

# DATA SHEET

## **74F125, 74F126** Quad buffers (3-State)

Product specification  
IC15 Data Handbook

1989 March 28

Quad buffers (3-State)

74F125, 74F126

FEATURE

- High impedance NPN base inputs for reduced loading (20µA in High and Low states)

| TYPE   | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|--------|---------------------------|--------------------------------|
| 74F125 | 5.0ns                     | 23mA                           |
| 74F126 | 5.0ns                     | 26mA                           |

ORDERING INFORMATION

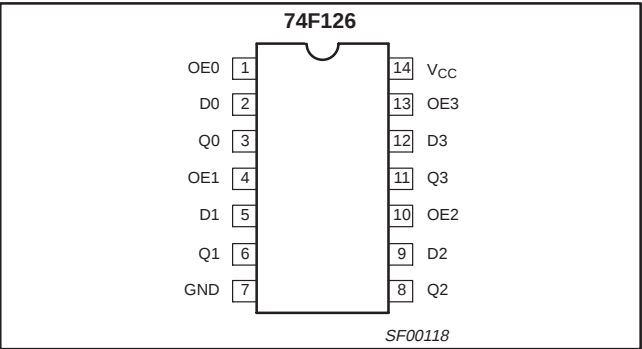
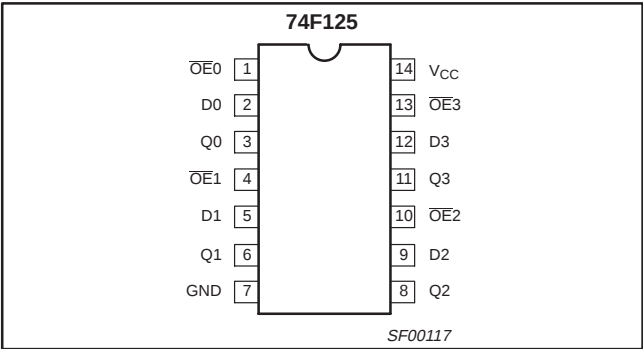
| DESCRIPTION        | COMMERCIAL RANGE<br>V <sub>CC</sub> = 5V ±10%,<br>T <sub>amb</sub> = 0°C to +70°C | PKG DWG # |
|--------------------|-----------------------------------------------------------------------------------|-----------|
| 14-pin plastic DIP | N74F125N, N74F126N                                                                | SOT27-1   |
| 14-pin plastic SO  | N74F125D, N74F126D                                                                | SOT108-1  |

INPUT AND OUTPUT LOADING AND FAN OUT TABLE

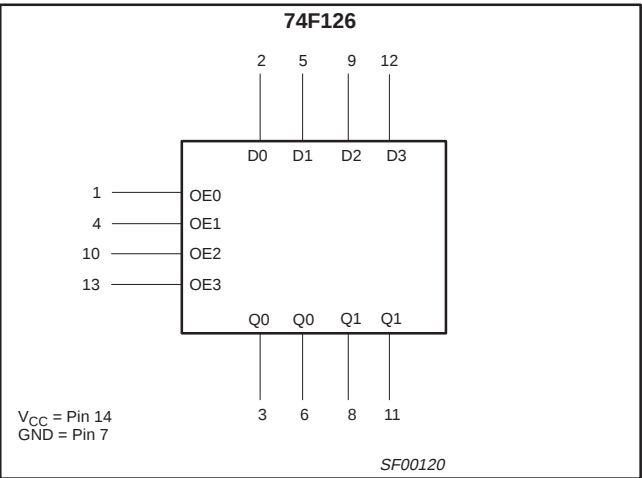
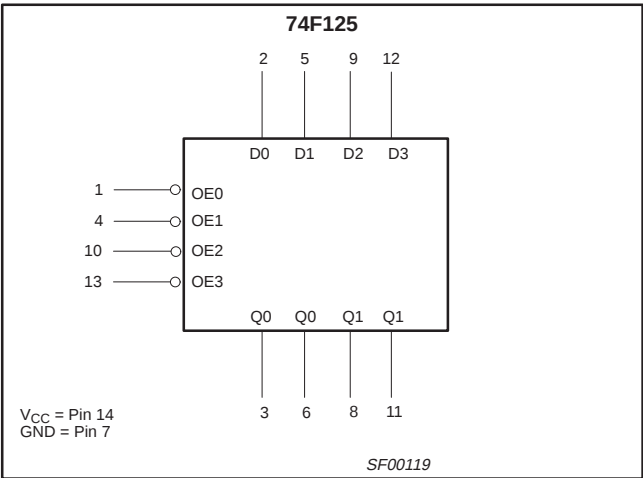
| PINS                                | DESCRIPTION                                | 74F (U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|-------------------------------------|--------------------------------------------|---------------------|---------------------|
| D0–D3                               | Data inputs                                | 1.0/0.033           | 20µA/20µA           |
| $\overline{OE}0$ – $\overline{OE}3$ | Output Enable inputs (active Low), 74F125  | 1.0/0.033           | 20µA/20µA           |
| OE0–OE3                             | Output Enable inputs (active High), 74F126 | 1.0/0.033           | 20µA/20µA           |
| Q0–Q3                               | Data outputs                               | 750/106.7           | 15mA/64mA           |

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

PIN CONFIGURATIONS



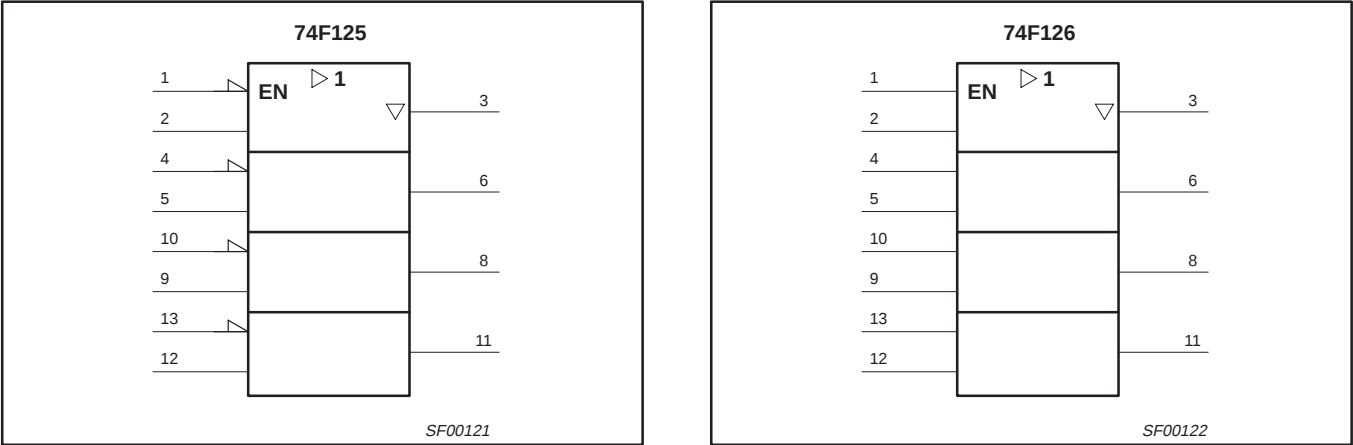
LOGIC SYMBOLS



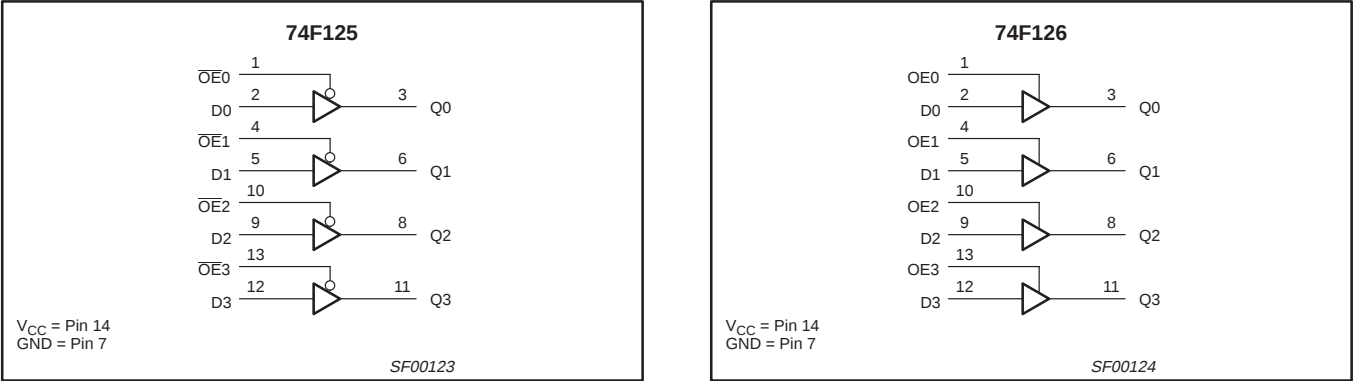
Quad buffers (3-State)

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IEC/IEEE SYMBOLS



LOGIC DIAGRAMS



FUNCTION TABLE, 74F125

| I NPUTS                 |    | OUTPUT |
|-------------------------|----|--------|
| $\overline{\text{OEn}}$ | Dn | Qn     |
| L                       | L  | L      |
| L                       | H  | H      |
| H                       | X  | Z      |

FUNCTION TABLE, 74F126

| I NPUTS |    | OUTPUT |
|---------|----|--------|
| OEn     | Dn | Qn     |
| H       | L  | L      |
| H       | H  | H      |
| L       | X  | Z      |

NOTES TO THE FUNCTION TABLES:

H = High voltage level  
L = Low voltage level  
X = Don't care  
Z = High impedance "off" state

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 <sub>CC</sub>  | Supply voltage                                 | −0.5 to +7.0            | V    |
| V <sub>IN</sub>  | Input voltage                                  | −0.5 to +7.0            | V    |
| I <sub>IN</sub>  | Input current                                  | −30 to +5               | mA   |
| V <sub>OUT</sub> | Voltage applied to output in High output state | −0.5 to V <sub>CC</sub> | V    |
| I <sub>OUT</sub> | Current applied to output in Low output state  | 128                     | mA   |
| T <sub>amb</sub> | Operating free-air temperature range           | 0 to +70                | °C   |
| T <sub>stg</sub> | Storage temperature range                      | −65 to +150             | °C   |

## Quad buffers (3-State)

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## 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            |        |     | -15 | mA   |
| $I_{OL}$  | Low-level output current             |        |     | 64  | mA   |
| $T_{amb}$ | 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 <sup>1</sup>                                              |                         |                       | LIMITS                                                               |                  |      | UNIT |    |
|------------------|---------------------------------------------------------|--|---------------------------------------------------------------------------|-------------------------|-----------------------|----------------------------------------------------------------------|------------------|------|------|----|
|                  |                                                         |  |                                                                           |                         |                       | MIN                                                                  | TYP <sup>2</sup> | MAX  |      |    |
| V <sub>OH</sub>  | High-level output voltage                               |  | V <sub>CC</sub> = MIN,<br>V <sub>IL</sub> = MAX,<br>V <sub>IH</sub> = MIN | I <sub>OH</sub> = −3mA  | ±10%V <sub>CC</sub>   | 2.4                                                                  |                  |      | V    |    |
|                  |                                                         |  |                                                                           |                         | ±5%V <sub>CC</sub>    | 2.7                                                                  | 3.3              |      | V    |    |
|                  |                                                         |  |                                                                           | I <sub>OH</sub> = −15mA | ±10%V <sub>CC</sub>   | 2.0                                                                  |                  |      | V    |    |
|                  |                                                         |  |                                                                           |                         | ±5%V <sub>CC</sub>    | 2.0                                                                  |                  |      | V    |    |
| V <sub>OL</sub>  | Low-level output voltage                                |  | V <sub>CC</sub> = MIN,<br>V <sub>IL</sub> = MAX,<br>V <sub>IH</sub> = MIN | I <sub>OH</sub> = MAX   | ±10%V <sub>CC</sub>   |                                                                      |                  | 0.55 | V    |    |
|                  |                                                         |  |                                                                           |                         | ±5%V <sub>CC</sub>    |                                                                      | 0.42             | 0.55 | V    |    |
| V <sub>IK</sub>  | Input clamp voltage                                     |  | V <sub>CC</sub> = MIN, I <sub>I</sub> = I <sub>IK</sub>                   |                         |                       |                                                                      | −0.73            | −1.2 | V    |    |
| I <sub>I</sub>   | Input current at maximum input voltage                  |  | V <sub>CC</sub> = 0.0V, V <sub>I</sub> = 7.0V                             |                         |                       |                                                                      |                  | 100  | μA   |    |
| I <sub>IH</sub>  | High-level input current                                |  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7V                              |                         |                       |                                                                      |                  | 20   | μA   |    |
| I <sub>IL</sub>  | Low-level input current                                 |  | V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5V                              |                         |                       |                                                                      |                  | −20  | μA   |    |
| I <sub>OZH</sub> | Off-state output current,<br>High-level voltage applied |  | V <sub>CC</sub> = MAX, V <sub>O</sub> = 2.7V                              |                         |                       |                                                                      |                  | 50   | μA   |    |
| I <sub>OZL</sub> | Off-state output current,<br>Low-level voltage applied  |  | V <sub>CC</sub> = MAX, V <sub>O</sub> = 0.5V                              |                         |                       |                                                                      |                  | −50  | μA   |    |
| I <sub>OS</sub>  | Short circuit output current <sup>3</sup>               |  | V <sub>CC</sub> = MAX                                                     |                         |                       | −100                                                                 |                  | −225 | mA   |    |
| I <sub>CC</sub>  | Supply current (total)                                  |  | 74F125                                                                    | I <sub>CCH</sub>        | V <sub>CC</sub> = MAX | $\overline{\text{OE}}\text{n} = \text{GND}, \text{Dn} = 4.5\text{V}$ |                  | 17   | 24   | mA |
|                  |                                                         |  |                                                                           | I <sub>CCL</sub>        |                       | $\overline{\text{OE}}\text{n} = \text{Dn} = \text{GND}$              |                  | 28   | 40   | mA |
|                  |                                                         |  |                                                                           | I <sub>CCZ</sub>        |                       | $\overline{\text{OE}}\text{n} = \text{Dn} = 4.5\text{V}$             |                  | 25   | 35   | mA |
|                  |                                                         |  | 74F126                                                                    | I <sub>CCH</sub>        | V <sub>CC</sub> = MAX | OEn = Dn = 4.5V                                                      |                  | 20   | 30   | mA |
|                  |                                                         |  |                                                                           | I <sub>CCL</sub>        |                       | OEn = 4.5V, Dn = GND                                                 |                  | 32   | 48   | mA |
|                  |                                                         |  |                                                                           | I <sub>CCZ</sub>        |                       | OEn = GND, Dn = 4.5V                                                 |                  | 26   | 39   | 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  $V_{CC} = 5\text{V}$ ,  $T_{amb} = 25^\circ\text{C}$ .
- 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.

Quad buffers (3-State)

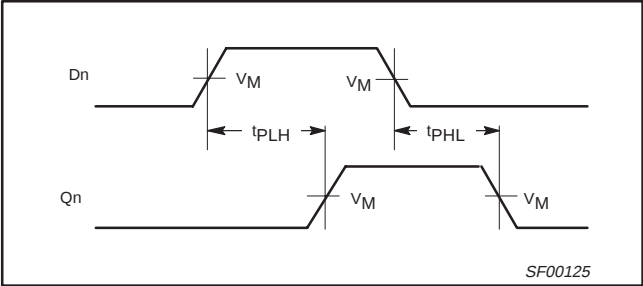
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AC ELECTRICAL CHARACTERISTICS

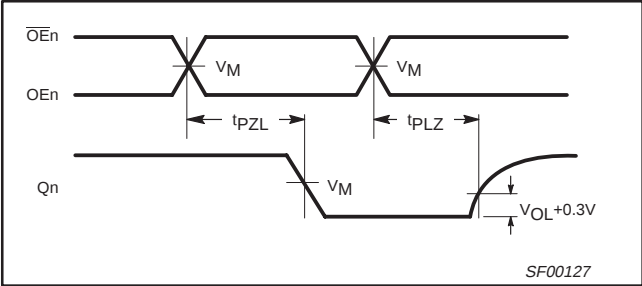
| SYMBOL                               | PARAMETER                                     |        | TEST<br>CONDITION        | LIMITS                                                                                              |            |            |                                                                                                                  |            | UNIT |
|--------------------------------------|-----------------------------------------------|--------|--------------------------|-----------------------------------------------------------------------------------------------------|------------|------------|------------------------------------------------------------------------------------------------------------------|------------|------|
|                                      |                                               |        |                          | V <sub>CC</sub> = +5.0V<br>T <sub>amb</sub> = +25°C<br>C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω |            |            | V <sub>CC</sub> = +5.0V ± 10%<br>T <sub>amb</sub> = 0°C to +70°C<br>C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω |            |      |
|                                      |                                               |        |                          | MIN                                                                                                 | TYP        | MAX        | MIN                                                                                                              | MAX        |      |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>Dn to Qn                 | 74F125 | Waveform 1               | 2.0<br>3.0                                                                                          | 4.0<br>5.5 | 6.0<br>7.5 | 2.0<br>3.0                                                                                                       | 6.5<br>8.0 | ns   |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output Enable time<br>to High or Low level    |        | Waveform 2<br>Waveform 3 | 3.5<br>4.0                                                                                          | 5.5<br>6.0 | 7.5<br>8.0 | 3.5<br>4.0                                                                                                       | 8.5<br>9.0 | ns   |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable time<br>from High or Low level |        | Waveform 2<br>Waveform 3 | 1.5<br>1.5                                                                                          | 3.5<br>3.5 | 5.0<br>5.5 | 1.5<br>1.5                                                                                                       | 6.0<br>6.0 | ns   |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>Dn to Qn                 | 74F126 | Waveform 1               | 2.0<br>3.0                                                                                          | 4.0<br>5.5 | 6.5<br>8.0 | 2.0<br>3.0                                                                                                       | 7.0<br>8.5 | ns   |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output Enable time<br>to High or Low level    |        | Waveform 2<br>Waveform 3 | 4.0<br>4.0                                                                                          | 6.0<br>6.0 | 7.5<br>8.0 | 3.5<br>3.5                                                                                                       | 8.5<br>8.5 | ns   |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output Disable time<br>from High or Low level |        | Waveform 2<br>Waveform 3 | 2.0<br>3.0                                                                                          | 4.5<br>5.5 | 6.5<br>7.5 | 2.0<br>3.0                                                                                                       | 7.5<br>8.0 | ns   |

AC WAVEFORMS

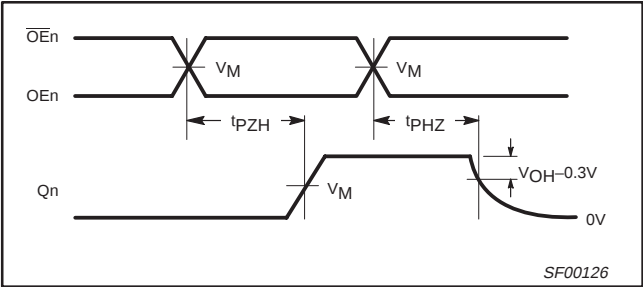
For all waveforms,  $V_M = 1.5V$ .



Waveform 1. Propagation Delay for Input to Output



Waveform 3. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

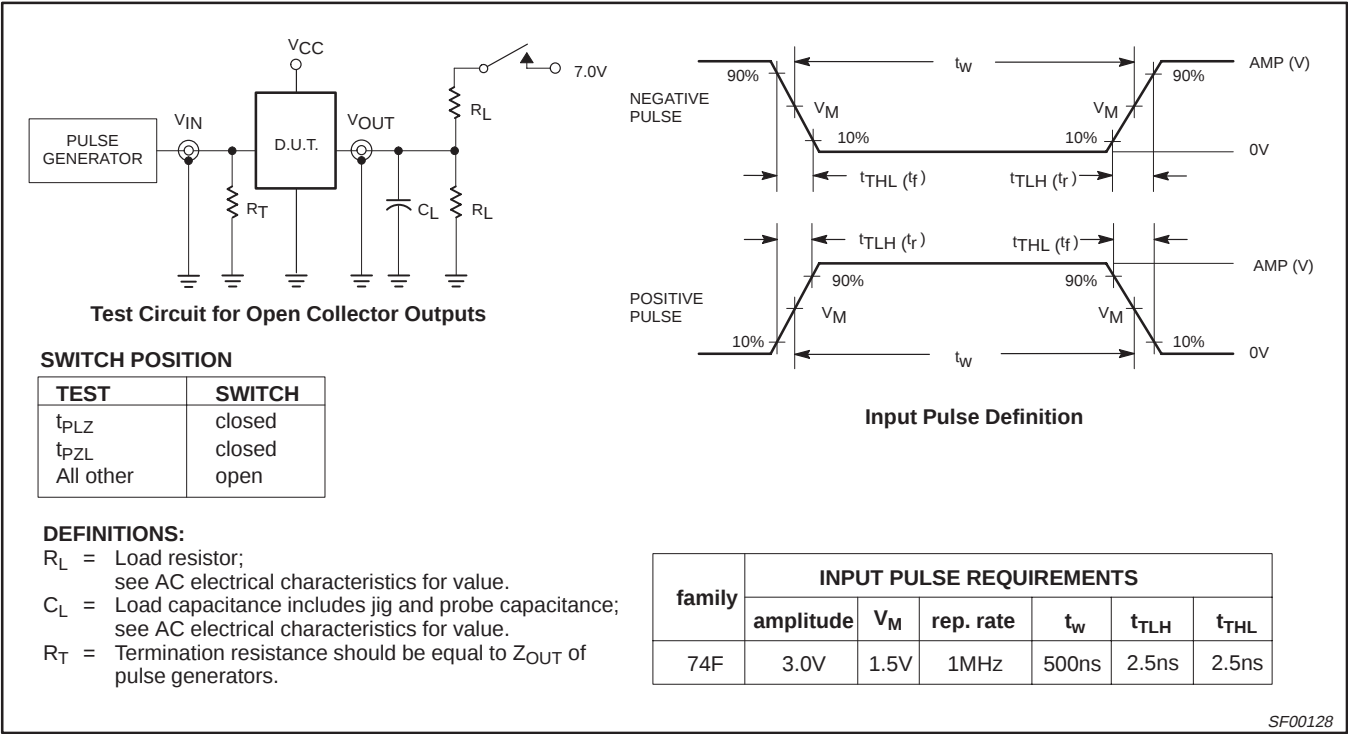


Waveform 2. 3-State Output Enable Time to High Level and Output Disable Time from High Level

Quad buffers (3-State)

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TEST CIRCUIT AND WAVEFORM

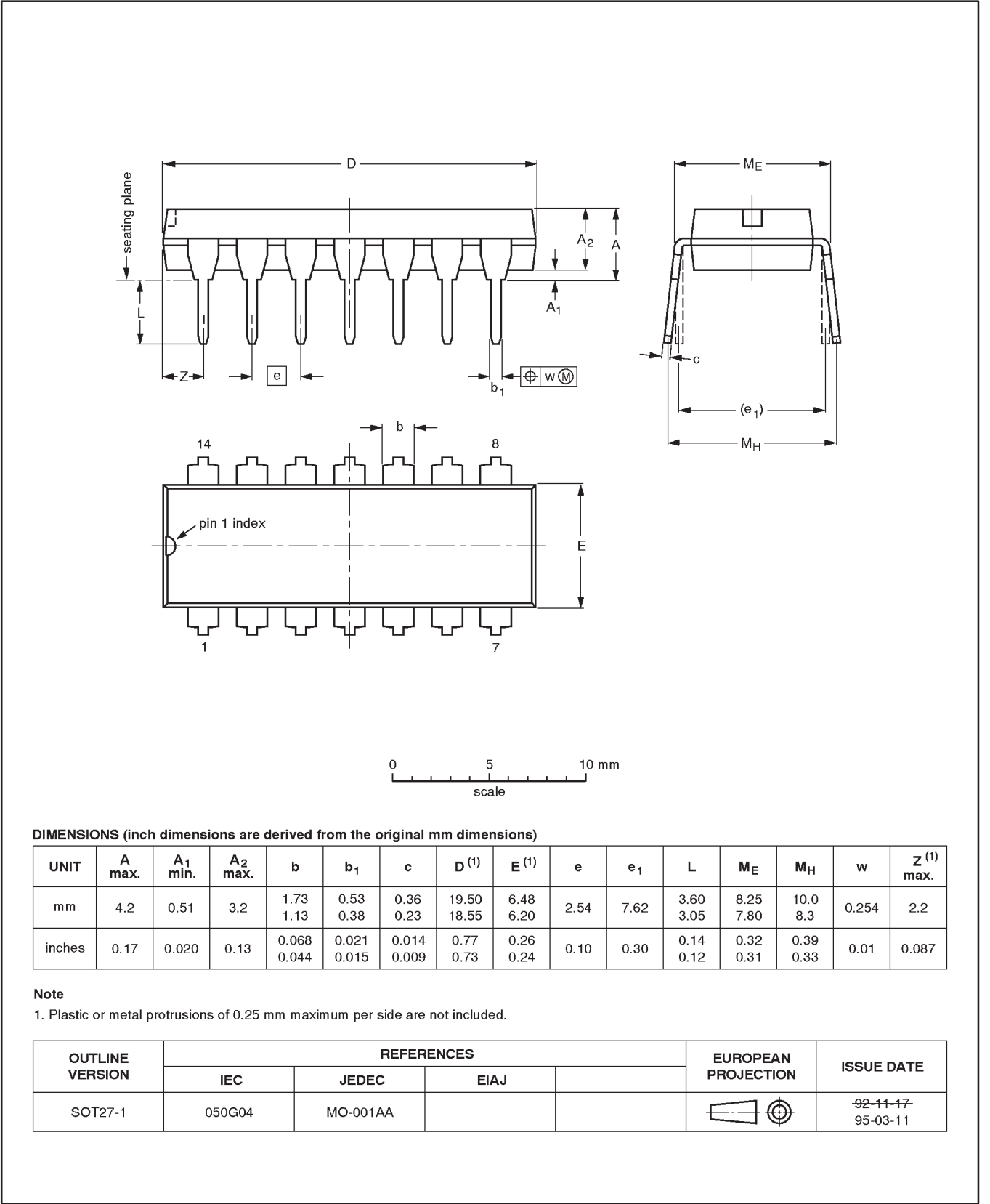


Quad buffers (3-State)

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

SOT27-1

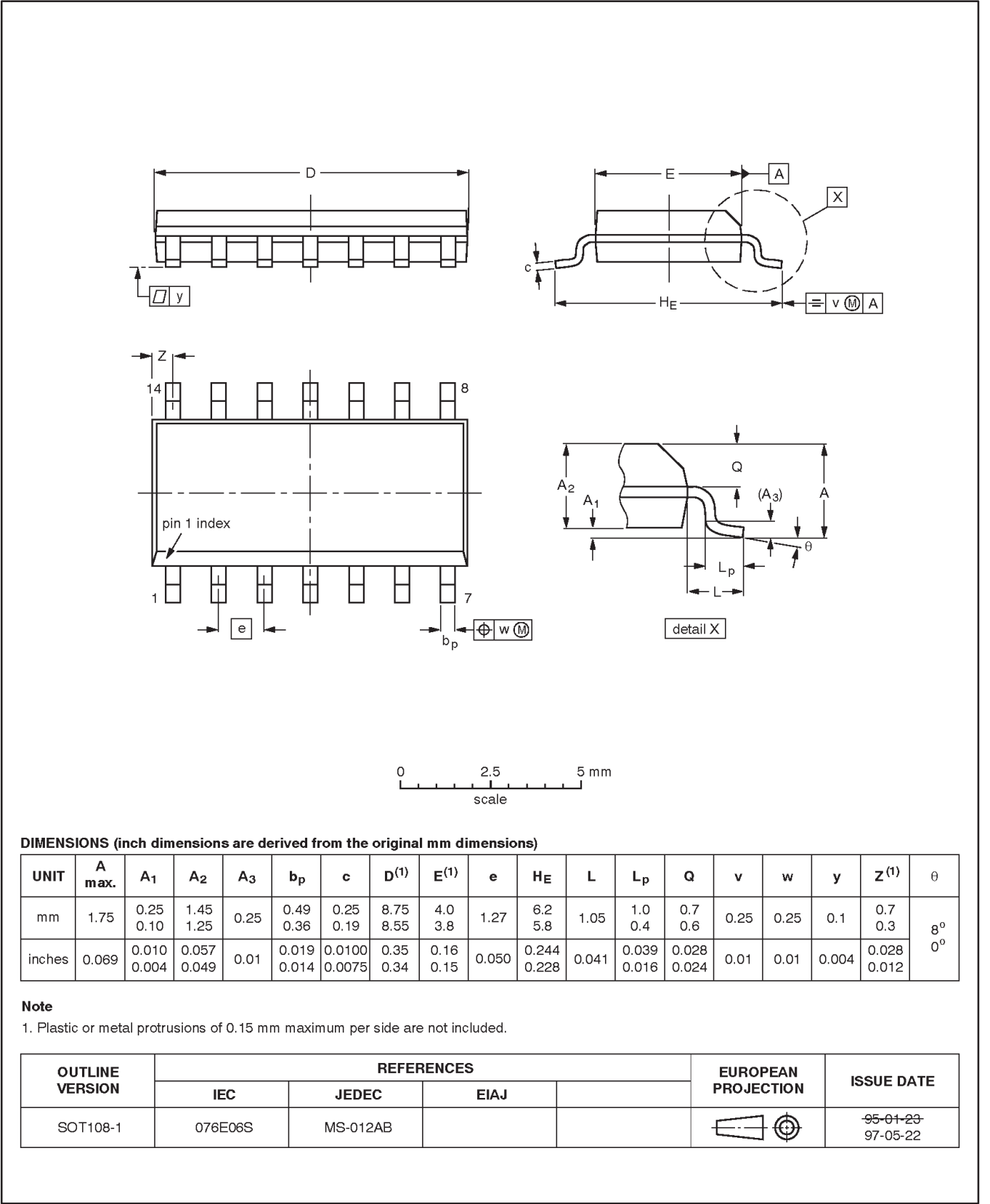


Quad buffers (3-State)

74F125, 74F126

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

SOT108-1



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|                        |                |
|------------------------|----------------|
| Quad buffers (3-State) | 74F125, 74F126 |
|------------------------|----------------|

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NOTES

## Quad buffers (3-State)

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

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