

# DATA SHEET

## **74F804, 74F1804** Hex 2-input NAND drivers

Product specification

1990 Sep 14

IC15 Data Handbook

Hex 2-input NAND drivers

74F804/1804

FEATURES

- High capacitive drive capability
- Choice of configuration  
Corner V<sub>CC</sub> and GND – 74F804  
Center V<sub>CC</sub> and GND – 74F1804
- Typical propagation delay of 2.5ns

| TYPE    | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT ( TOTAL) |
|---------|---------------------------|---------------------------------|
| 74F804  | 2.5ns                     | 9mA                             |
| 74F1804 | 2.5ns                     | 9mA                             |

INPUT AND OUTPUT  
LOADING AND FAN OUT TABLE

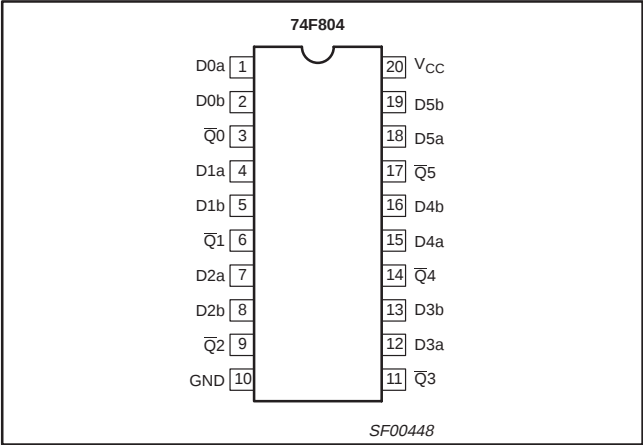
| PINS                              | DESCRIPTION  | 74F (U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-----------------------------------|--------------|---------------------|---------------------|
| D <sub>na</sub> – D <sub>nb</sub> | Data inputs  | 1.0/0.033           | 20μA/20μA           |
| $\overline{Q}0$ – $\overline{Q}5$ | Data outputs | 2400/80             | 48mA/48mA           |

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

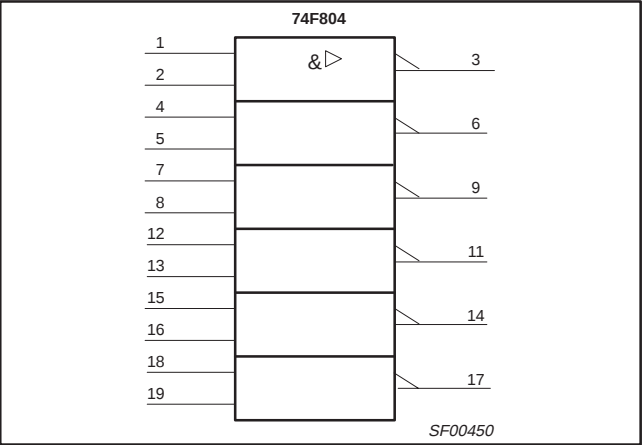
ORDERING INFORMATION

| DESCRIPTION        | ORDER CODE                                                                     | PKG DWG # |
|--------------------|--------------------------------------------------------------------------------|-----------|
|                    | COMMERCIAL RANGE<br>V <sub>CC</sub> = 5V ±10%, T <sub>amb</sub> = 0°C to +70°C |           |
| 20–pin plastic DIP | N74F804N, N74F1804N                                                            | SOT146-1  |
| 20–pin plastic SOL | N74F804D, N74F1804D                                                            | SOT163-1  |

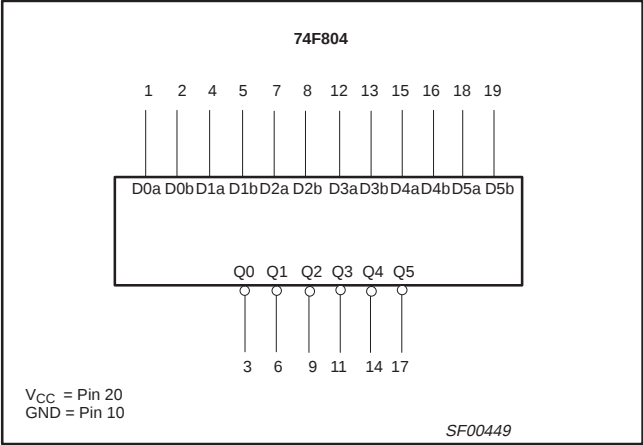
PIN CONFIGURATION



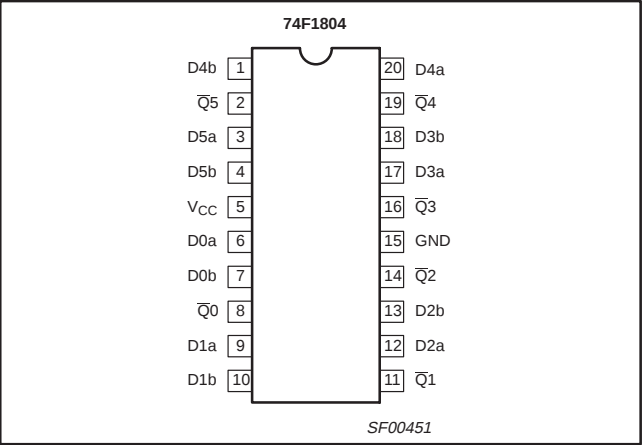
IEC/IEEE SYMBOL



LOGIC SYMBOL



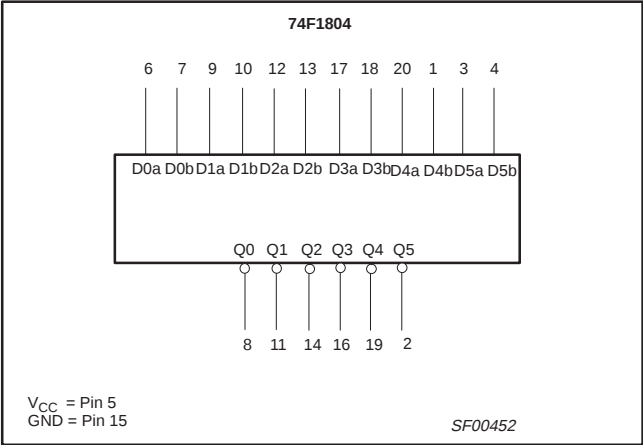
PIN CONFIGURATION



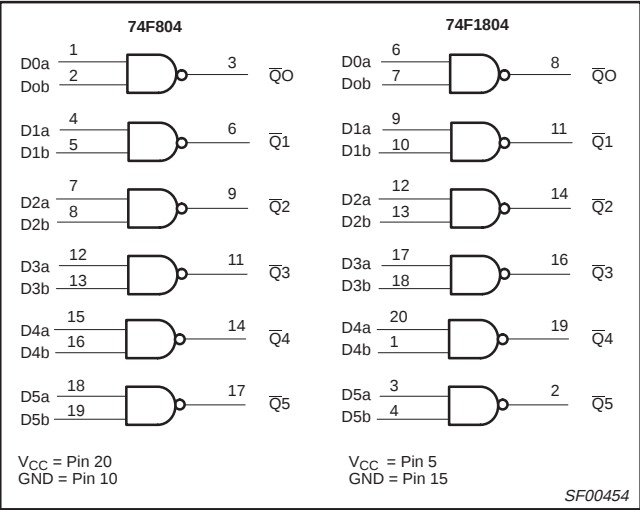
Hex 2-input NAND drivers

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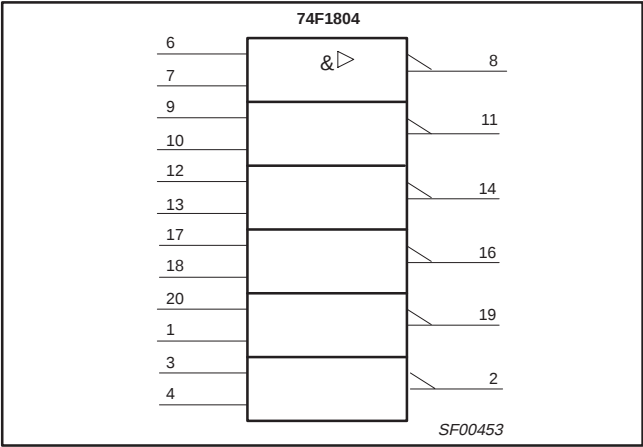
LOGIC SYMBOL



LOGIC DIAGRAM



IEC/IEEE SYMBOL



FUNCTION TABLE

| INPUTS |    | OUTPUT    |
|--------|----|-----------|
| Da     | Db | $\bar{Q}$ |
| H      | H  | L         |
| L      | X  | H         |
| X      | L  | H         |

NOTES:  
H = High voltage level  
L = Low voltage level  
X = Don't care

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  | 96               | mA   |
| $T_{amb}$ | Operating free-air temperature range           | 0 to +70         | °C   |
| $T_{stg}$ | Storage temperature range                      | −65 to +150      | °C   |

## Hex 2-input NAND drivers

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## RECOMMENDED OPERATING CONDITIONS

| SYMBOL<br>UNIT | PARAMETER                            | LIMITS |     |     | $T_A = -40$ to $+85^\circ\text{C}$ |
|----------------|--------------------------------------|--------|-----|-----|------------------------------------|
|                |                                      | 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            |        |     | -48 | mA                                 |
| $I_{OL}$       | Low-level output current             |        |     | 48  | mA                                 |
| $T_{amb}$      | Operating free air temperature range | 0      |     | +70 | $^\circ\text{C}$                   |

## 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              | $V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$ | $\pm 10\%V_{CC}$       | 2.0    |                  |      | V             |
|          |                                        | $V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$ | $\pm 5\%V_{CC}$        | 2.0    |                  |      | V             |
| $V_{OL}$ | Low-level output voltage               | $V_{CC} = \text{MIN}, V_{IL} = \text{MAX}$ | $\pm 10\%V_{CC}$       |        | 0.38             | 0.55 | V             |
|          |                                        | $V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$ | $\pm 5\%V_{CC}$        |        | 0.38             | 0.55 | 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                | $V_{CC} = \text{MAX}, V_I = 0.5\text{V}$   |                        |        |                  | -20  | $\mu\text{A}$ |
| $I_O$    | Output current <sup>3</sup>            | $V_{CC} = \text{MAX}$                      |                        | -60    |                  | -160 | mA            |
| $I_{CC}$ | Supply current (total)                 | $I_{CCH}$ $V_{CC} = \text{MAX}$            | $V_{IN} = \text{GND}$  |        | 2.0              | 3.0  | mA            |
|          |                                        | $I_{CCL}$ $V_{CC} = \text{MAX}$            | $V_{IN} = 4.5\text{V}$ |        | 15               | 20   | 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  $V_{CC} = 5\text{V}$ ,  $T_{amb} = 25^\circ\text{C}$ .
- The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

## AC ELECTRICAL CHARACTERISTICS

| SYMBOL                               | PARAMETER                           | TEST<br>CONDITION | LIMITS                                                                                                 |            |            |                                                                                                                     |            | UNIT |
|--------------------------------------|-------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------|------------|------------|---------------------------------------------------------------------------------------------------------------------|------------|------|
|                                      |                                     |                   | T <sub>amb</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50pF,<br>R <sub>L</sub> = 500Ω |            |            | T <sub>amb</sub> = 0°C to +70°C<br>V <sub>CC</sub> = +5.0V ± 10%<br>C <sub>L</sub> = 50pF,<br>R <sub>L</sub> = 500Ω |            |      |
|                                      |                                     |                   | MIN                                                                                                    | TYP        | MAX        | MIN                                                                                                                 | MAX        |      |
|                                      |                                     |                   |                                                                                                        |            |            |                                                                                                                     |            |      |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>Dna, Dnb to Qn | Waveform 1        | 1.0<br>1.0                                                                                             | 2.0<br>3.0 | 4.0<br>4.5 | 1.0<br>1.0                                                                                                          | 4.0<br>5.0 | ns   |
| t <sub>sk(n)</sub>                   | Output skew <sup>1,2</sup>          | Waveform 2        |                                                                                                        |            | 1.5        |                                                                                                                     | 1.5        | ns   |

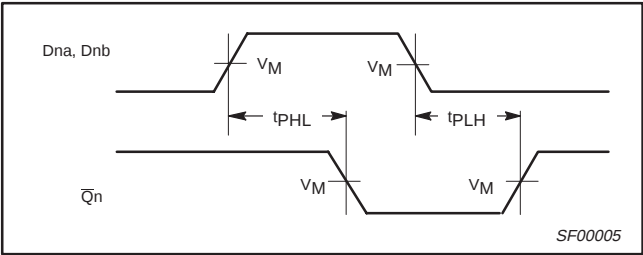
## NOTES:

- $[t_{PN} \text{ actual} - t_{PM} \text{ actual}]$  for any output compared to any other output where N and M are either LH or HL.
- Skew times are valid only under same test conditions (temperature,  $V_{CC}$ , loading, etc.).

Hex 2-input NAND drivers

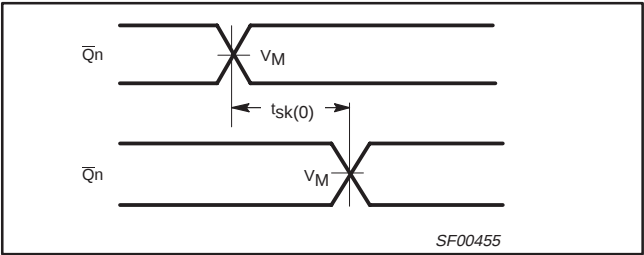
74F804/1804

AC WAVEFORMS



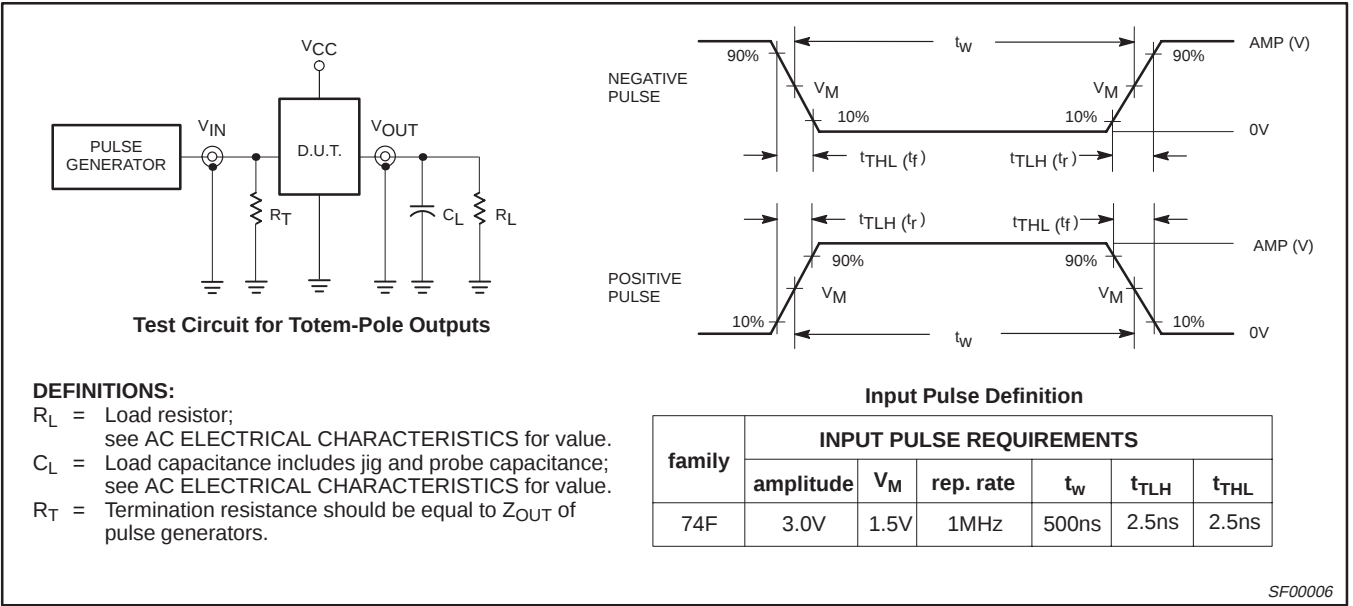
Waveform 1. Propagation delay for inverting outputs

NOTE: For all waveforms,  $V_M = 1.5V$ .



Waveform 2. Output skew

TEST CIRCUIT AND WAVEFORMS

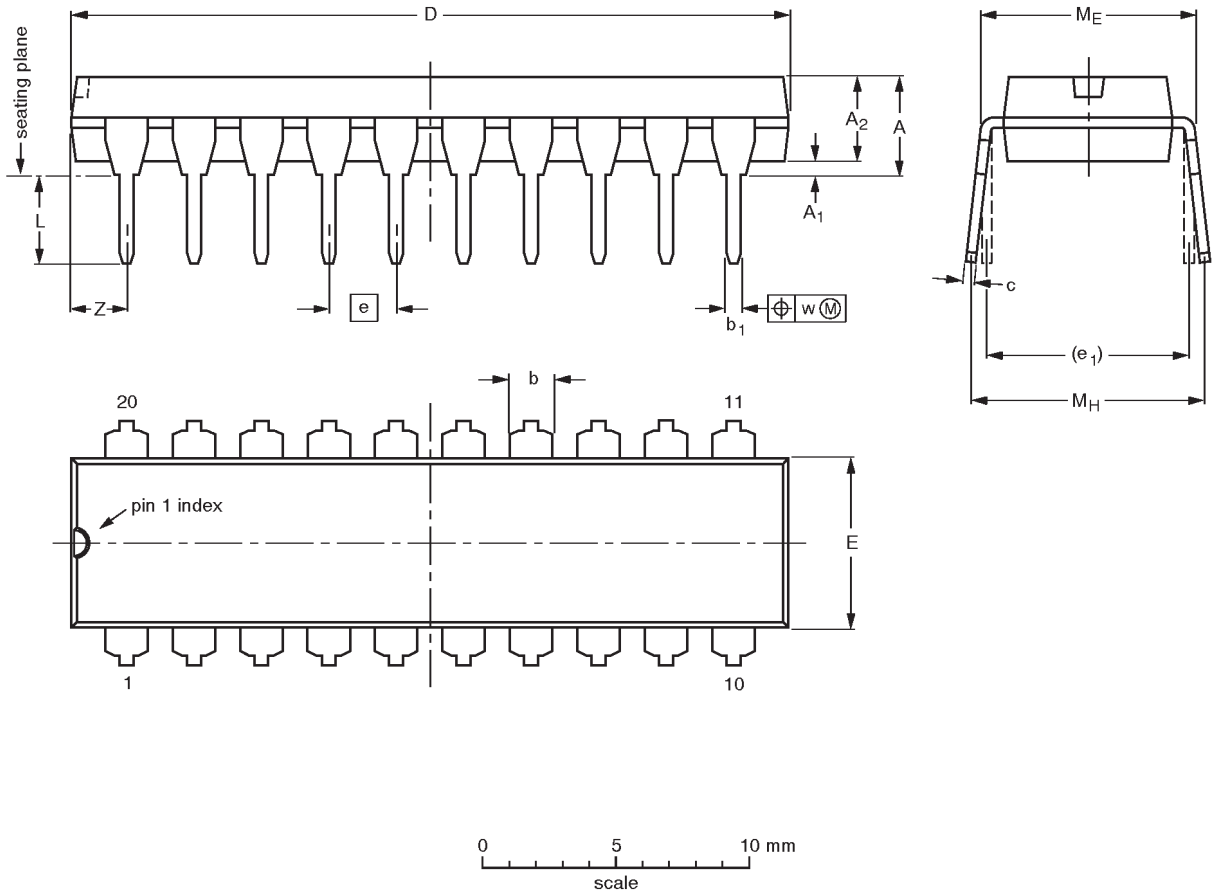


Hex 2-input NAND drivers

74F804, 74F1804

DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1



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>1.30   | 0.53<br>0.38   | 0.36<br>0.23   | 26.92<br>26.54   | 6.40<br>6.22     | 2.54 | 7.62           | 3.60<br>3.05 | 8.25<br>7.80   | 10.0<br>8.3    | 0.254 | 2.0                   |
| inches | 0.17   | 0.020               | 0.13                | 0.068<br>0.051 | 0.021<br>0.015 | 0.014<br>0.009 | 1.060<br>1.045   | 0.25<br>0.24     | 0.10 | 0.30           | 0.14<br>0.12 | 0.32<br>0.31   | 0.39<br>0.33   | 0.01  | 0.078                 |

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

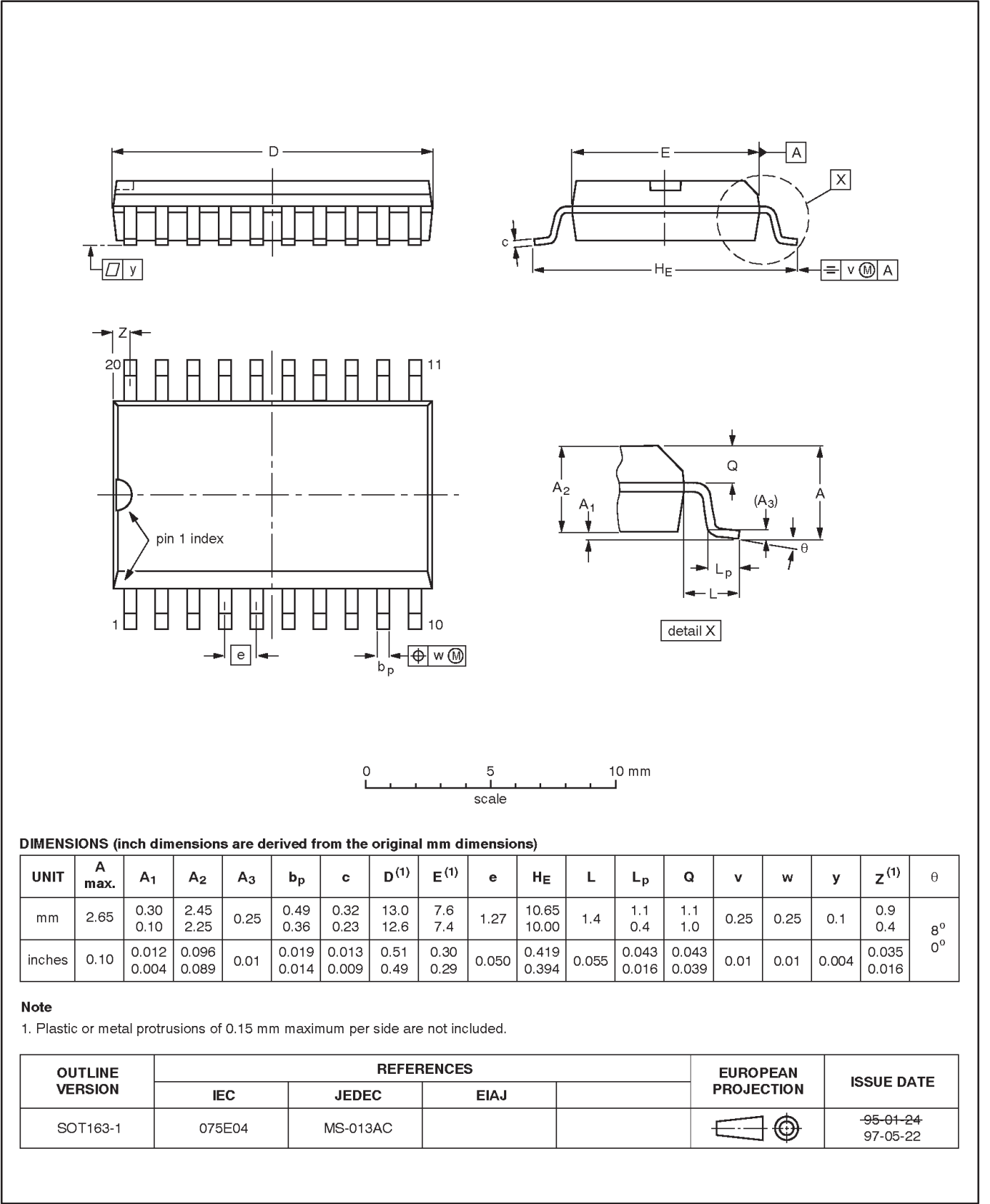
| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE           |
|--------------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|----------------------|
|                    | IEC        | JEDEC | EIAJ  |  |                                                                                       |                      |
| SOT146-1           |            |       | SC603 |  |  | 92-11-17<br>95-05-24 |

Hex 2-input NAND drivers

74F804, 74F1804

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1



## Hex 2-input NAND drivers

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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.                                                                                                          |
| Preliminary specification | Qualification  | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
| Product specification     | Production     | This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.                                                       |

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

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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.

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