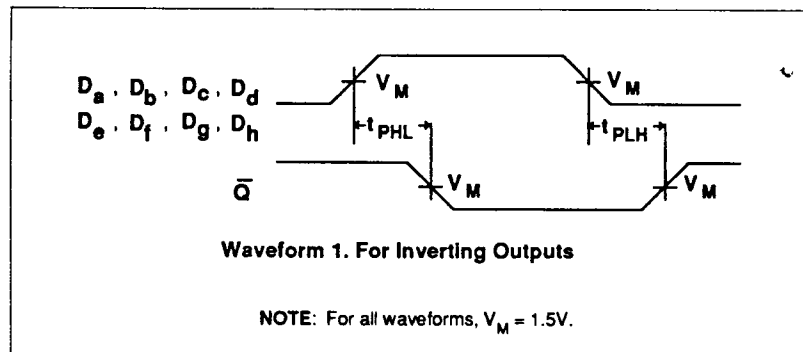
| SYMBOL   | PARAMETER                                 | TEST CONDITIONS <sup>1</sup>               | LIMITS                 |                  |      | UNIT          |
|----------|-------------------------------------------|--------------------------------------------|------------------------|------------------|------|---------------|
|          |                                           |                                            | Min                    | Typ <sup>2</sup> | Max  |               |
| $V_{OH}$ | High-level output voltage                 | $V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$ | $\pm 10\%V_{CC}$       | 2.5              |      | V             |
|          |                                           | $V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$ | $\pm 5\%V_{CC}$        | 2.7              | 3.4  | V             |
| $V_{OL}$ | Low-level output voltage                  | $V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$ | $\pm 10\%V_{CC}$       |                  | 0.30 | 0.50          |
|          |                                           | $V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$ | $\pm 5\%V_{CC}$        |                  | 0.30 | 0.50          |
| $V_{IK}$ | Input clamp voltage                       | $V_{CC} = \text{MIN}, I_I = I_{IK}$        |                        | -0.73            | -1.2 | V             |
| $I_I$    | Input current at maximum input voltage    | $V_{CC} = \text{MAX}, V_I = 7.0\text{V}$   |                        |                  | 100  | $\mu\text{A}$ |
| $I_{IH}$ | High-level input current                  | $V_{CC} = \text{MAX}, V_I = 2.7\text{V}$   |                        |                  | 20   | $\mu\text{A}$ |
| $I_{IL}$ | Low-level input current                   | $V_{CC} = \text{MAX}, V_I = 0.5\text{V}$   |                        |                  | -0.6 | mA            |
| $I_{OS}$ | Short circuit output current <sup>3</sup> | $V_{CC} = \text{MAX}$                      | -60                    |                  | -150 | mA            |
| $I_{CC}$ | Supply current (total)                    | $V_{CC} = \text{MAX}$                      | $V_{IN} = \text{GND}$  | 0.6              | 1.5  | mA            |
|          |                                           |                                            | $V_{IN} = 4.5\text{V}$ | 2.8              | 4.0  | 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  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .
- Not more than one output should be shorted at a time. For testing  $I_{OS}$ , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests,  $I_{OS}$  tests should be performed last.

**AC ELECTRICAL CHARACTERISTICS**

| SYMBOL                               | PARAMETER                                                                       | TEST CONDITION | LIMITS                                                                                          |            |            |                                                                                                                                |            | UNIT |
|--------------------------------------|---------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------|------------|------------|--------------------------------------------------------------------------------------------------------------------------------|------------|------|
|                                      |                                                                                 |                | $T_A = +25^{\circ}\text{C}$<br>$V_{CC} = 5\text{V}$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |            |            | $T_A = 0^{\circ}\text{C to } +70^{\circ}\text{C}$<br>$V_{CC} = 5\text{V} \pm 10\%$<br>$C_L = 50\text{pF}$<br>$R_L = 500\Omega$ |            |      |
|                                      |                                                                                 |                | Min                                                                                             | Typ        | Max        | Min                                                                                                                            | Max        |      |
| $t_{\text{PLH}}$<br>$t_{\text{PHL}}$ | Propagation delay<br>$D_a, D_b, D_c, D_d, D_e, D_f, D_g, D_h$ to $\overline{Q}$ | Waveform 1     | 1.5<br>1.0                                                                                      | 3.5<br>3.0 | 5.0<br>4.5 | 1.5<br>1.0                                                                                                                     | 5.5<br>5.0 | ns   |

**AC WAVEFORMS**

Gate

FAST 74F30

TEST CIRCUIT AND WAVEFORMS

