

# 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	$\mu\text{A}$
$I_{CCL}$		Output Low; $V_{CC} = 5.5\text{ V}$	10	mA

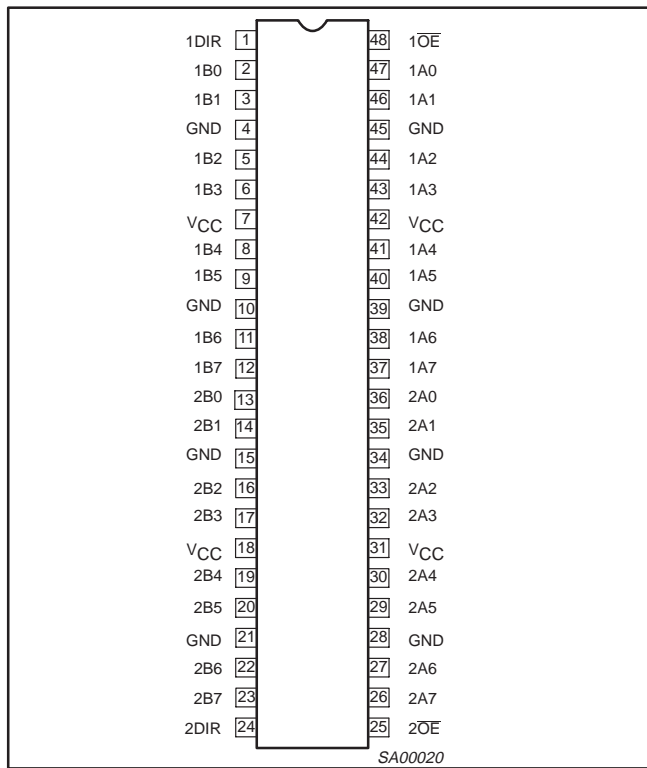
### ORDERING INFORMATION

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

# 16-bit bus transceiver (3-State)

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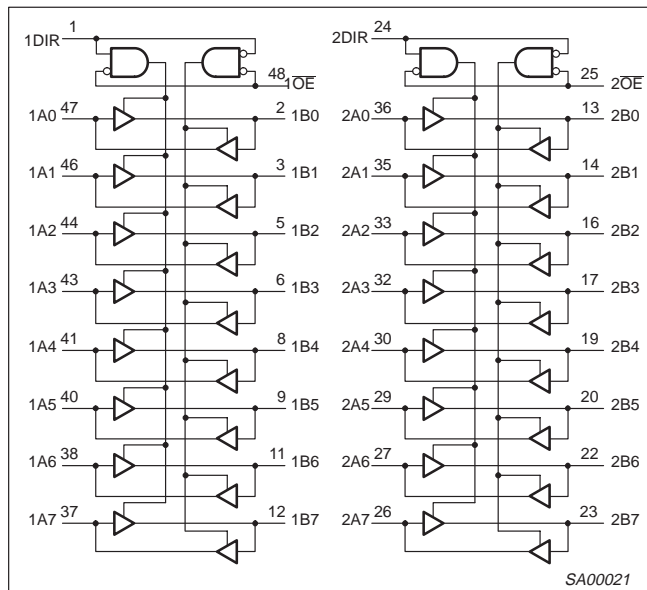
## PIN CONFIGURATION



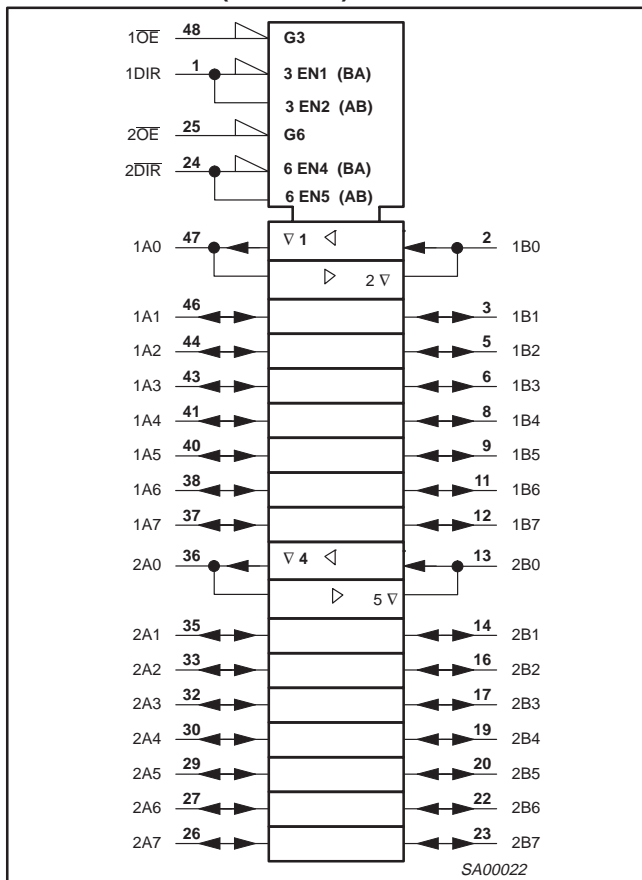
## PIN DESCRIPTION

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<sup>1, 2</sup>

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V <sub>CC</sub>	DC supply voltage		-0.5 to +7.0	V
I <sub>IK</sub>	DC input diode current	V <sub>I</sub> < 0 V	-18	mA
V <sub>I</sub>	DC input voltage <sup>3</sup>		-1.2 to +7.0	V
I <sub>OK</sub>	DC output diode current	V <sub>O</sub> < 0 V	-50	mA
V <sub>OUT</sub>	DC output voltage <sup>3</sup>	output in Off or HIGH state	-0.5 to +5.5	V
I <sub>OUT</sub>	DC output current	output in LOW state	128	mA
		output in HIGH state	-64	
T <sub>stg</sub>	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 <sub>CC</sub>	DC supply voltage	4.5	5.5	V
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>	V
V <sub>IH</sub>	HIGH-level input voltage	2.0		V
V <sub>IL</sub>	LOW-level Input voltage		0.8	V
I <sub>OH</sub>	HIGH-level output current		-32	mA
I <sub>OL</sub>	LOW-level output current		64	mA
Δt/Δv	Input transition rise or fall rate	0	10	ns/V
T <sub>amb</sub>	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 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>HOLD</sub>	Bus hold current A and B inputs 74ABTH16245B	V <sub>CC</sub> = 4.5 V; V <sub>I</sub> = 0.8 V	50			50		µA
		V <sub>CC</sub> = 5.5 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	±500					
I <sub>OFF</sub>	Power-off leakage current	V <sub>CC</sub> = 0.0 V; V <sub>O</sub> or V <sub>I</sub> ≤ 4.5 V		±5.0	±100		±100	µA
I <sub>PU</sub> /I <sub>PD</sub>	Power-up/down 3-State output current	V <sub>CC</sub> = 2.0 V; V <sub>O</sub> = 0.5 V; V <sub>I</sub> = GND or V <sub>CC</sub> ; V <sub>OE</sub> = Don't care		±5.0	±50		±50	µA
I <sub>IH</sub> +I <sub>OZH</sub>	3-State output HIGH current	V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 5.5 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		0.1	10		10	µA
I <sub>IL</sub> +I <sub>OZL</sub>	3-State output LOW current	V <sub>CC</sub> = 5.5 V; V <sub>O</sub> = 0.0 V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>		0.1	10		10	µA
I <sub>CEX</sub>	Output high leakage 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>		5.0	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	-92	-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>		0.30	0.70		0.70	mA
I <sub>CCL</sub>		V <sub>CC</sub> = 5.5 V; Outputs Low, V <sub>I</sub> = GND or V <sub>CC</sub>		10	19		19	mA
I <sub>CCZ</sub>		V <sub>CC</sub> = 5.5 V; Outputs 3-State; V <sub>I</sub> = GND or V <sub>CC</sub>		0.30	0.70		0.70	mA
ΔI <sub>CC</sub>	Additional supply current per input pin <sup>2</sup>	Outputs enabled, one data input at 3.4 V, other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V		400	700		700	µA
		Outputs disabled, one data input at 3.4 V, other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V		100	250		250	µA
		Control pins, outputs disabled, one enable input at 3.4 V, other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5 V		400	700		700	µA

## NOTES:

1. Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
2. This is the increase in supply current for each input at 3.4 V.
3. This is the bus hold overdrive current required to force the input to the opposite logic state.

# 16-bit bus transceiver (3-State)

74ABT16245B  
74ABTH16245B

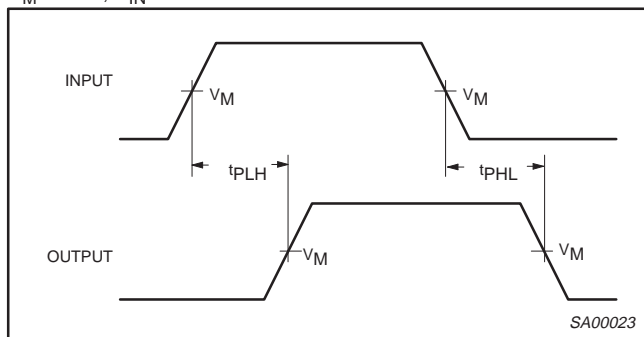
## AC CHARACTERISTICS

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

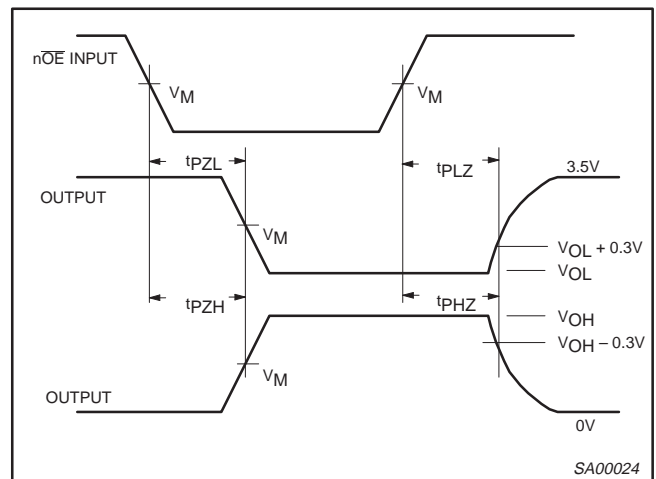
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			$T_{\text{amb}} = +25\text{ }^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{ V}$			$T_{\text{amb}} = -40\text{ }^\circ\text{C to } +85\text{ }^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{ V } \pm 0.5\text{ V}$		
			Min	Typ	Max	Min	Max	
$t_{\text{PLH}}$ $t_{\text{PHL}}$	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
$t_{\text{PZH}}$ $t_{\text{PZL}}$	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
$t_{\text{PHZ}}$ $t_{\text{PLZ}}$	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

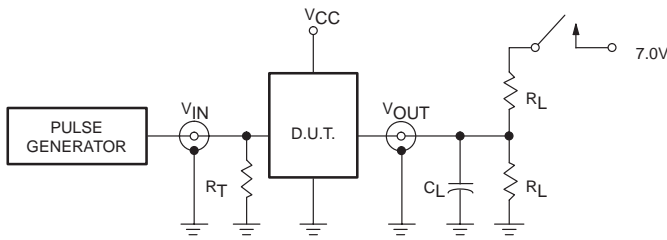


Waveform 2. 3-State Output Enable and Disable Times

# 16-bit bus transceiver (3-State)

74ABT16245B  
74ABTH16245B

## TEST CIRCUIT



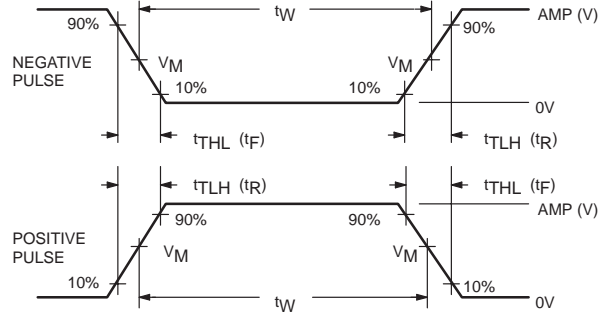
Test Circuit for 3-State Outputs

### 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

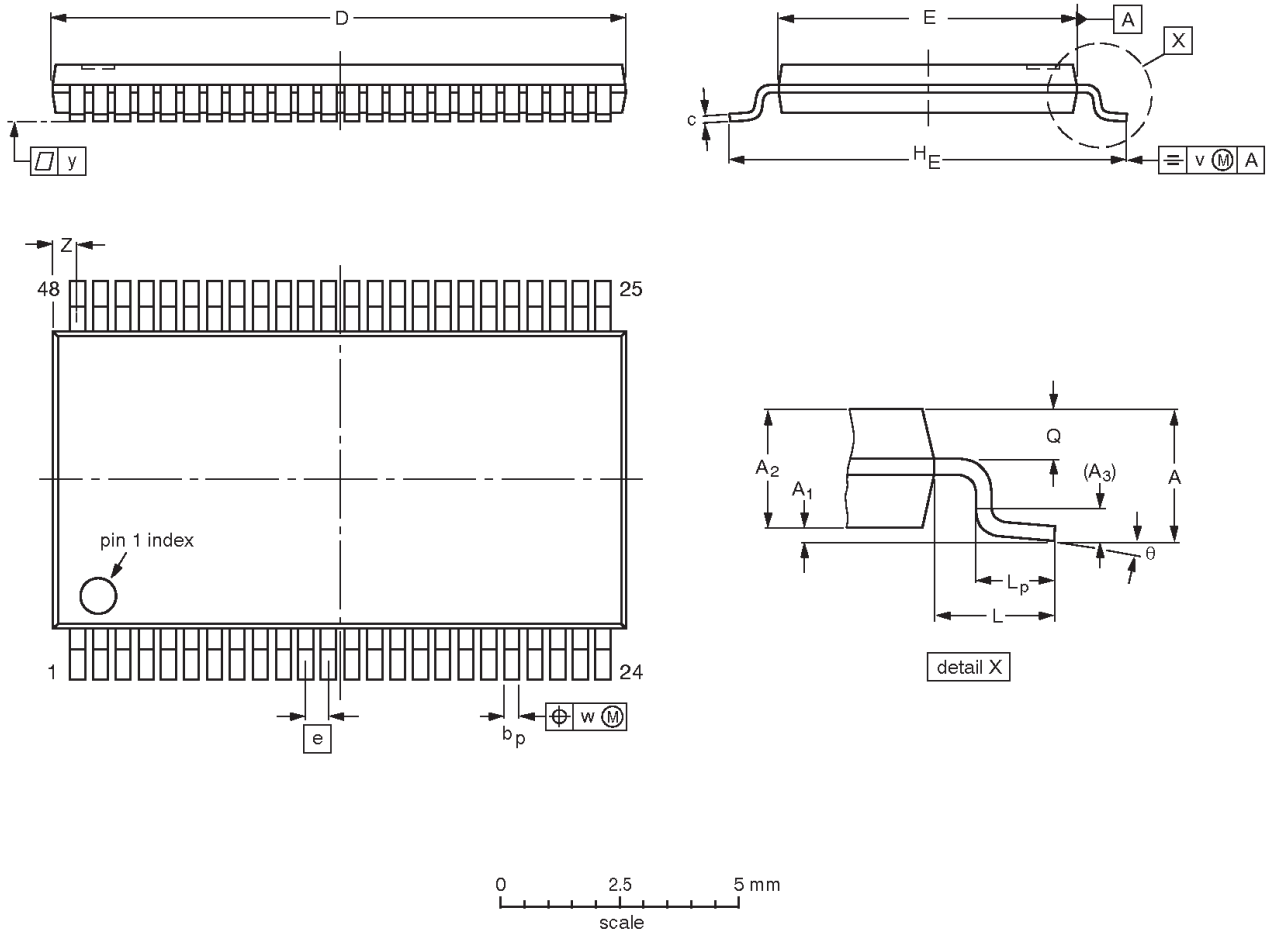
SA00018

# 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 <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(2)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	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

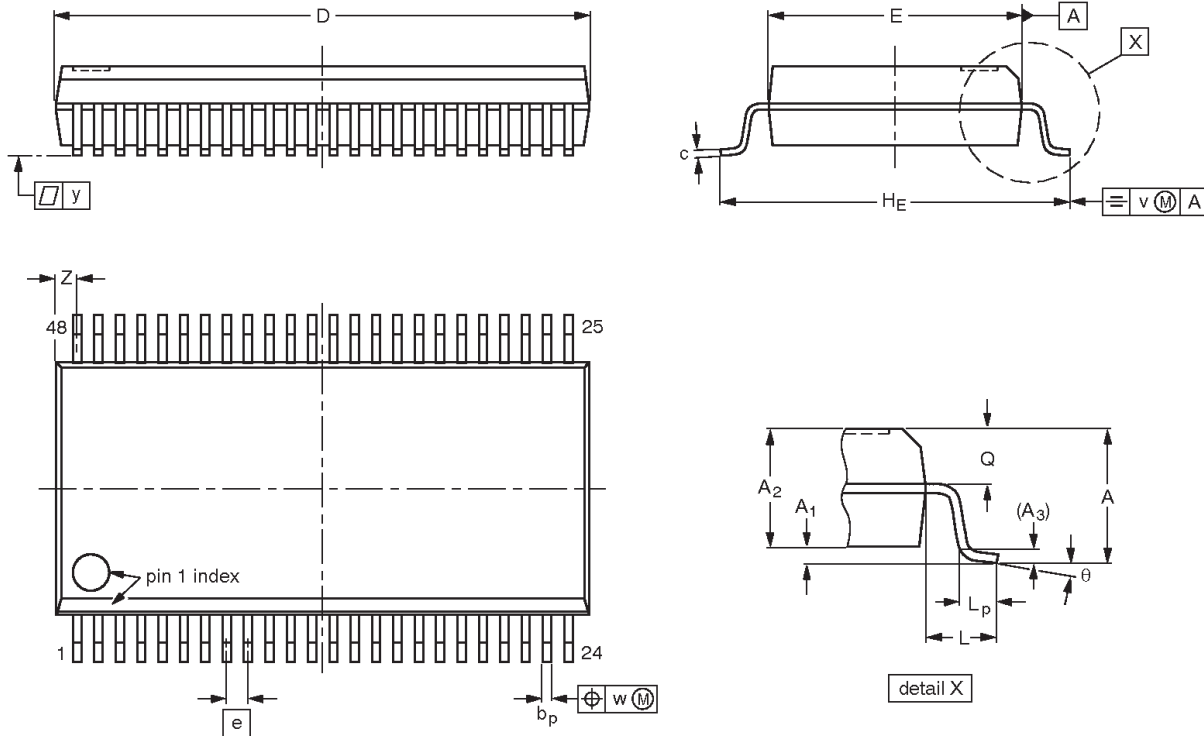


16-bit bus transceiver (3-State)

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 <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	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

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**16-bit bus transceiver (3-State)**

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**74ABT16245B**  
**74ABTH16245B**

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**REVISION HISTORY**

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

## 16-bit bus transceiver (3-State)

74ABT16245B  
74ABTH16245B

## 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.
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[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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