

DATA SHEET

74F3037

Quad 2-input NAND 30Ω driver

Product specification

1990 Feb 09

IC15 Data Handbook

Quad 2-input NAND 30Ω driver

74F3037

FEATURES

- 30Ω line driver
- 67mA output drive capability in the high state
- High speed
- Facilitates incident wave switching
- 3nH lead inductance each on V_{CC} and GND when both side pins are used
- 160mA output drive capability in the low state
- Industrial temperature range available (-40°C to +85°C)

DESCRIPTION

The 74F3037 is a high current line driver composed of four 2-input NAND gates. It has been designed to deal with the

transmission line effects of PC boards which appear when fast edge rates are used.

The drive capability of the 74F3037 is 67mA source and 160mA sink with a V_{CC} as low as 4.5V. This guarantees incident wave switching with V_{OH} not less than 2.0V and V_{OL} not more than 0.8mA while driving impedances as low as 30 ohms. This is applicable with any combination of outputs using continuous duty. The propagation delay of the part is minimally affected by reflections when terminated only by the TTL inputs of other devices. Performances may be improved by full or partial line termination.

| TYPE | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT(TOTAL) |
|---------|---------------------------|--------------------------------|
| 74F3037 | 2.0ns | 16mA |

ORDERING INFORMATION

| DESCRIPTION | ORDER CODE | | PKG DWG # |
|--------------------|---|---|-----------|
| | COMMERCIAL RANGE V _{CC} = 5V ±10%, T _{amb} = 0°C to +70°C | INDUSTRIAL RANGE V _{CC} = 5V ±10%, T _{amb} = -40°C to +85°C | |
| 16-pin plastic DIP | N74F3037N | I74F3037N | SOT38-4 |
| 16-pin plastic SOL | N74F3037D | I74F3037D | SOT162-1 |

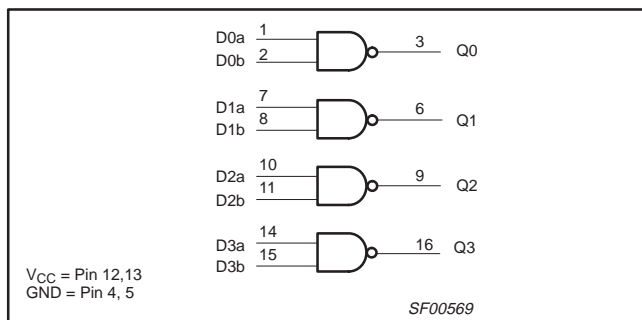
INPUT AND OUTPUT LOADING AND FAN OUT TABLE

| PINS | DESCRIPTION | 74F (U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-----------------------------------|-------------|---------------------|---------------------|
| D _{na} , D _{nb} | Data inputs | 1.0/1.0 | 20μA/0.6mA |
| \bar{Q}_n | Data output | 3350/266 | 67mA/160mA |

Note to input and output loading and fan out table

One (1.0) FAST unit load is defined as: 20μA in the high state and 0.6mA in the low state.

LOGIC DIAGRAM



FUNCTION TABLE

| INPUTS | | OUTPUT |
|-----------------|-----------------|-------------|
| D _{na} | D _{nb} | \bar{Q}_n |
| L | L | H |
| L | H | H |
| H | L | H |
| H | H | L |

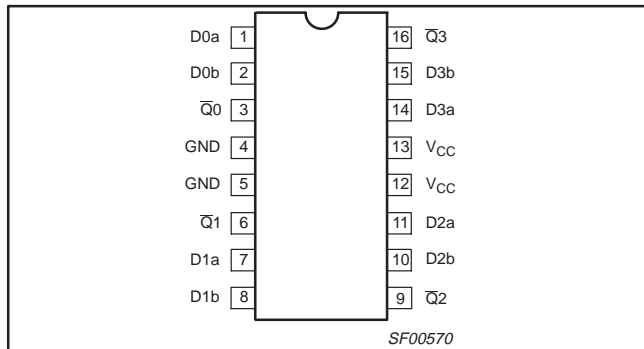
Notes to function table

- H = High voltage level
- L = Low voltage level

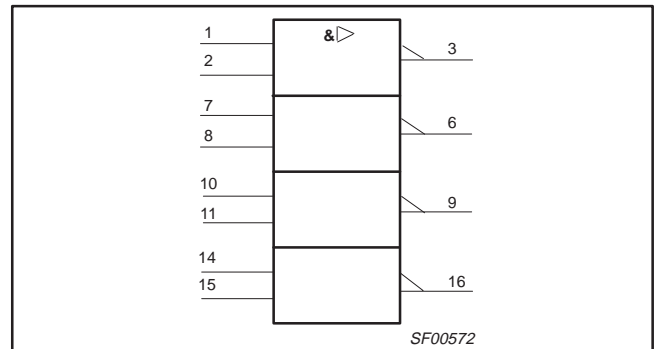
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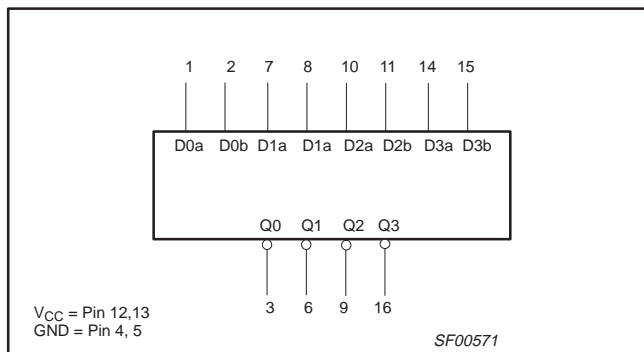
PIN CONFIGURATION



IEC/IEEE SYMBOL



LOGIC SYMBOL



ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limit 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 | 320 | mA |
| T _{amb} | Operating free air temperature range | Commercial range | 0 to +70 °C |
| | | Industrial range | -40 to +85 °C |
| T _{stg} | Storage temperature range | -65 to +150 | °C |

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RECOMMENDED OPERATING CONDITIONS

| SYMBOL UNIT | PARAMETER | LIMITS | | | T _A = -40 to +85°C |
|------------------|--------------------------------------|------------------|-----|-----|-------------------------------------|
| | | MIN | NOM | MAX | |
| V _{CC} | Supply voltage | 4.5 | 5.0 | 5.5 | V |
| V _{IH} | High-level input voltage | 2.4 | | | V |
| V _{IL} | Low-level input voltage | | | 0.8 | V |
| I _{Ik} | Input clamp current | | | -18 | mA |
| I _{OH} | High-level output current | | | -67 | mA |
| I _{OL} | Low-level output current | | | 160 | mA |
| T _{amb} | Operating free air temperature range | Commercial range | 0 | +70 | °C |
| | | Industrial range | -40 | +85 | °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 | I _{OH} = -45mA | ±10%V _{CC} | 2.5 | | V |
| | | | | ±5%V _{CC} | 2.7 | | V |
| | | I _{OH1} = -67mA ³ | ±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} | 0.30 | 0.50 | V |
| | | | I _{OL1} = 160mA ⁴ | ±5%V _{CC} | 0.30 | 0.50 | 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 _O | Output current ⁵ | V _{CC} = MAX, V _O = 2.25V | | | -100 | -200 | mA |
| I _{CC} | Supply current (total) | I _{CC} H | V _{CC} = MAX | | 6.0 | 9.0 | mA |
| | | I _{CC} L | | | 30 | 40 | mA |

Notes to DC electrical characteristics

- 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} = 5V, T_{amb} = 25°C.
- I_{OH1} is the current necessary to guarantee the low to high transition in a 30 ohm transmission line on the incident wave.
- I_{OL1} is the current necessary to guarantee the high to low transition in a 30 ohm transmission line on the incident wave.
- I_O is tested under conditions that produce current approximately one half of the true short-circuit current (I_{OS}).

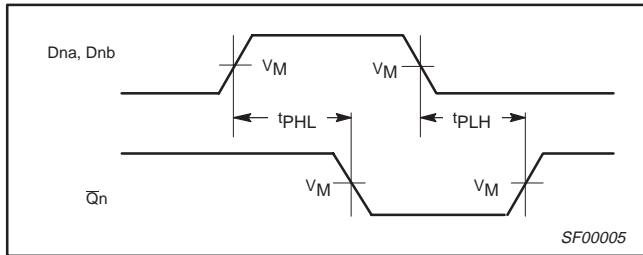
AC ELECTRICAL CHARACTERISTICS

| SYMBOL | PARAMETER | TEST CONDITION | LIMITS | | | | | | UNIT | |
|--------------------------------------|--|-------------------|--|------------|------------|---|------------|---|------------|-----|
| | | | T _{amb} = +25°C V _{CC} = +5.0V C _L = 50pF, R _L = 500Ω | | | T _{amb} = 0°C to +70°C V _{CC} = +5.0V ± 10% C _L = 50pF, R _L = 500Ω | | T _{amb} = -40°C to +85°C V _{CC} = +5.0V ± 10% C _L = 50pF, R _L = 500Ω | | |
| | | | MIN | TYP | MAX | MIN | MAX | MIN | | MAX |
| t _{PLH} t _{PHL} | Propagation delay D _{na} , D _{nb} to Q _n | Waveform 1 | 1.0 1.0 | 2.0 2.0 | 5.0 4.5 | 1.0 1.0 | 5.5 5.0 | 1.0 1.0 | 5.5 5.0 | ns |

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AC WAVEFORMS

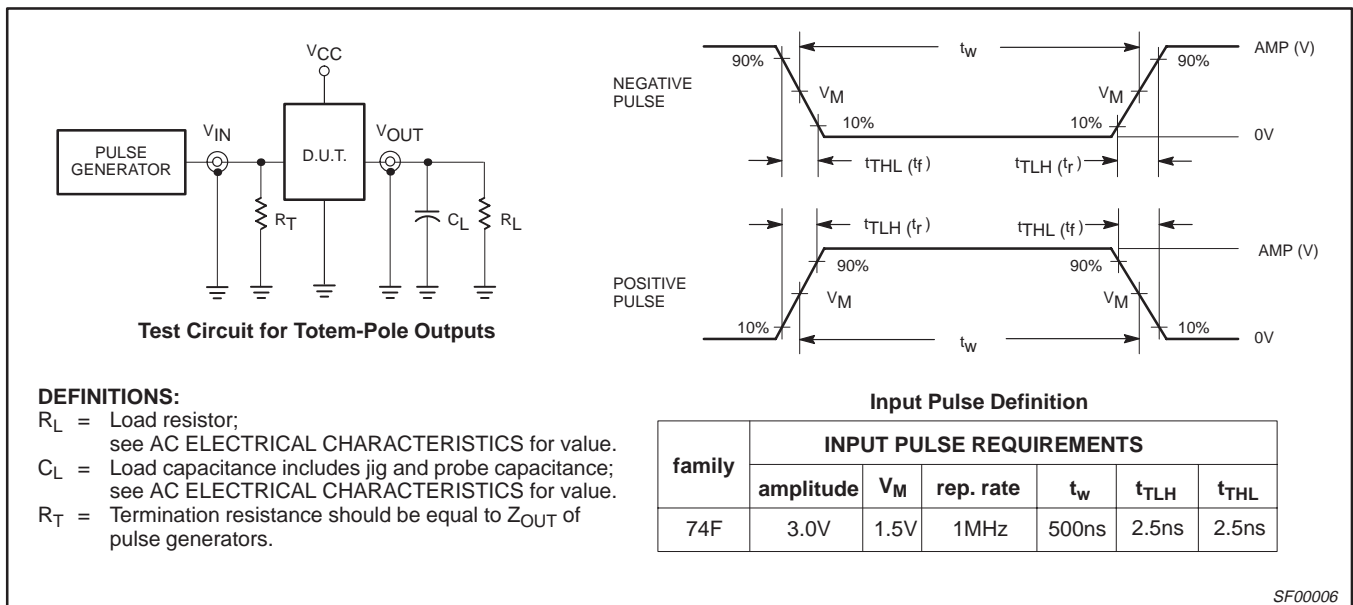


Waveform 1. Propagation delay for inverting outputs

Note to AC waveforms

For all waveforms, $V_M = 1.5V$.

TEST CIRCUIT AND WAVEFORMS



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DIP16: plastic dual in-line package; 16 leads (300 mil)

SOT38-4



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT | A max. | A ₁ min. | A ₂ max. | b | b ₁ | b ₂ | c | D ⁽¹⁾ | E ⁽¹⁾ | e | e ₁ | L | M _E | M _H | w | Z ⁽¹⁾ max. |
|--------|--------|---------------------|---------------------|----------------|----------------|----------------|----------------|------------------|------------------|------|----------------|--------------|----------------|----------------|-------|-----------------------|
| mm | 4.2 | 0.51 | 3.2 | 1.73 1.30 | 0.53 0.38 | 1.25 0.85 | 0.36 0.23 | 19.50 18.55 | 6.48 6.20 | 2.54 | 7.62 | 3.60 3.05 | 8.25 7.80 | 10.0 8.3 | 0.254 | 0.76 |
| inches | 0.17 | 0.020 | 0.13 | 0.068 0.051 | 0.021 0.015 | 0.049 0.033 | 0.014 0.009 | 0.77 0.73 | 0.26 0.24 | 0.10 | 0.30 | 0.14 0.12 | 0.32 0.31 | 0.39 0.33 | 0.01 | 0.030 |

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

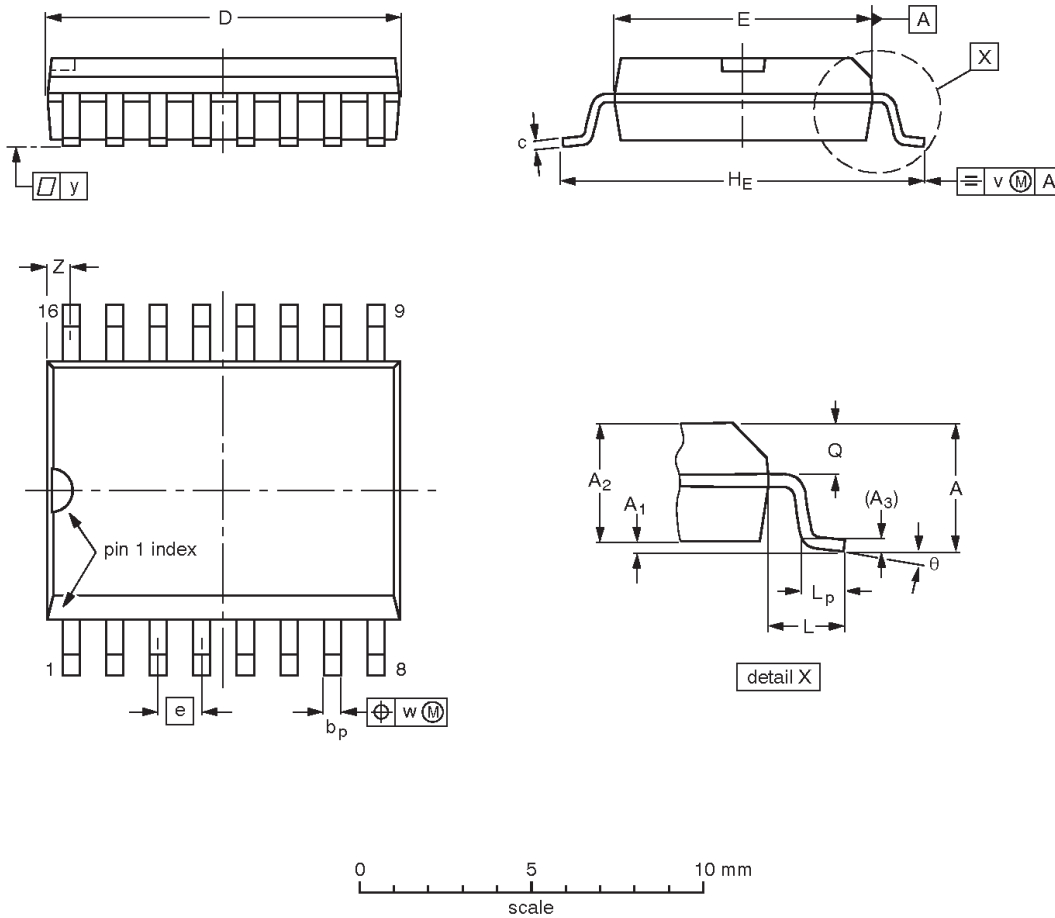
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|--|---------------------|-----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT38-4 | | | | | | -92-11-17 95-01-14 |

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SO16: plastic small outline package; 16 leads; body width 7.5 mm

SOT162-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽¹⁾ | e | H _E | L | L _p | Q | v | w | y | z ⁽¹⁾ | θ |
|--------|--------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|-------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm | 2.65 | 0.30 0.10 | 2.45 2.25 | 0.25 | 0.49 0.36 | 0.32 0.23 | 10.5 10.1 | 7.6 7.4 | 1.27 | 10.65 10.00 | 1.4 | 1.1 0.4 | 1.1 1.0 | 0.25 | 0.25 | 0.1 | 0.9 0.4 | 8° 0° |
| inches | 0.10 | 0.012 0.004 | 0.096 0.089 | 0.01 | 0.019 0.014 | 0.013 0.009 | 0.41 0.40 | 0.30 0.29 | 0.050 | 0.419 0.394 | 0.055 | 0.043 0.016 | 0.043 0.039 | 0.01 | 0.01 | 0.004 | 0.035 0.016 | |

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|----------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT162-1 | 075E03 | MS-013AA | | | | 95-01-24 97-05-22 |

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Data sheet status

| Data sheet status | Product status | Definition [1] |
|---------------------------|----------------|--|
| Objective specification | Development | This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice. |
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