

# DATA SHEET

**74F06**

Inverter/buffer drivers

Product data  
Supersedes data of 1992 Jul 24

2004 Mar 12

# Hex inverter/buffer drivers (open-collector)

## 74F06

### FEATURES

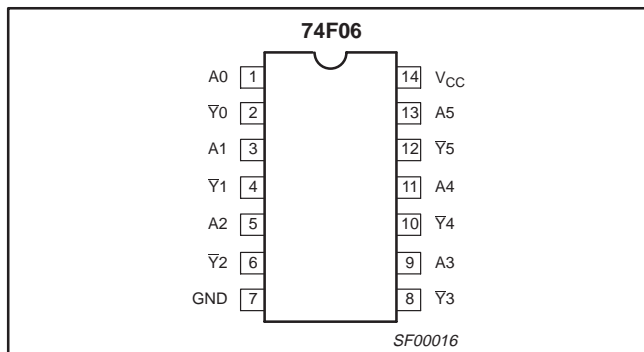
- Open Collector output drive 64mA
- High speed
- 12V output termination voltage

| TYPE  | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|-------|---------------------------|--------------------------------|
| 74F06 | 3.5ns                     | 30mA                           |

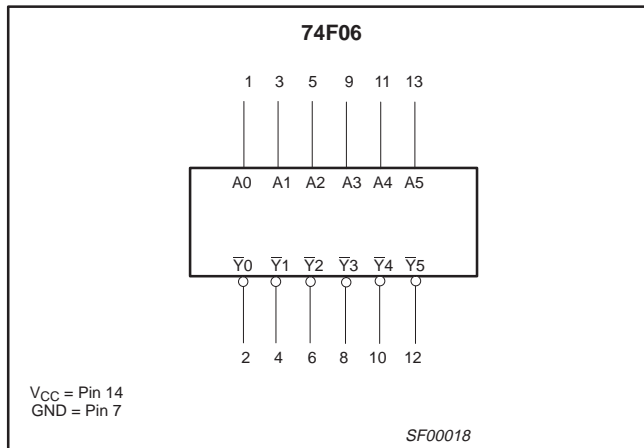
### ORDERING INFORMATION

| DESCRIPTION                          | TYPE NUMBER | PKG DWG # |
|--------------------------------------|-------------|-----------|
| 14-pin plastic dual in-line package  | N74F06N     | SOT27-1   |
| 14-pin plastic small outline package | N74F06D     | SOT108-1  |

### PIN CONFIGURATIONS



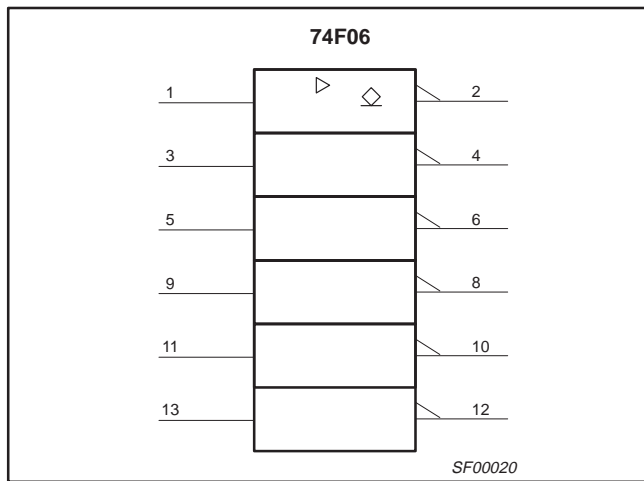
### LOGIC SYMBOLS



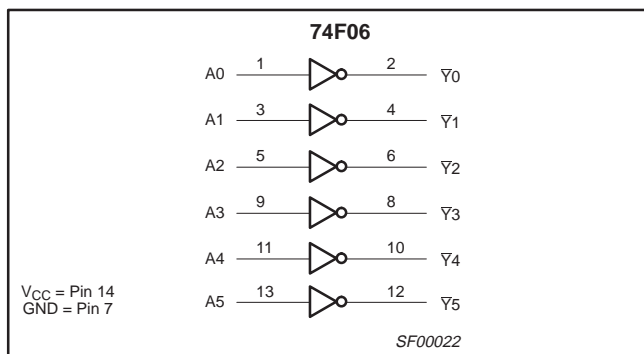
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## IEC/IEEE SYMBOLS



## LOGIC DIAGRAMS



## INPUT AND OUTPUT LOADING AND FAN OUT TABLE

| PINS        | DESCRIPTION  | 74F (U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-------------|--------------|---------------------|---------------------|
| $A_n$       | Data inputs  | 1.0/1.0             | 20 $\mu$ A/0.6mA    |
| $\bar{Y}_n$ | Data outputs | OC/106.7            | OC/64mA             |

**NOTES:**

- One (1.0) FAST unit load is defined as: 20 $\mu$ A in the High state and 0.6mA in the Low state.
- OC = Open Collector

## FUNCTION TABLE

| INPUTS | OUTPUTS     |
|--------|-------------|
| $A_n$  | $\bar{Y}_n$ |
| L      | H           |
| H      | L           |

**NOTES:**

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

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**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 12   | V    |
| $I_{OUT}$ | Current applied to output in Low output state  | 128          | mA   |
| $T_{amb}$ | Operating free air temperature range           | 0 to +70     | °C   |
| $T_{stg}$ | Storage temperature range                      | -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   |
| $V_{OH}$  | High-level output voltage            |        |     | 12  | V    |
| $I_{OL}$  | Low-level output current             |        |     | 64  | mA   |
| $T_{amb}$ | Operating free air temperature range | 0      |     | +70 | °C   |

## Hex inverter/buffer drivers (open-collector)

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**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  |               |    |
| $I_{OH}$ | High-level output current              | $V_{CC} = \text{MIN}, V_{IL} = \text{MAX},$<br>$V_{OH} = \text{MAX}, V_{IH} = \text{MIN}$ |                       |                   | 250  | $\mu\text{A}$ |    |
| $V_{OL}$ | Low-level output voltage               | $V_{CC} = \text{MIN},$<br>$V_{IL} = \text{MAX},$<br>$V_{IH} = \text{MIN}$                 | $I_{OL} = \text{MAX}$ | $\pm 10\% V_{CC}$ | 0.30 | 0.50          | V  |
|          |  |   |                       | $\pm 5\% V_{CC}$  | 0.30 | 0.50          | V  |
| $V_{IK}$ | 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            |    |
| $I_{CC}$ | Supply current (total)                 | $V_{CC} = \text{MAX}$   |                       |                   | 5.0  | 8.0           | mA |
|          |  |   |                       |                   | 30   | 43            | 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  $V_{CC} = 5\text{V}, T_{\text{amb}} = 25^\circ\text{C}$ .

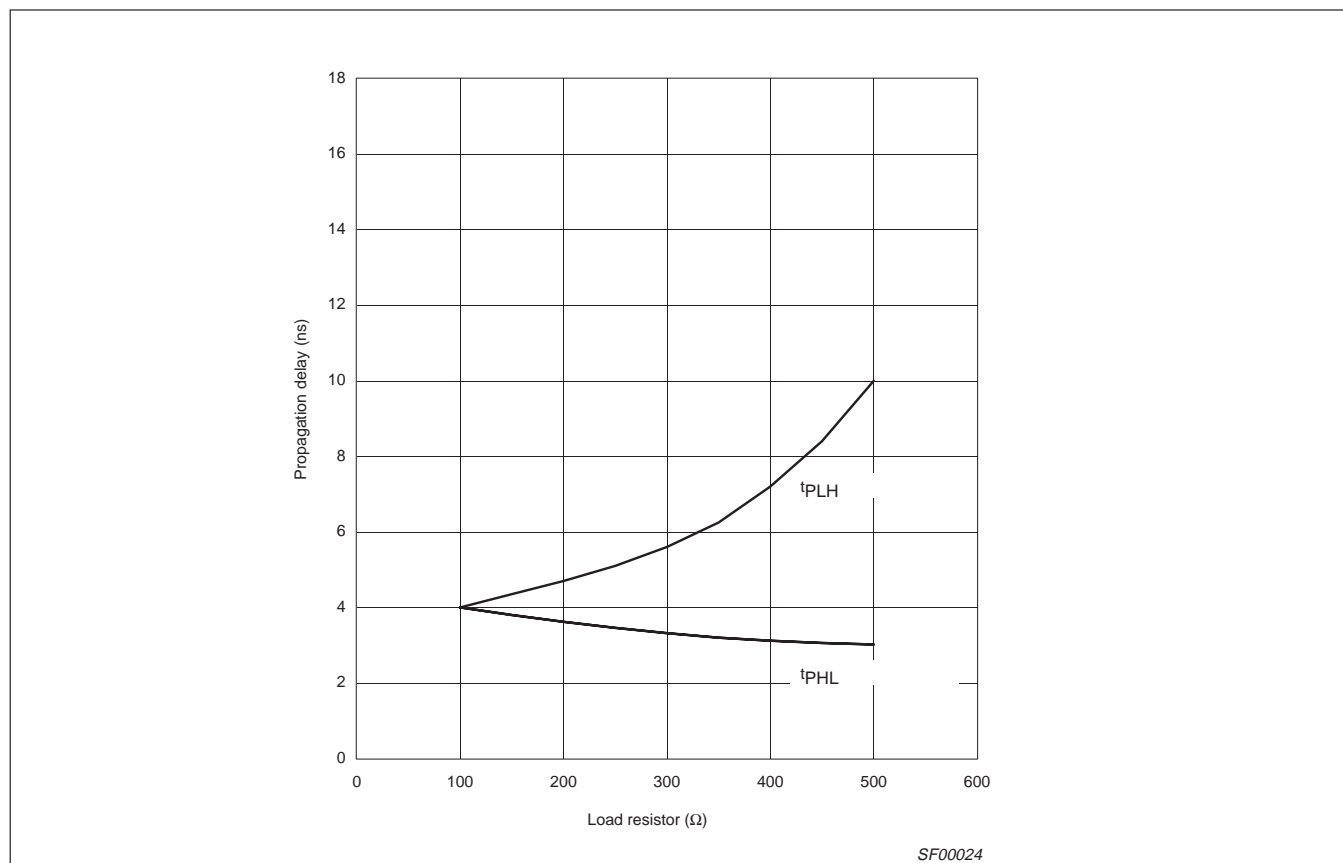
**AC ELECTRICAL CHARACTERISTICS**

| SYMBOL                 | PARAMETER                     | TEST CONDITION | LIMITS  |            |            |  |            | UNIT |
|------------------------|-------------------------------|----------------|---|------------|------------|--|------------|------|
|                        |                               |                | $V_{CC} = +5.0\text{V}$<br>$T_{\text{amb}} = +25^\circ\text{C}$<br>$C_L = 50\text{pF}, R_L = 100\Omega$ |            |            | $V_{CC} = +5.0\text{V} \pm 10\%$<br>$T_{\text{amb}} = 0^\circ\text{C to } +70^\circ\text{C}$<br>$C_L = 50\text{pF}, R_L = 100\Omega$ |            |      |
|                        |                               |                | Min   | Typ        | Max        | Min  | Max        |      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>An to Yn | Waveform 1     | 2.0<br>1.5  | 3.5<br>3.0 | 6.0<br>5.5 | 1.5<br>1.0   | 6.5<br>6.0 | ns   |

# Hex inverter/buffer drivers (open-collector)

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## TYPICAL PROPAGATION DELAYS VERSUS LOAD FOR OPEN COLLECTOR OUTPUTS



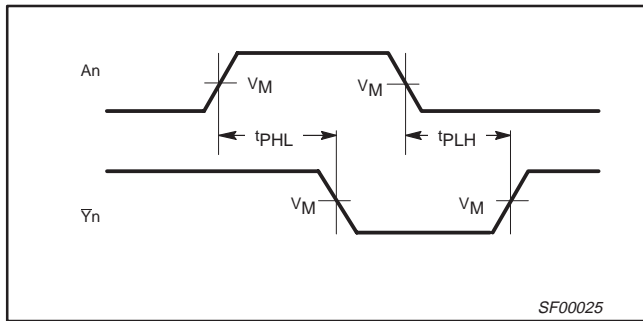
**NOTE:**

When using Open-Collector parts, the value of the pull-up resistor greatly affects the value of the t<sub>PLH</sub>. For example, changing the specified pull-up resistor value from 500Ω to 100Ω will improve the t<sub>PLH</sub> up to 50% with only a slight increase in the t<sub>PHL</sub>. However, if the value of the pull-up resistor is changed, the user must make certain that the total I<sub>OL</sub> current through the resistor and the total I<sub>IL</sub>'s of the receivers does not exceed the I<sub>OL</sub> maximum specification.

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## AC WAVEFORMS

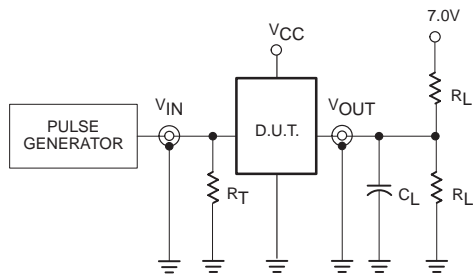


**Waveform 1. Propagation delay for inverting outputs**

**NOTE:**

For all waveforms,  $V_M = 1.5V$ .

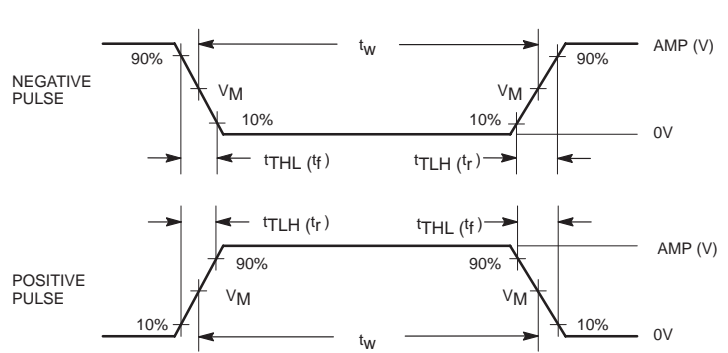
## TEST CIRCUIT AND WAVEFORMS



**Test Circuit for Open Collector Outputs**

**DEFINITIONS:**

- $R_L$  = Load resistor; see AC electrical characteristics for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.



**Input Pulse Definition**

| family | INPUT PULSE REQUIREMENTS |       |           |       |                     |                     |
|--------|--------------------------|-------|-----------|-------|---------------------|---------------------|
|        | amplitude                | $V_M$ | rep. rate | $t_w$ | $t_{TLH}$ ( $t_r$ ) | $t_{THL}$ ( $t_f$ ) |
| 74F    | 3.0V                     | 1.5V  | 1MHz      | 500ns | 2.5ns               | 2.5ns               |

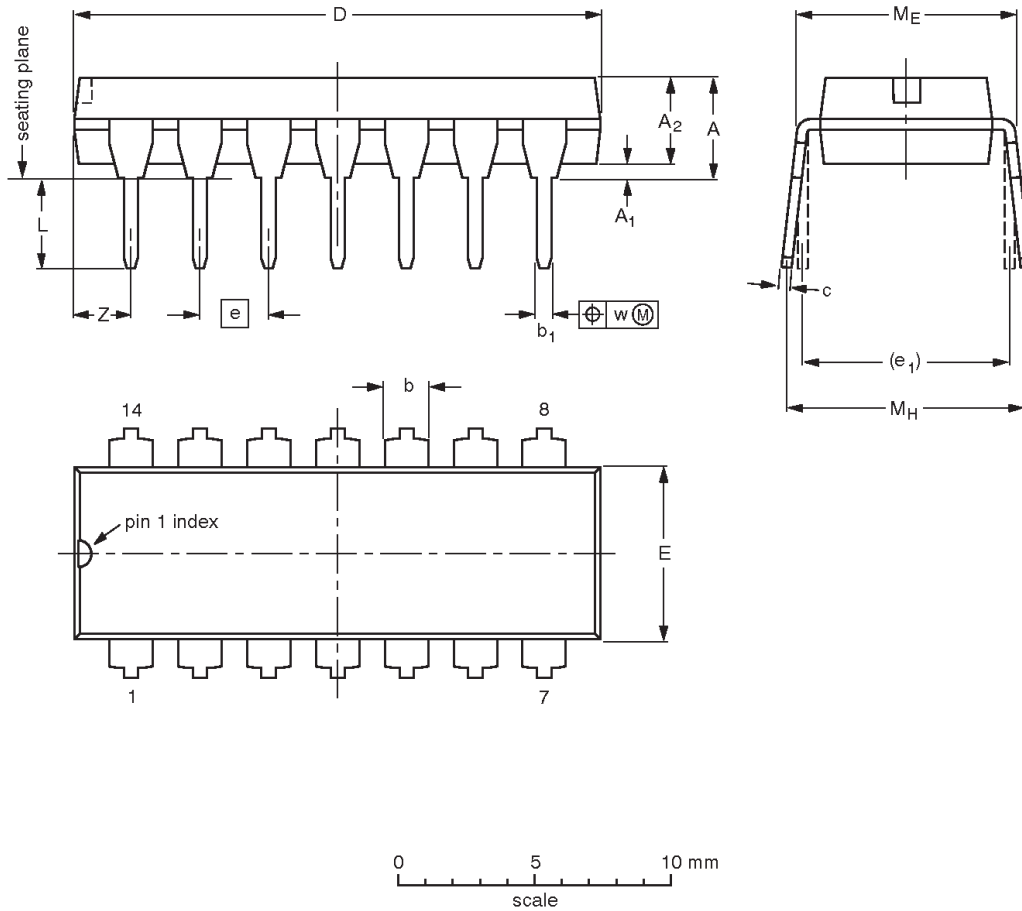
SF00027

# Hex inverter/buffer drivers (open-collector)

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DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



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

| UNIT   | A max. | A <sub>1</sub> min. | A <sub>2</sub> max. | b              | b <sub>1</sub> | c              | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | e <sub>1</sub> | L            | M <sub>E</sub> | M <sub>H</sub> | w     | Z <sup>(1)</sup> max. |
|--------|--------|---------------------|---------------------|----------------|----------------|----------------|------------------|------------------|------|----------------|--------------|----------------|----------------|-------|-----------------------|
| mm     | 4.2    | 0.51                | 3.2                 | 1.73<br>1.13   | 0.53<br>0.38   | 0.36<br>0.23   | 19.50<br>18.55   | 6.48<br>6.20     | 2.54 | 7.62           | 3.60<br>3.05 | 8.25<br>7.80   | 10.0<br>8.3    | 0.254 | 2.2                   |
| inches | 0.17   | 0.02                | 0.13                | 0.068<br>0.044 | 0.021<br>0.015 | 0.014<br>0.009 | 0.77<br>0.73     | 0.26<br>0.24     | 0.1  | 0.3            | 0.14<br>0.12 | 0.32<br>0.31   | 0.39<br>0.33   | 0.01  | 0.087                 |

**Note**

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

| OUTLINE VERSION | REFERENCES |        |           |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|--------|-----------|--|---------------------|----------------------|
|                 | IEC        | JEDEC  | JEITA     |  |                     |                      |
| SOT27-1         | 050G04     | MO-001 | SC-501-14 |  |                     | 99-12-27<br>03-02-13 |

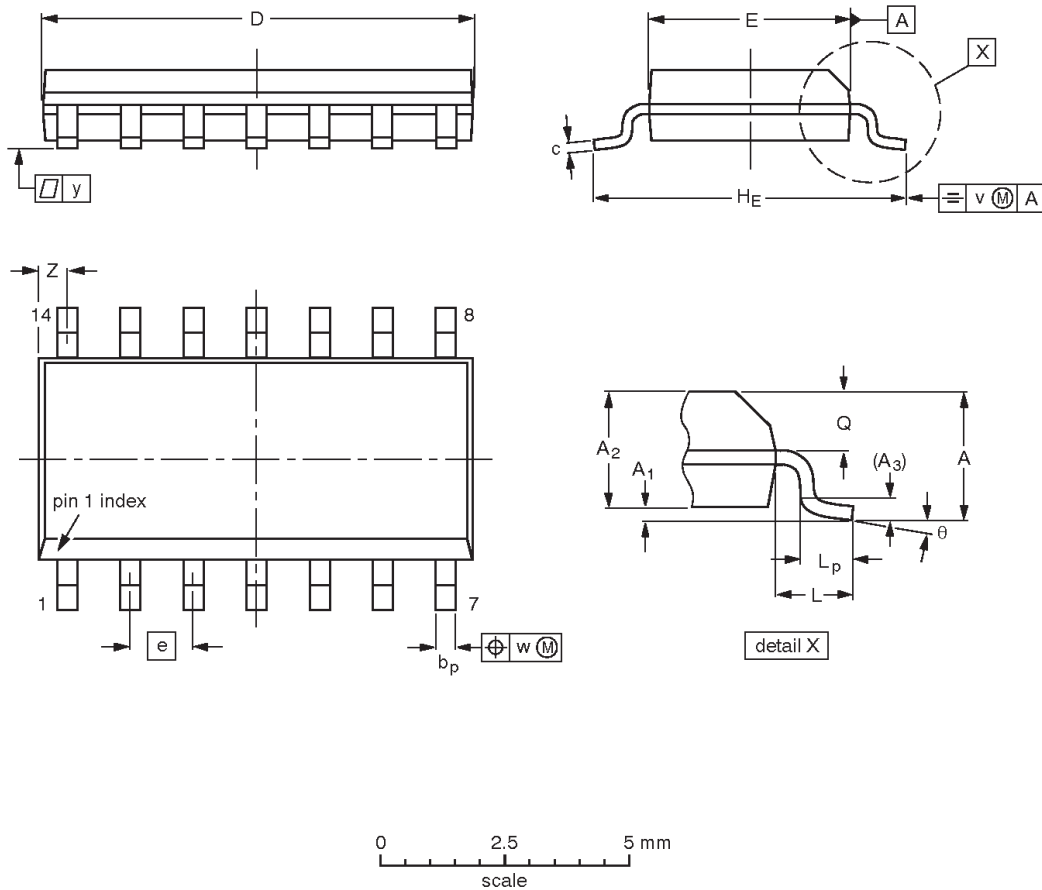


# Hex inverter/buffer drivers (open-collector)

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SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



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

| UNIT   | A max. | A <sub>1</sub> | A <sub>2</sub> | A <sub>3</sub> | b <sub>p</sub> | c                | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | H <sub>E</sub> | L     | L <sub>p</sub> | Q              | v    | w    | y     | Z <sup>(1)</sup> | θ        |
|--------|--------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|------|----------------|-------|----------------|----------------|------|------|-------|------------------|----------|
| mm     | 1.75   | 0.25<br>0.10   | 1.45<br>1.25   | 0.25           | 0.49<br>0.36   | 0.25<br>0.19     | 8.75<br>8.55     | 4.0<br>3.8       | 1.27 | 6.2<br>5.8     | 1.05  | 1.0<br>0.4     | 0.7<br>0.6     | 0.25 | 0.25 | 0.1   | 0.7<br>0.3       | 8°<br>0° |
| inches | 0.069  | 0.010<br>0.004 | 0.057<br>0.049 | 0.01           | 0.019<br>0.014 | 0.0100<br>0.0075 | 0.35<br>0.34     | 0.16<br>0.15     | 0.05 | 0.244<br>0.228 | 0.041 | 0.039<br>0.016 | 0.028<br>0.024 | 0.01 | 0.01 | 0.004 | 0.028<br>0.012   |          |

**Note**

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

| OUTLINE VERSION | REFERENCES |        |       |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|--------|-------|--|---------------------|----------------------|
|                 | IEC        | JEDEC  | JEITA |  |                     |                      |
| SOT108-1        | 076E06     | MS-012 |       |  |                     | 99-12-27<br>03-02-19 |

## Hex inverter/buffer drivers (open-collector)

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**REVISION HISTORY**

| Rev | Date     | Description   |
|-----|----------|---|
| _3  | 20040312 | <b>Product data (9397 750 13034); supersedes data sheet 74F06_A_7_A_2 of 1992 Jul 24 (9397 750 05054).</b><br>Modifications: <ul style="list-style-type: none"><li>• Delete all references to 74F06A and 74F07A (product discontinued).</li><li>• Separate 74F06 and 74F07 into standalone data sheets.</li></ul> |
| _2  | 19920724 | <b>Product data (9397 750 05054); supersedes previous version.</b>  |

## Hex inverter/buffer drivers (open-collector)

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## Data sheet status

| Level | Data sheet status <sup>[1]</sup> | Product status <sup>[2] [3]</sup> | Definitions  |
|-------|----------------------------------|-----------------------------------|--|
| I     | Objective data                   | Development                       | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.  |
| II    | Preliminary data                 | Qualification                     | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.             |
| III   | Product data                     | Production                        | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). |

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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Document order number:

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