

DATA SHEET

74ABT16245B
74ABTH16245B
16-bit bus transceiver (3-State)

Product data
Supersedes data of 1998 Feb 25

2002 Dec 13

16-bit bus transceiver (3-State)

74ABT16245B 74ABTH16245B

FEATURES

- 16-bit bidirectional bus interface
- Power-up 3-State
- Multiple V_{CC} and GND pins minimize switching noise
- 3-State buffers
- Output capability: +64 mA / -32 mA
- Latch-up protection exceeds 500 mA per JEDEC Std 17
- Live insertion/extraction permitted
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model
- 74ABTH16245B incorporates bus-hold data inputs which eliminate the need for external pull-up resistors to hold unused inputs
- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs

DESCRIPTION

The 74ABT16245B high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT16245B device is a dual octal transceiver featuring non-inverting 3-State bus compatible outputs in both send and receive directions. The control function implementation minimizes external timing requirements. The device features two Output Enable ($1\overline{OE}$, $2\overline{OE}$) inputs for easy cascading and two Direction ($1DIR$, $2DIR$) inputs for direction control.

Two options are available, 74ABT16245B which does not have the bus hold feature and the 74ABTH16245B which incorporates the bus hold feature.

QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS $T_{amb} = 25\text{ }^{\circ}\text{C}; \text{GND} = 0\text{ V}$ | TYPICAL | UNIT |
|------------------------|---|---|------------|---------------|
| t_{PLH} t_{PHL} | Propagation delay nAx to nBx or nBx to nAx | $C_L = 50\text{ pF}; V_{CC} = 5\text{ V}$ | 2.0 2.3 | ns |
| C_{IN} | Input capacitance | $V_I = 0\text{ V or } V_{CC}$ | 4 | pF |
| $C_{I/O}$ | I/O pin capacitance | $V_O = 0\text{ V or } V_{CC}; 3\text{-State}$ | 7 | pF |
| I_{CCZ} | Quiescent supply current | Outputs disabled; $V_{CC} = 5.5\text{ V}$ | 500 | μA |
| I_{CCL} | | Output Low; $V_{CC} = 5.5\text{ V}$ | 10 | mA |

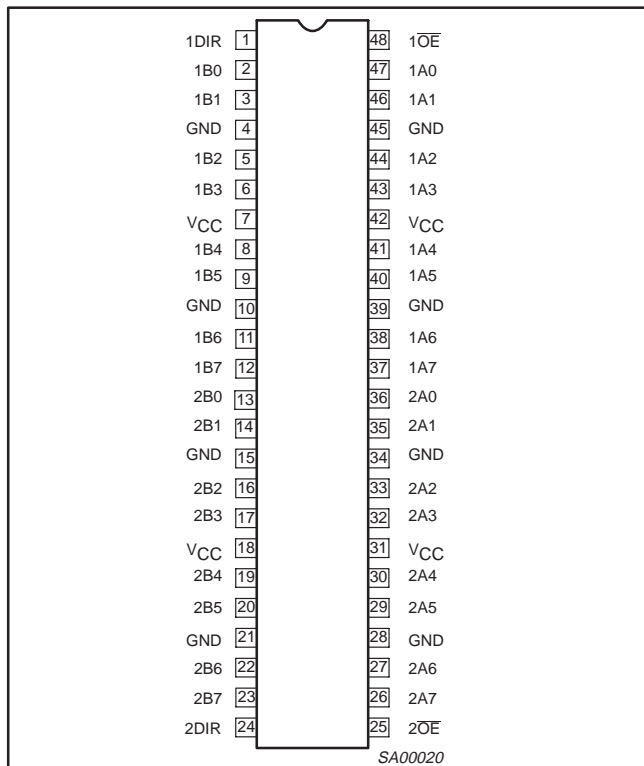
ORDERING INFORMATION

| PACKAGES | TEMPERATURE RANGE | PART NUMBER | DWG NUMBER |
|------------------------------|-------------------|----------------|------------|
| 48-Pin Plastic SSOP Type III | -40 °C to +85 °C | 74ABT16245BDL | SOT370-1 |
| 48-Pin Plastic TSSOP Type II | -40 °C to +85 °C | 74ABT16245BDGG | SOT362-1 |
| 48-Pin Plastic SSOP Type III | -40 °C to +85 °C | 74ABTH16245BDL | SOT370-1 |

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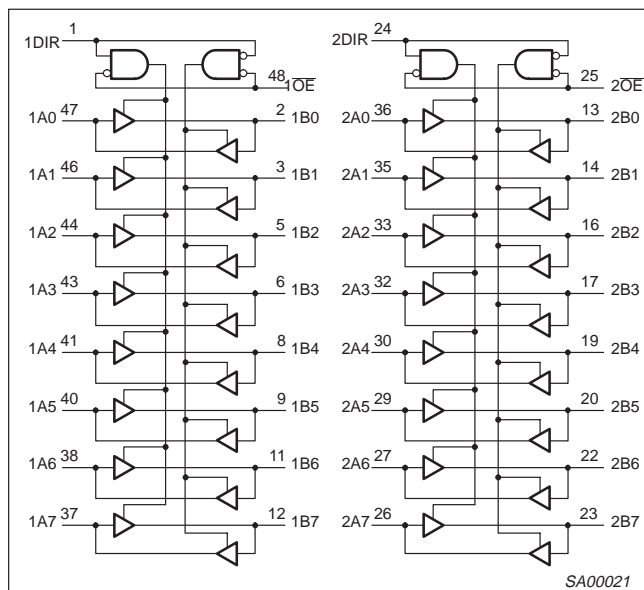
PIN CONFIGURATION



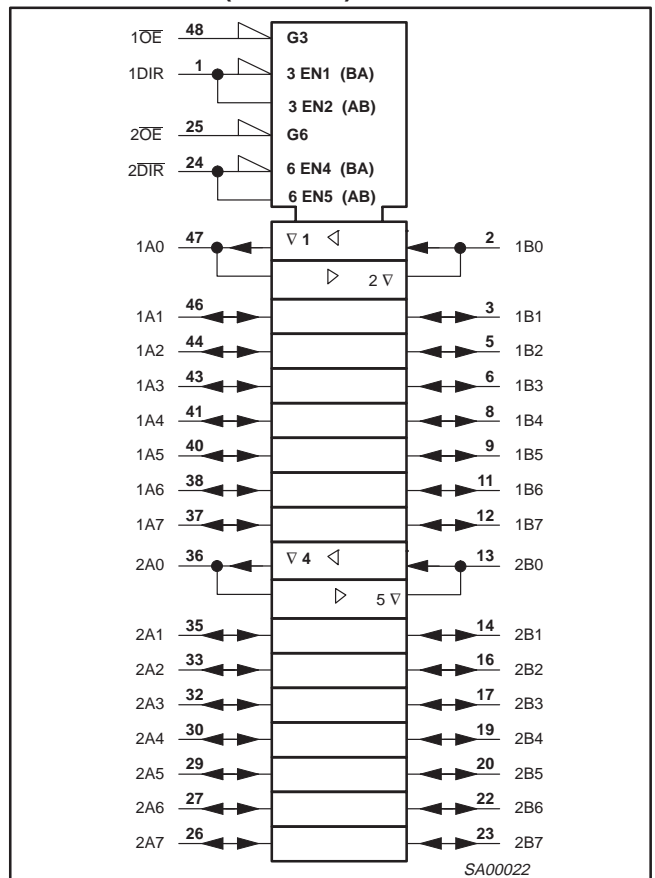
PIN DESCRIPTION

| SYMBOL | PIN NUMBER | NAME AND FUNCTION |
|----------------------|--|--|
| 1DIR, 2DIR | 1, 24 | Direction control inputs (Active-HIGH) |
| 1A0 – 1A7, 2A0 – 2A7 | 47, 46, 44, 43, 41, 40, 38, 37, 36, 35, 33, 32, 30, 29, 27, 26 | Data inputs/outputs (A side) |
| 1B0 – 1B7, 2B0 – 2B7 | 2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 16, 17, 19, 20, 22, 23 | Data inputs/outputs (B side) |
| 1OE, 2OE | 48, 25 | Output enables |
| GND | 4, 10, 15, 21, 28, 34, 39, 45 | Ground (0 V) |
| VCC | 7, 18, 31, 42 | Positive supply voltage |

LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



16-bit bus transceiver (3-State)

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FUNCTION TABLE

| INPUTS | | INPUTS/OUTPUTS | |
|--------|------|----------------|--------|
| nOE | nDIR | nAx | nBx |
| L | L | A = B | Inputs |
| L | H | Inputs | B = A |
| H | X | Z | Z |

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

ABSOLUTE MAXIMUM RATINGS^{1, 2}

| 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 ³ | | -1.2 to +7.0 | V |
| I _{OK} | DC output diode current | V _O < 0 V | -50 | mA |
| V _{OUT} | DC output voltage ³ | 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 | |
| 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 |
| Δt/Δv | Input transition rise or fall rate | 0 | 10 | ns/V |
| T _{amb} | Operating free-air temperature range | -40 | +85 | °C |

16-bit bus transceiver (3-State)

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74ABTH16245B

DC ELECTRICAL CHARACTERISTICS

| SYMBOL | PARAMETER | TEST CONDITIONS | LIMITS | | | | | UNIT |
|-----------------------------------|--|--|---------------------------|-------|------|-------------------------------------|------|------|
| | | | T _{amb} = +25 °C | | | T _{amb} = -40 °C to +85 °C | | |
| | | | Min | Typ | Max | Min | Max | |
| V _{IK} | Input clamp voltage | V _{CC} = 4.5 V; I _{IK} = -18 mA | | -0.9 | -1.2 | | -1.2 | V |
| V _{OH} | High-level output voltage | V _{CC} = 4.5 V; I _{OH} = -3 mA; V _I = V _{IL} or V _{IH} | 2.5 | 2.9 | | 2.5 | | V |
| | | V _{CC} = 5.0 V; I _{OH} = -3 mA; V _I = V _{IL} or V _{IH} | 3.0 | 3.4 | | 3.0 | | V |
| | | V _{CC} = 4.5 V; I _{OH} = -32 mA; V _I = V _{IL} or V _{IH} | 2.0 | 2.4 | | 2.0 | | V |
| V _{OL} | Low-level output voltage | V _{CC} = 4.5 V; I _{OL} = 64 mA; V _I = V _{IL} or V _{IH} | | 0.42 | 0.55 | | 0.55 | V |
| I _I | Input leakage current | V _{CC} = 5.5 V; V _I = GND or 5.5 V | | ±0.01 | ±1.0 | | ±1.0 | µA |
| I _{HOLD} | Bus hold current A and B inputs 74ABTH16245B | V _{CC} = 4.5 V; V _I = 0.8 V | 50 | | | 50 | | µA |
| | | V _{CC} = 5.5 V; V _I = 2.0 V | -75 | | | -75 | | |
| | | V _{CC} = 5.5 V; V _I = 0 to 5.5 V | ±500 | | | | | |
| I _{OFF} | Power-off leakage current | V _{CC} = 0.0 V; V _O or V _I ≤ 4.5 V | | ±5.0 | ±100 | | ±100 | µA |
| I _{PU} /I _{PD} | Power-up/down 3-State output current | V _{CC} = 2.0 V; V _O = 0.5 V; V _I = GND or V _{CC} ; V _{OE} = Don't care | | ±5.0 | ±50 | | ±50 | µA |
| I _{IH} +I _{OZH} | 3-State output HIGH current | V _{CC} = 5.5 V; V _O = 5.5 V; V _I = V _{IL} or V _{IH} | | 0.1 | 10 | | 10 | µA |
| I _{IL} +I _{OZL} | 3-State output LOW current | V _{CC} = 5.5 V; V _O = 0.0 V; V _I = V _{IL} or V _{IH} | | 0.1 | 10 | | 10 | µA |
| I _{CEX} | Output high leakage current | V _{CC} = 5.5 V; V _O = 5.5 V; V _I = GND or V _{CC} | | 5.0 | 50 | | 50 | µA |
| I _O | Output current ¹ | V _{CC} = 5.5 V; V _O = 2.5 V | -50 | -92 | -180 | -50 | -180 | mA |
| I _{CCH} | Quiescent supply current | V _{CC} = 5.5 V; Outputs High, V _I = GND or V _{CC} | | 0.30 | 0.70 | | 0.70 | mA |
| I _{CCL} | | V _{CC} = 5.5 V; Outputs Low, V _I = GND or V _{CC} | | 10 | 19 | | 19 | mA |
| I _{CCZ} | | V _{CC} = 5.5 V; Outputs 3-State; V _I = GND or V _{CC} | | 0.30 | 0.70 | | 0.70 | mA |
| ΔI _{CC} | Additional supply current per input pin ² | Outputs enabled, one data input at 3.4 V, other inputs at V _{CC} or GND; V _{CC} = 5.5 V | | 400 | 700 | | 700 | µA |
| | | Outputs disabled, one data input at 3.4 V, other inputs at V _{CC} or GND; V _{CC} = 5.5 V | | 100 | 250 | | 250 | µA |
| | | Control pins, outputs disabled, one enable input at 3.4 V, other inputs at V _{CC} or GND; V _{CC} = 5.5 V | | 400 | 700 | | 700 | µA |

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 V.
- This is the bus hold overdrive current required to force the input to the opposite logic state.

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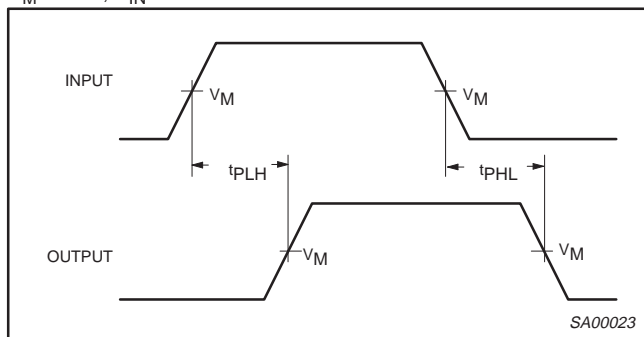
AC CHARACTERISTICS

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

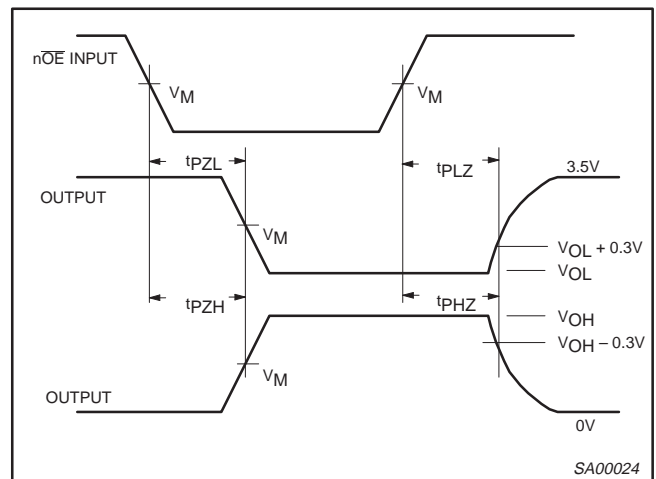
| SYMBOL | PARAMETER | WAVEFORM | LIMITS | | | | | UNIT |
|--------------------------------------|--|----------|---|------------|------------|---|------------|------|
| | | | $T_{\text{amb}} = +25\text{ }^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{ V}$ | | | $T_{\text{amb}} = -40\text{ }^\circ\text{C to } +85\text{ }^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{ V } \pm 0.5\text{ V}$ | | |
| | | | Min | Typ | Max | Min | Max | |
| t_{PLH} t_{PHL} | Propagation delay nAx to nBx or nBx to nAx | 1 | 1.0 1.0 | 2.0 2.3 | 3.2 3.5 | 1.0 1.0 | 3.5 4.0 | ns |
| t_{PZH} t_{PZL} | Output enable time to High and Low level | 2 | 1.0 1.7 | 3.1 4.0 | 4.4 5.2 | 1.0 1.7 | 5.1 6.1 | ns |
| t_{PHZ} t_{PLZ} | Output disable time from High and Low level | 2 | 1.7 1.5 | 3.5 3.2 | 4.9 4.4 | 1.7 1.5 | 5.4 5.0 | ns |

AC WAVEFORMS

$V_M = 1.5\text{V}$, $V_{\text{IN}} = \text{GND to } 3.0\text{V}$



Waveform 1. Input to Output Propagation Delays

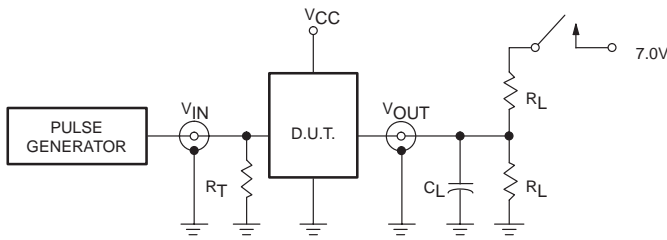


Waveform 2. 3-State Output Enable and Disable Times

16-bit bus transceiver (3-State)

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74ABTH16245B

TEST CIRCUIT



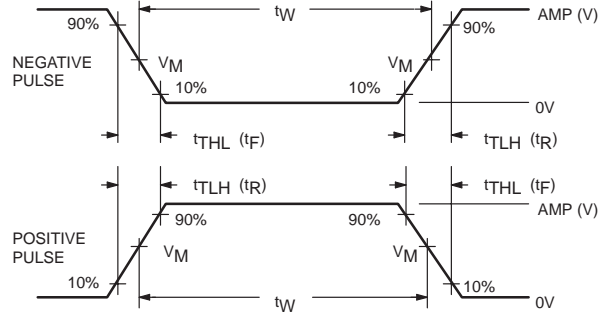
Test Circuit for 3-State Outputs

SWITCH POSITION

| TEST | SWITCH |
|-----------|--------|
| t_{PLZ} | closed |
| t_{pZL} | closed |
| All other | open |

DEFINITIONS

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



$V_M = 1.5V$
Input Pulse Definition

| FAMILY | INPUT PULSE REQUIREMENTS | | | | |
|-----------|--------------------------|-----------|-------|-------|-------|
| | Amplitude | Rep. Rate | t_W | t_R | t_F |
| 74ABT/H16 | 3.0V | 1MHz | 500ns | 2.5ns | 2.5ns |

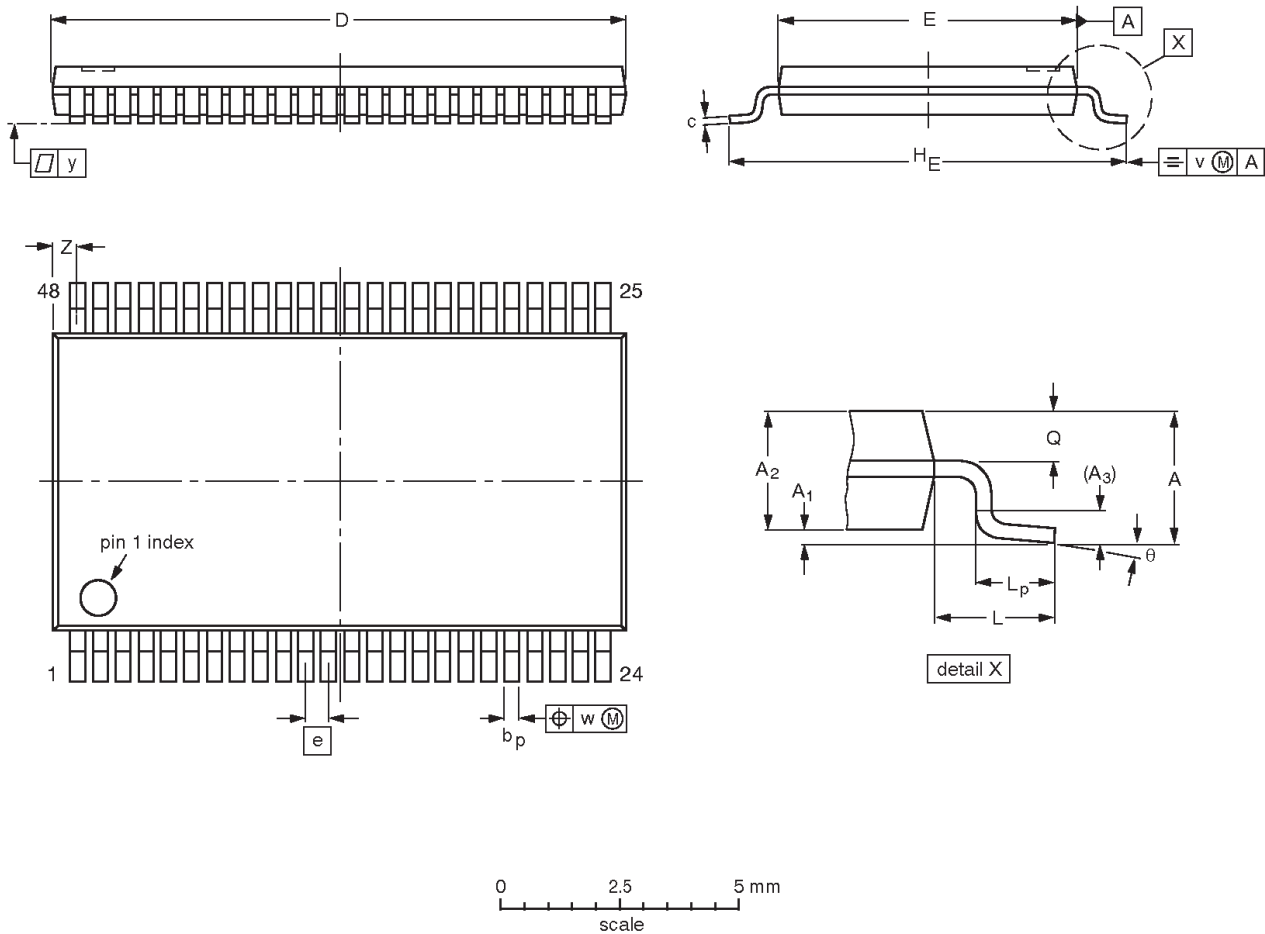
SA00018

16-bit bus transceiver (3-State)

74ABT16245B
74ABTH16245B

TSSOP48: plastic thin shrink small outline package; 48 leads; body width 6.1 mm

SOT362-1



DIMENSIONS (mm are the original dimensions).

| UNIT | A max. | A ₁ | A ₂ | A ₃ | b _p | c | D ⁽¹⁾ | E ⁽²⁾ | e | H _E | L | L _p | Q | v | w | y | Z | θ |
|------|--------|----------------|----------------|----------------|----------------|------------|------------------|------------------|-----|----------------|---|----------------|--------------|------|------|-----|------------|----------|
| mm | 1.2 | 0.15 0.05 | 1.05 0.85 | 0.25 | 0.28 0.17 | 0.2 0.1 | 12.6 12.4 | 6.2 6.0 | 0.5 | 8.3 7.9 | 1 | 0.8 0.4 | 0.50 0.35 | 0.25 | 0.08 | 0.1 | 0.8 0.4 | 8° 0° |

Notes

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic interlead protrusions of 0.25 mm maximum per side are not included.

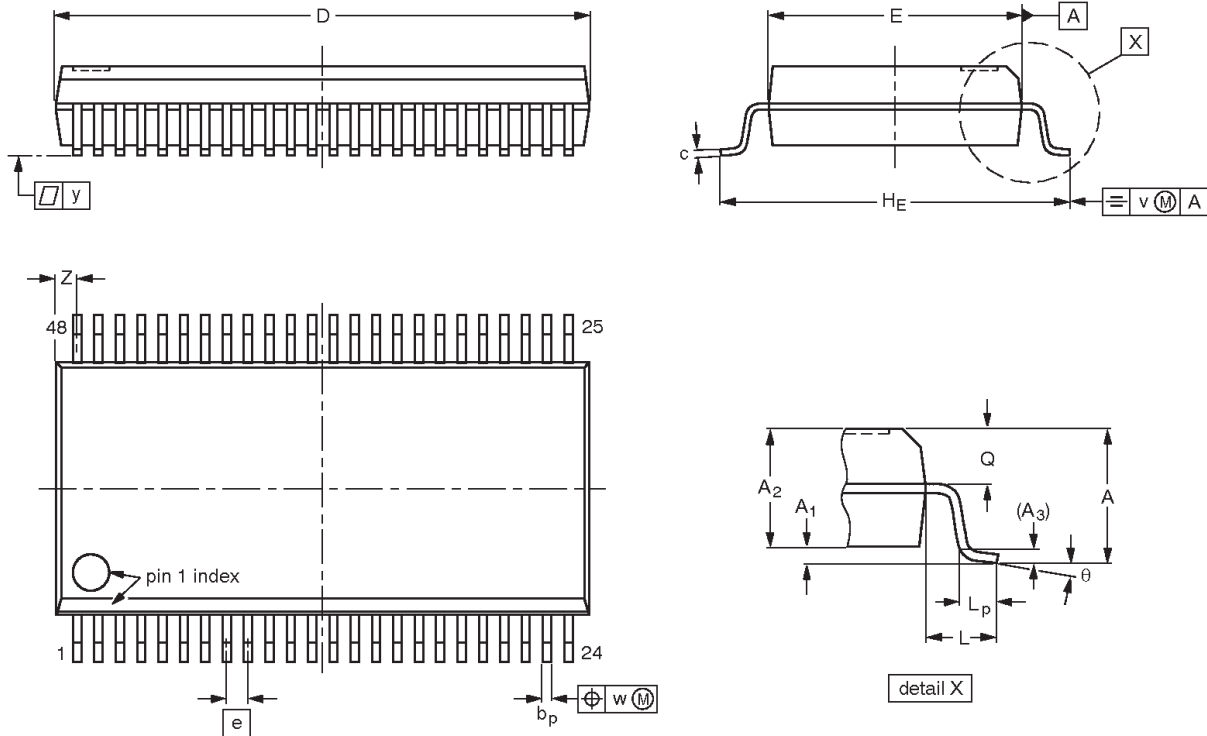
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT362-1 | | MO-153 | | | | 95-02-10 99-12-27 |

16-bit bus transceiver (3-State)

74ABT16245B
74ABTH16245B

SSOP48: plastic shrink small outline package; 48 leads; body width 7.5 mm

SOT370-1



DIMENSIONS (mm are the original 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 | 2.8 | 0.4 0.2 | 2.35 2.20 | 0.25 | 0.3 0.2 | 0.22 0.13 | 16.00 15.75 | 7.6 7.4 | 0.635 | 10.4 10.1 | 1.4 | 1.0 0.6 | 1.2 1.0 | 0.25 | 0.18 | 0.1 | 0.85 0.40 | 8° 0° |

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 | | | |
| SOT370-1 | | MO-118 | | | | 95-02-04 99-12-27 |

16-bit bus transceiver (3-State)

74ABT16245B
74ABTH16245B

REVISION HISTORY

| Rev | Date | Description |
|-----|----------|---|
| _3 | 20021213 | Product data (9397 750 10854); ECN 853-1742 29296 of 12 December 2002. Supersedes data of 25 February 1998 (9397 750 03486). Modifications: <ul style="list-style-type: none">● Ordering information table: remove "North America" column; remove 74ABTH16245BDGG package offering. |
| _2 | 19980225 | Product specification (9397 750 03486). ECN 853-1742 19018 of 25 February 1998. Supersedes data of 20 November 1996. |

16-bit bus transceiver (3-State)

74ABT16245B
74ABTH16245B

Data sheet status

| Level | Data sheet status ^[1] | Product status ^{[2] [3]} | 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 10854

Let's make things better.