

# DATA SHEET

**74ABT16827A**

**74ABTH16827A**

20-bit buffer/line driver, non-inverting  
(3-State)

Product specification  
Supersedes data of 1998 Feb 27

2002 Dec 17

## 20-bit buffer/line driver, non-inverting (3-State)

**74ABT16827A**  
**74ABTH16827A**

### FEATURES

- Multiple  $V_{CC}$  and GND pins minimize switching noise
- Live insertion/extraction permitted
- 3-State output buffers
- Power-up 3-State
- 74ABTH16827A incorporates bus-hold data inputs which eliminate the need for external pull-up resistors to hold unused inputs
- Output capability: +64 mA / –32 mA
- Latch-up protection exceeds 500 mA per Jedec Std 17
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model

### DESCRIPTION

The 74ABT16827A high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16827A 20-bit buffers provide high performance bus interface buffering for wide data/address paths or buses carrying parity. They have NOR Output Enables ( $\overline{nOE1}$ ,  $\overline{nOE2}$ ) for maximum control flexibility.

Two options are available, 74ABT16827A which does not have the bus-hold feature and 74ABTH16827A which incorporates the bus-hold feature.

### QUICK REFERENCE DATA

| SYMBOL                 | PARAMETER                       | CONDITIONS<br>$T_{amb} = 25\text{ }^{\circ}\text{C}$ ; GND = 0 V | TYPICAL    | UNIT          |
|------------------------|---------------------------------|------------------------------------------------------------------|------------|---------------|
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>nAx to nYx | $C_L = 50\text{ pF}$ ; $V_{CC} = 5\text{ V}$                     | 1.7<br>1.4 | ns            |
| $C_{IN}$               | Input capacitance               | $V_I = 0\text{ V}$ or $V_{CC}$                                   | 4          | pF            |
| $C_{OUT}$              | Output capacitance              | $V_O = 0\text{ V}$ or $V_{CC}$ ; 3-State                         | 6          | pF            |
| $I_{CCZ}$              | Quiescent supply current        | Outputs disabled; $V_{CC} = 5.5\text{ V}$                        | 500        | $\mu\text{A}$ |
| $I_{CCL}$              |                                 | Outputs LOW; $V_{CC} = 5.5\text{ V}$                             | 9          | mA            |

### ORDERING INFORMATION

| PACKAGES                     | TEMPERATURE RANGE | PART NUMBER     | DWG NUMBER |
|------------------------------|-------------------|-----------------|------------|
| 56-Pin Plastic SSOP Type III | –40 °C to +85 °C  | 74ABT16827ADL   | SOT371-1   |
| 56-Pin Plastic TSSOP Type II | –40 °C to +85 °C  | 74ABT16827ADGG  | SOT364-1   |
| 56-Pin Plastic TSSOP Type II | –40 °C to +85 °C  | 74ABTH16827ADGG | SOT364-1   |

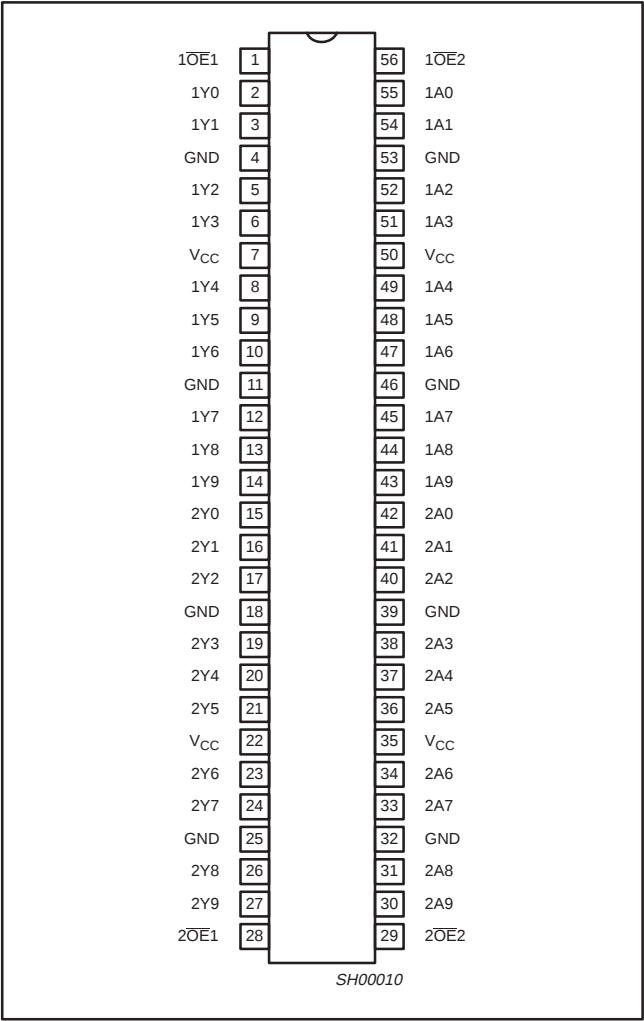
### PIN DESCRIPTION

| PIN NUMBER                                                                        | SYMBOL                                                                         | FUNCTION                          |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------|
| 55, 54, 52, 51, 49, 48, 47, 45, 44, 43,<br>42, 41, 40, 38, 37, 36, 34, 33, 31, 30 | 1A0 – 1A9<br>2A0 – 2A9                                                         | Data inputs                       |
| 2, 3, 5, 6, 8, 9, 10, 12, 13, 14,<br>15, 16, 17, 19, 20, 21, 23, 24, 26, 27       | 1Y0 – 1Y9<br>2Y0 – 2Y9                                                         | Data outputs                      |
| 1, 56,<br>28, 29                                                                  | $\overline{1OE0}$ , $\overline{1OE1}$<br>$\overline{2OE0}$ , $\overline{2OE1}$ | Output enable inputs (active-LOW) |
| 4, 11, 18, 25, 32, 39, 46, 53                                                     | GND                                                                            | Ground (0 V)                      |
| 7, 22, 35, 50                                                                     | $V_{CC}$                                                                       | Positive supply voltage           |

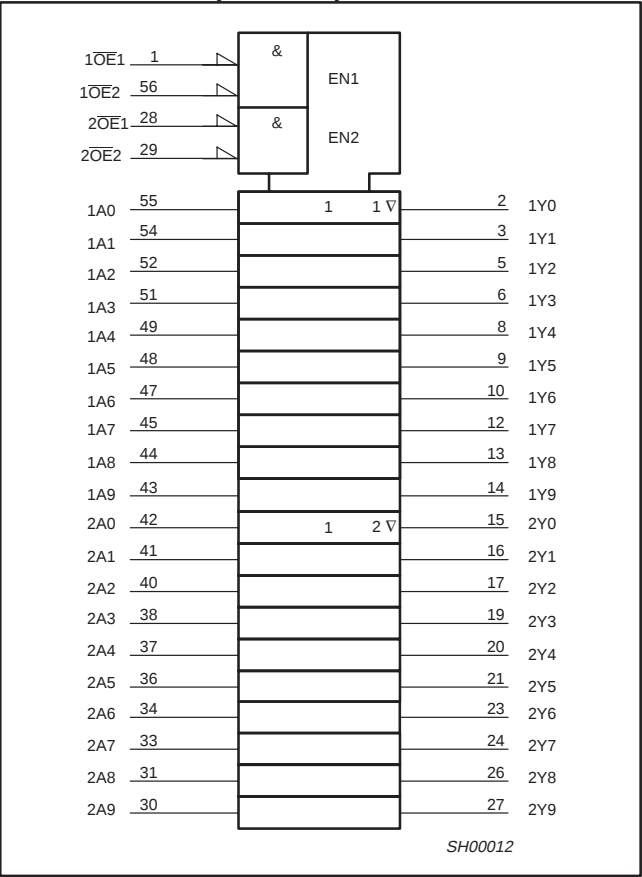
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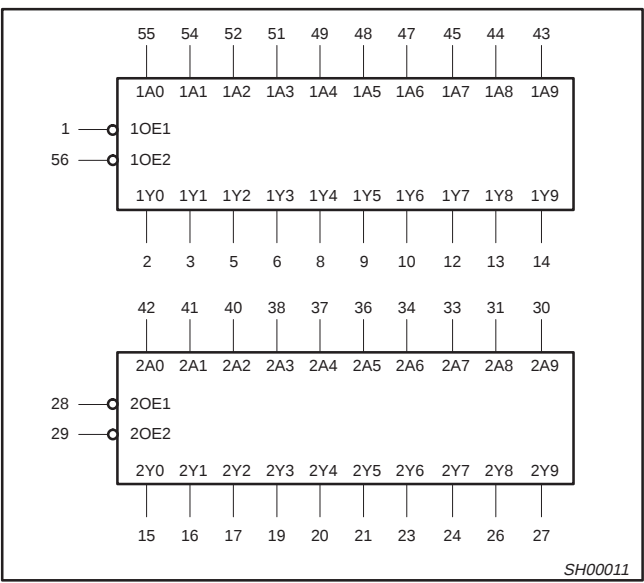
PIN CONFIGURATION



LOGIC SYMBOL (IEEE/IEC)



LOGIC SYMBOL



FUNCTION TABLE

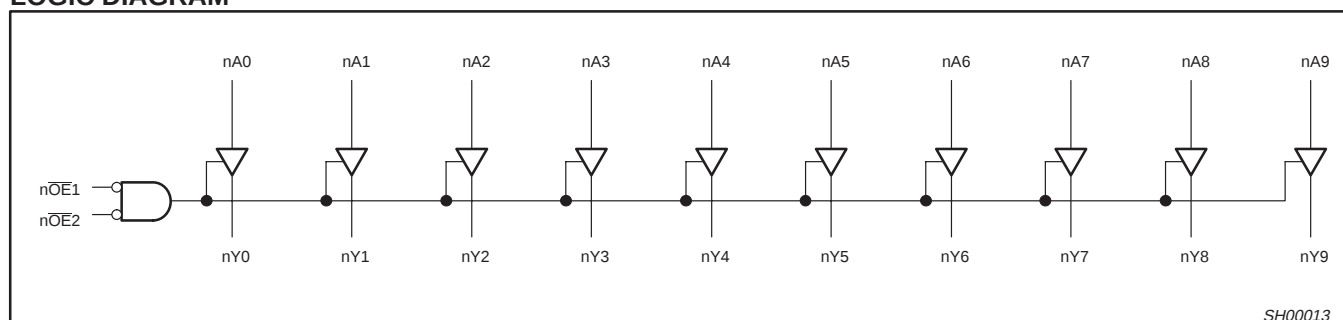
| INPUTS           |                 | OUTPUTS         | OPERATING MODE |
|------------------|-----------------|-----------------|----------------|
| nOE <sub>x</sub> | nA <sub>x</sub> | nY <sub>x</sub> |                |
| L                | L               | L               | Transparent    |
| L                | H               | H               | Transparent    |
| H                | X               | Z               | High impedance |

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

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## LOGIC DIAGRAM

ABSOLUTE MAXIMUM RATINGS<sup>1, 2</sup>

| SYMBOL    | PARAMETER                      | CONDITIONS                  | RATING       | UNIT |
|-----------|--------------------------------|-----------------------------|--------------|------|
| $V_{CC}$  | DC supply voltage              |                             | -0.5 to +7.0 | V    |
| $I_{IK}$  | DC input diode current         | $V_I < 0$ V                 | -18          | mA   |
| $V_I$     | DC input voltage <sup>3</sup>  |                             | -1.2 to +7.0 | V    |
| $I_{OK}$  | DC output diode current        | $V_O < 0$ V                 | -50          | mA   |
| $V_{OUT}$ | DC output voltage <sup>3</sup> | Output in Off or HIGH state | -0.5 to +5.5 | V    |
| $I_{OUT}$ | DC output current              | Output in LOW state         | 128          | mA   |
|           |                                | Output in HIGH state        | -64          | mA   |
| $T_{stg}$ | Storage temperature range      |                             | -65 to 150   | °C   |

## NOTES:

- Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150 °C.
- The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

## RECOMMENDED OPERATING CONDITIONS

| SYMBOL              | PARAMETER                            | LIMITS |          | UNIT |
|---------------------|--------------------------------------|--------|----------|------|
|                     |                                      | MIN    | MAX      |      |
| $V_{CC}$            | DC supply voltage                    | 4.5    | 5.5      | V    |
| $V_I$               | Input voltage                        | 0      | $V_{CC}$ | V    |
| $V_{IH}$            | HIGH-level input voltage             | 2.0    | —        | V    |
| $V_{IL}$            | LOW-level Input voltage              | —      | 0.8      | V    |
| $I_{OH}$            | HIGH-level output current            | —      | -32      | mA   |
| $I_{OL}$            | LOW-level output current             | —      | 64       | mA   |
| $\Delta t/\Delta v$ | Input transition rise or fall rate   | 0      | 10       | ns/V |
| $T_{amb}$           | Operating free-air temperature range | -40    | +85      | °C   |

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## DC ELECTRICAL CHARACTERISTICS

| SYMBOL                           | PARAMETER                                               | TEST CONDITIONS                                                                                                            |                        | LIMITS                    |       |      |                                        |      | UNIT |
|----------------------------------|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------|---------------------------|-------|------|----------------------------------------|------|------|
|                                  |                                                         |                                                                                                                            |                        | T <sub>amb</sub> = +25 °C |       |      | T <sub>amb</sub> = −40 °C<br>to +85 °C |      |      |
|                                  |                                                         |                                                                                                                            |                        | MIN                       | TYP   | MAX  | MIN                                    | MAX  |      |
| V <sub>IK</sub>                  | Input clamp voltage                                     | V <sub>CC</sub> = 4.5 V; I <sub>IK</sub> = −18 mA                                                                          |                        |                           | −0.9  | −1.2 |                                        | −1.2 | V    |
| V <sub>OH</sub>                  | HIGH-level output voltage                               | V <sub>CC</sub> = 4.5 V; I <sub>OH</sub> = −3 mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                      |                        | 2.5                       | 2.9   |      | 2.5                                    |      | V    |
|                                  |                                                         | V <sub>CC</sub> = 5.0 V; I <sub>OH</sub> = −3 mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                      |                        | 3.0                       | 3.4   |      | 3.0                                    |      | V    |
|                                  |                                                         | V <sub>CC</sub> = 4.5 V; I <sub>OH</sub> = −32 mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                     |                        | 2.0                       | 2.4   |      | 2.0                                    |      | V    |
| V <sub>OL</sub>                  | LOW-level output voltage                                | V <sub>CC</sub> = 4.5 V; I <sub>OL</sub> = 64 mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                      |                        |                           | 0.42  | 0.55 |                                        | 0.55 | V    |
| I <sub>I</sub>                   | Input leakage current                                   | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = GND or 5.5 V                                                                     |                        |                           | ±0.01 | ±1.0 |                                        | ±1.0 | μA   |
| I <sub>I</sub>                   | Input leakage current<br>74ABTH16827A                   | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = 5.5 V                                                                            |                        |                           | 0.01  | 1    |                                        | 1    | μA   |
|                                  |                                                         | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>CC</sub> or GND                                                           | Control pins           |                           | ±0.01 | ±1   |                                        | ±1   | μA   |
|                                  |                                                         | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = V <sub>CC</sub>                                                                  | Data pins <sup>4</sup> |                           | 0.01  | 1    |                                        | 1    | μA   |
|                                  |                                                         | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = 0                                                                                |                        |                           | −1    | −3   |                                        | −5   | μA   |
| I <sub>HOLD</sub>                | Bus Hold current A inputs <sup>5</sup><br>74ABTH16827A  | V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = 0.8 V                                                                            |                        | 35                        |       |      | 35                                     |      | μA   |
|                                  |                                                         | V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = 2.0 V                                                                            |                        | −75                       |       |      | −75                                    |      |      |
|                                  |                                                         | V <sub>CC</sub> = 5.5 V; V <sub>I</sub> = 0 to 5.5 V                                                                       |                        | ±800                      |       |      |                                        |      |      |
| I <sub>OFF</sub>                 | Power-off leakage current                               | V <sub>CC</sub> = 0.0 V; V <sub>O</sub> = 4.5 V; V <sub>I</sub> = 0 V or 5.5 V                                             |                        |                           | ±5.0  | ±100 |                                        | ±100 | μA   |
| I <sub>PU</sub> /I <sub>PD</sub> | Power-up/down 3-State<br>output current <sup>3</sup>    | V <sub>CC</sub> = 2.1 V; V <sub>O</sub> = 0.5 V; V <sub>I</sub> = GND or V <sub>CC</sub> ;<br>V <sub>OE</sub> = Don't care |                        |                           | ±5.0  | ±50  |                                        | ±50  | μA   |
| I <sub>OZH</sub>                 | 3-State output High current                             | V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 2.7 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                       |                        |                           | 1.0   | 10   |                                        | 10   | μA   |
| I <sub>OZL</sub>                 | 3-State output Low current                              | V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 0.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                       |                        |                           | −1.0  | −10  |                                        | −10  | μA   |
| I <sub>CEX</sub>                 | Output HIGH leakage<br>current                          | V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 5.5 V; V <sub>I</sub> = GND or V <sub>CC</sub>                                   |                        |                           | 1.0   | 50   |                                        | 50   | μA   |
| I <sub>O</sub>                   | Output current <sup>1</sup>                             | V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 2.5 V                                                                            |                        | −50                       | −70   | −180 | −50                                    | −180 | mA   |
| I <sub>CCH</sub>                 | Quiescent supply current                                | V <sub>CC</sub> = 5.5 V; Outputs HIGH, V <sub>I</sub> = GND or V <sub>CC</sub>                                             |                        |                           | 0.5   | 1    |                                        | 1    | mA   |
| I <sub>CCL</sub>                 |                                                         | V <sub>CC</sub> = 5.5 V; Outputs LOW, V <sub>I</sub> = GND or V <sub>CC</sub>                                              |                        |                           | 9     | 19   |                                        | 19   | mA   |
| I <sub>CCZ</sub>                 |                                                         | V <sub>CC</sub> = 5.5 V; Outputs 3-State;<br>V <sub>I</sub> = GND or V <sub>CC</sub>                                       |                        |                           | 0.5   | 1    |                                        | 1    | mA   |
| ΔI <sub>CC</sub>                 | Additional supply current<br>per input pin <sup>2</sup> | V <sub>CC</sub> = 5.5 V; one input at 3.4 V,<br>other inputs at V <sub>CC</sub> or GND                                     |                        |                           | 0.2   | 1    |                                        | 1    | mA   |

## NOTES:

- Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
- This is the increase in supply current for each input at  $3.4\text{ V}$ .
- This parameter is valid for any  $V_{CC}$  between  $0\text{ V}$  and  $2.1\text{ V}$  with a transition time of up to  $10\text{ msec}$ . From  $V_{CC} = 2.1\text{ V}$  to  $V_{CC} = 5\text{ V} \pm 10\%$  a transition time of up to  $100\text{ }\mu\text{sec}$  is permitted.
- Unused pins at  $V_{CC}$  or GND.
- This is the bus hold overdrive current required to force the input to the opposite logic state.

## AC CHARACTERISTICS

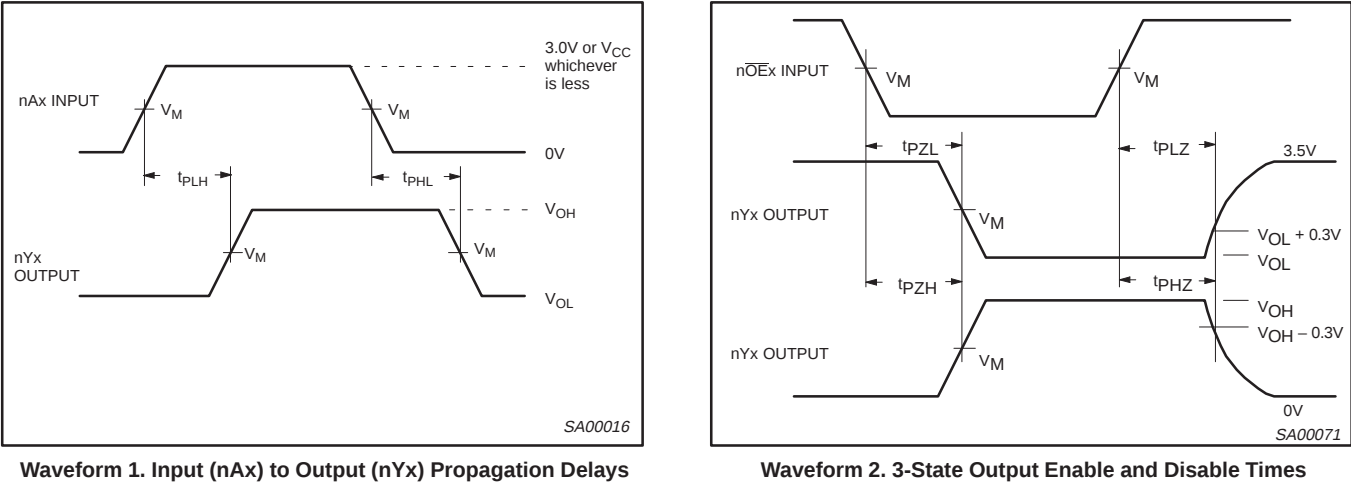
GND = 0 V,  $t_R = t_F = 2.5\text{ ns}$ ,  $C_L = 50\text{ pF}$ ,  $R_L = 500\text{ }\Omega$ 

| SYMBOL                               | PARAMETER                                      | WAVEFORM | LIMITS                                                |            |            |                                                                        |            | UNIT |
|--------------------------------------|------------------------------------------------|----------|-------------------------------------------------------|------------|------------|------------------------------------------------------------------------|------------|------|
|                                      |                                                |          | T <sub>amb</sub> = +25 °C<br>V <sub>CC</sub> = +5.0 V |            |            | T <sub>amb</sub> = −40 °C to +85 °C<br>V <sub>CC</sub> = +5.0 V ±0.5 V |            |      |
|                                      |                                                |          | MIN                                                   | TYP        | MAX        | MIN                                                                    | MAX        |      |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>nAx to nYx                | 1        | 1.0<br>0.6                                            | 1.7<br>1.4 | 2.4<br>2.0 | 1.0<br>0.6                                                             | 2.7<br>2.3 | ns   |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output enable time<br>to HIGH and LOW level    | 2        | 1.0<br>1.0                                            | 3.0<br>3.0 | 4.1<br>4.0 | 1.0<br>1.0                                                             | 5.0<br>5.0 | ns   |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output disable time<br>from HIGH and LOW level | 2        | 2.0<br>1.6                                            | 3.2<br>2.4 | 4.3<br>3.2 | 2.0<br>1.6                                                             | 5.0<br>3.5 | ns   |

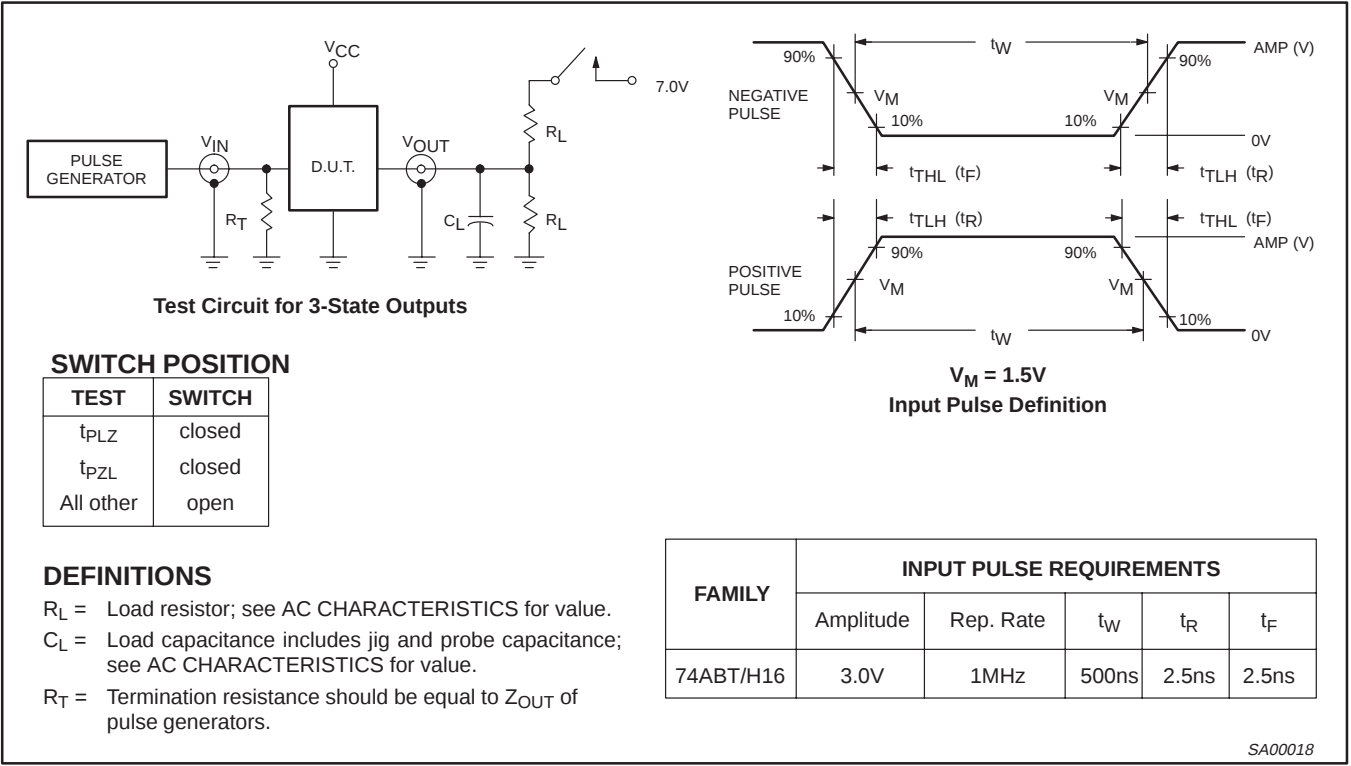
20-bit buffer/line driver, non-inverting (3-State)

74ABT16827A  
74ABTH16827A

AC WAVEFORMS



TEST CIRCUIT AND WAVEFORM

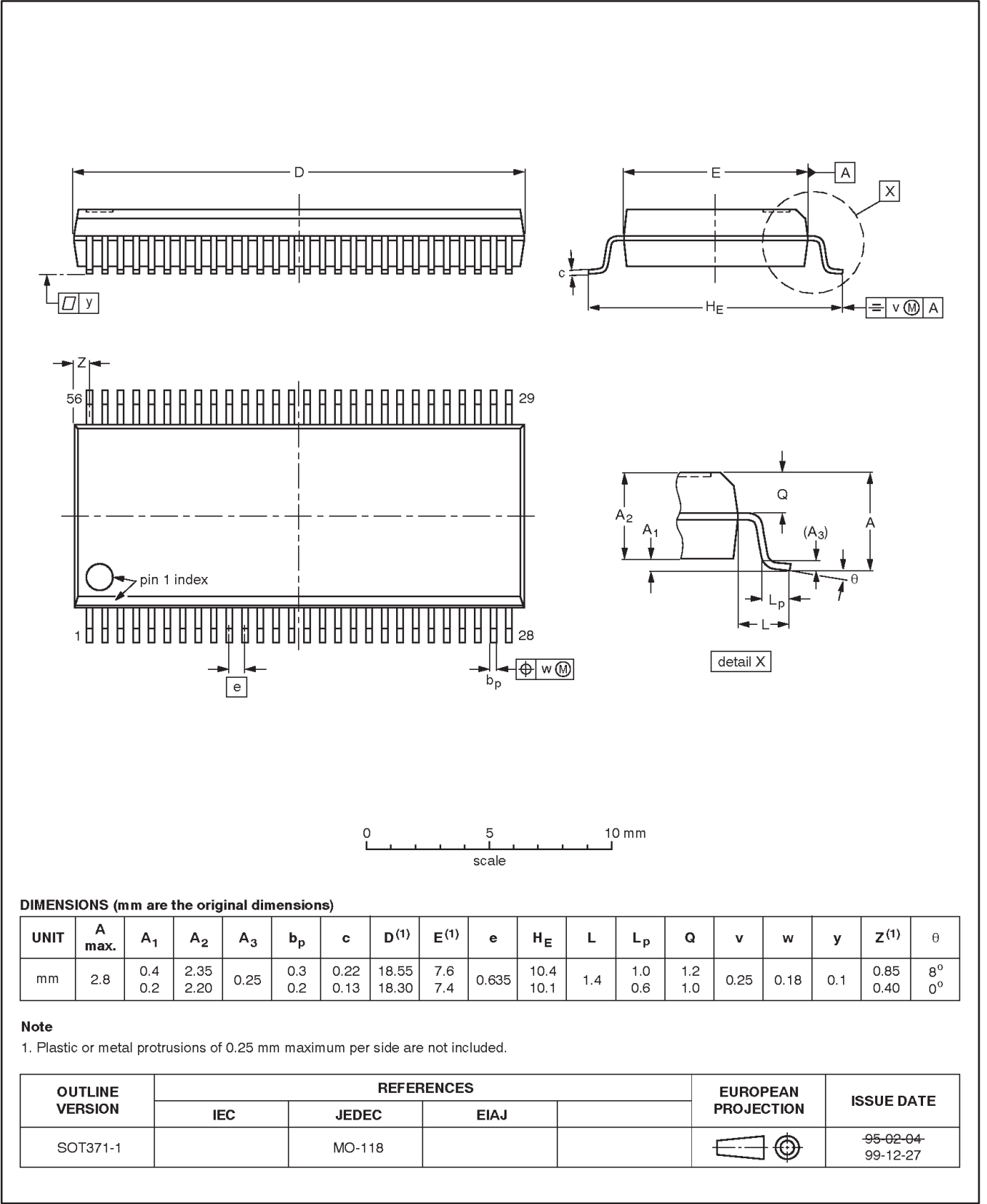


20-bit buffer/line driver, non-inverting (3-State)

74ABT16827A  
74ABTH16827A

SSOP56: plastic shrink small outline package; 56 leads; body width 7.5 mm

SOT371-1

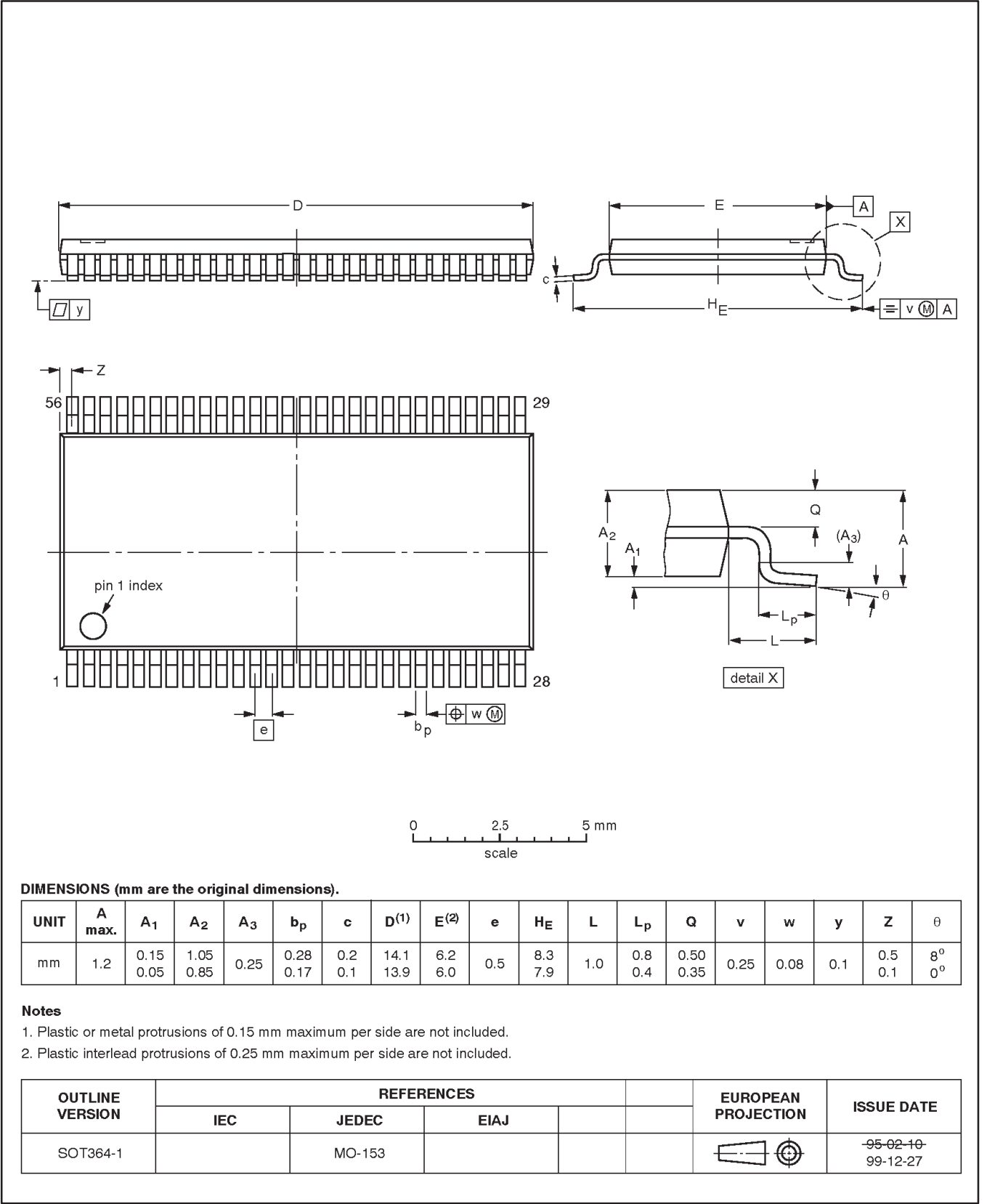


20-bit buffer/line driver, non-inverting (3-State)

74ABT16827A  
74ABTH16827A

TSSOP56: plastic thin shrink small outline package; 56 leads; body width 6.1 mm

SOT364-1



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20-bit buffer/line driver, non-inverting (3-State)74ABT16827A  
74ABTH16827A

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**REVISION HISTORY**

| Rev | Date     | Description                                                                                                                                                                                                                                                                                                              |
|-----|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| _2  | 20021217 | <b>Product data (9397 750 10858); ECN 853-1824 29295 of 12 December 2002.</b><br><b>Supersedes data of 27 February 1998 (9397 750 03504).</b><br><br>Modifications: <ul style="list-style-type: none"><li>● Ordering information table: remove "North America" column; remove 74ABTH16827ADL package offering.</li></ul> |
| _1  | 19980227 | <b>Product specification (9397 750 03504). ECN 853-1824 19025 of 27 February 1998.</b>                                                                                                                                                                                                                                   |

## 20-bit buffer/line driver, non-inverting (3-State)

74ABT16827A  
74ABTH16827A

## 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.

## Definitions

**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: 9397 750 10858

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