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)

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$\overline{\text{OE}}$, 2$\overline{\text{OE}}$) 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 °C; GND = 0 V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay nAx to nBx or nBx to nAx	C_L = 50 pF; V_{CC} = 5 V	2.0 2.3	ns
C_{IN}	Input capacitance	V_I = 0 V or V_{CC}	4	pF
$C_{I/O}$	I/O pin capacitance	V_O = 0 V or V_{CC}; 3-State	7	pF
I_{CCZ}	Quiescent supply current	Outputs disabled; V_{CC} = 5.5 V	500	μA
I_{CCL}		Output Low; V_{CC} = 5.5 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)

PIN CONFIGURATION

1DIR	1	48	1OE
1B0	2	47	1A0
1B1	3	46	1A1
GND	4	45	GND
1B2	5	44	1A2
1B3	6	43	1A3
V$_{CC}$	7	42	V$_{CC}$
1B4	8	41	1A4
1B5	9	40	1A5
GND	10	39	GND
1B6	11	38	1A6
1B7	12	37	1A7
2B0	13	36	2A0
2B1	14	35	2A1
GND	15	34	GND
2B2	16	33	2A2
2B3	17	32	2A3
V$_{CC}$	18	31	V$_{CC}$
2B4	19	30	2A4
2B5	20	29	2A5
GND	21	28	GND
2B6	22	27	2A6
2B7	23	26	2A7
2DIR	24	25	2OE

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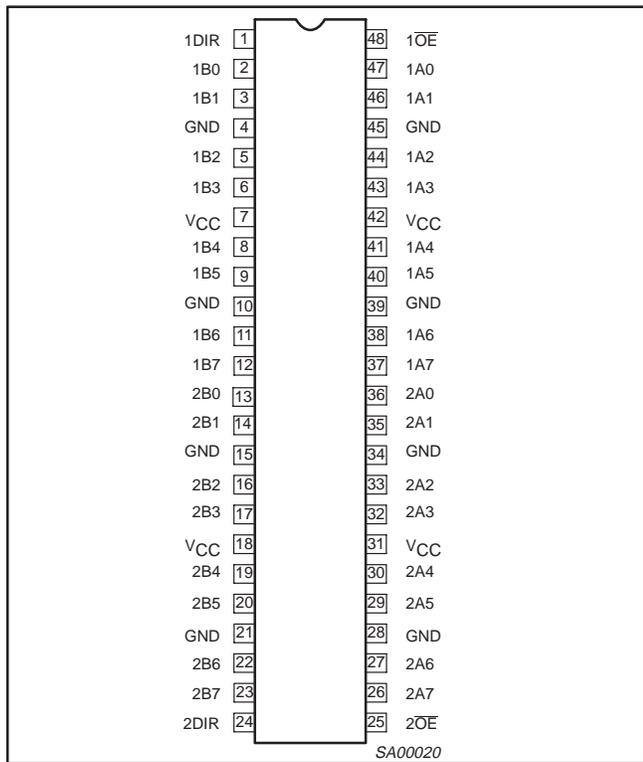
PIN DESCRIPTION

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)
V$_{CC}$	7, 18, 31, 42	Positive supply voltage

LOGIC SYMBOL
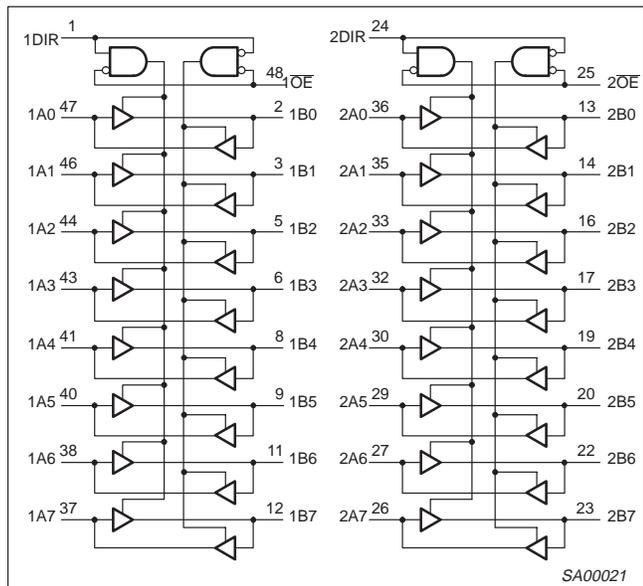
SA00021

LOGIC SYMBOL (IEEE/IEC)

SA00022
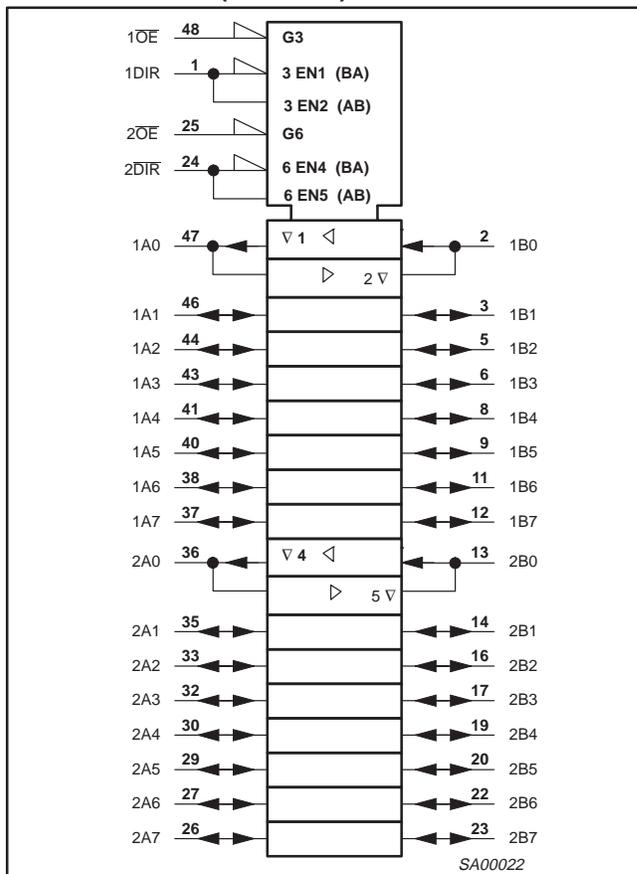
FUNCTION TABLE

INPUTS		INPUTS/OUTPUTS	
n$\overline{\text{OE}}$	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:
1. 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.
2. 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.
3. 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

DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS		T_{amb} = +25 °C			T_{amb} = −40 °C to +85 °C		UNIT
				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	Control pins		±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:
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.

AC CHARACTERISTICS

GND = 0V; t_R = t_F = 2.5ns; C_L = 50pF, R_L = 500Ω

SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T_{amb} = +25 °C V_{CC} = +5.0 V			T_{amb} = −40 °C to +85 °C V_{CC} = +5.0 V ±0.5 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 = 1.5V, V_{IN} = GND to 3.0V
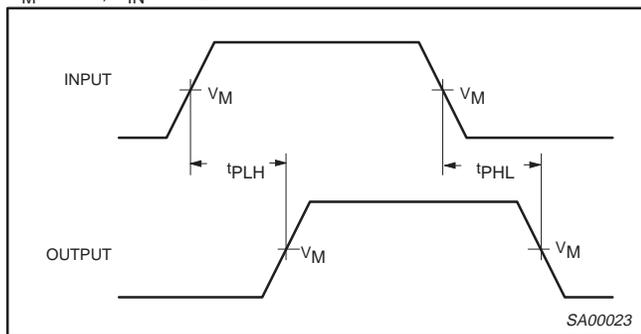
Waveform 1.   Input to Output Propagation Delays
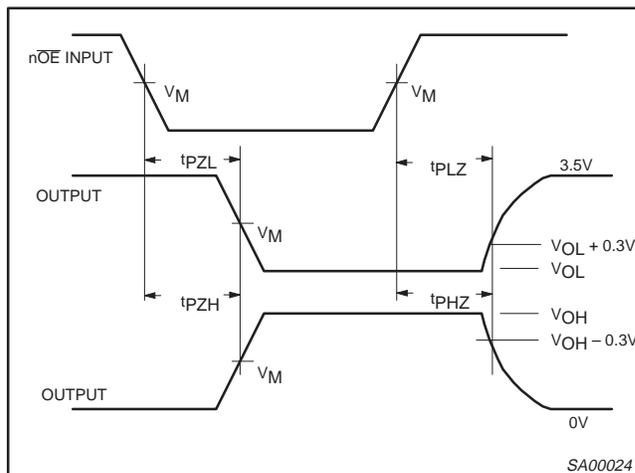
Waveform 2.   3-State Output Enable and Disable Times
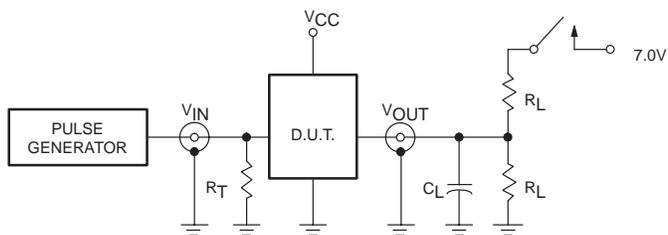
TEST CIRCUIT

Test Circuit for 3-State Outputs

$V_M = 1.5V$
Input Pulse Definition

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.

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

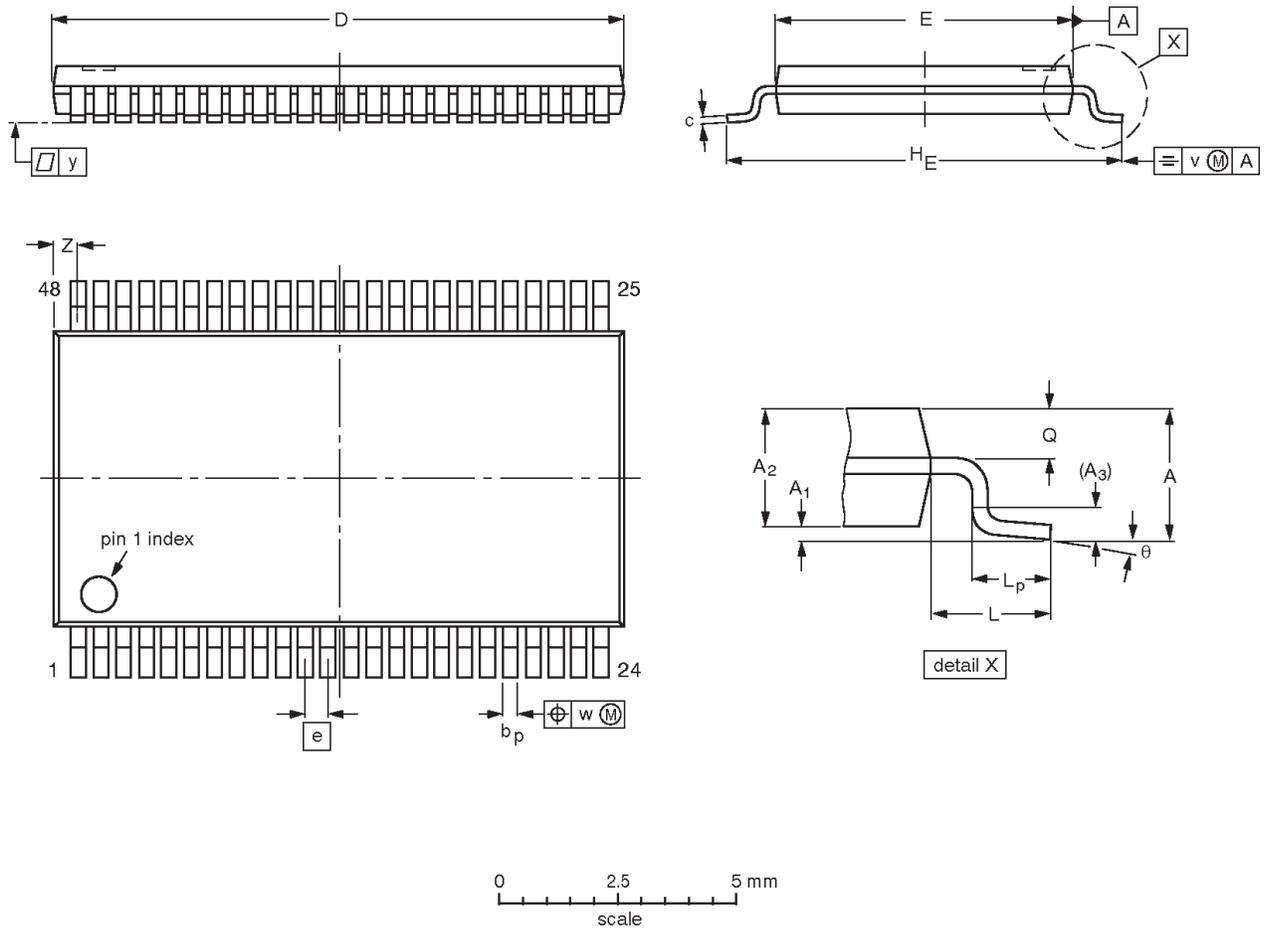SA00018

16-bit bus transceiver (3-State)

74ABT16245B
74ABTH16245B

TSSOP48:   plastic thin shrink small outline package; 48 leads; body width 6.1 mm   **SOT362-1**

                                                    0   2.5   5 mm
                                                    scale

DIMENSIONS (mm are the original dimensions).

UNIT	A max.	A₁	A₂	A₃	bₚ	c	D(1)	E(2)	e	H_E	L	Lₚ	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.
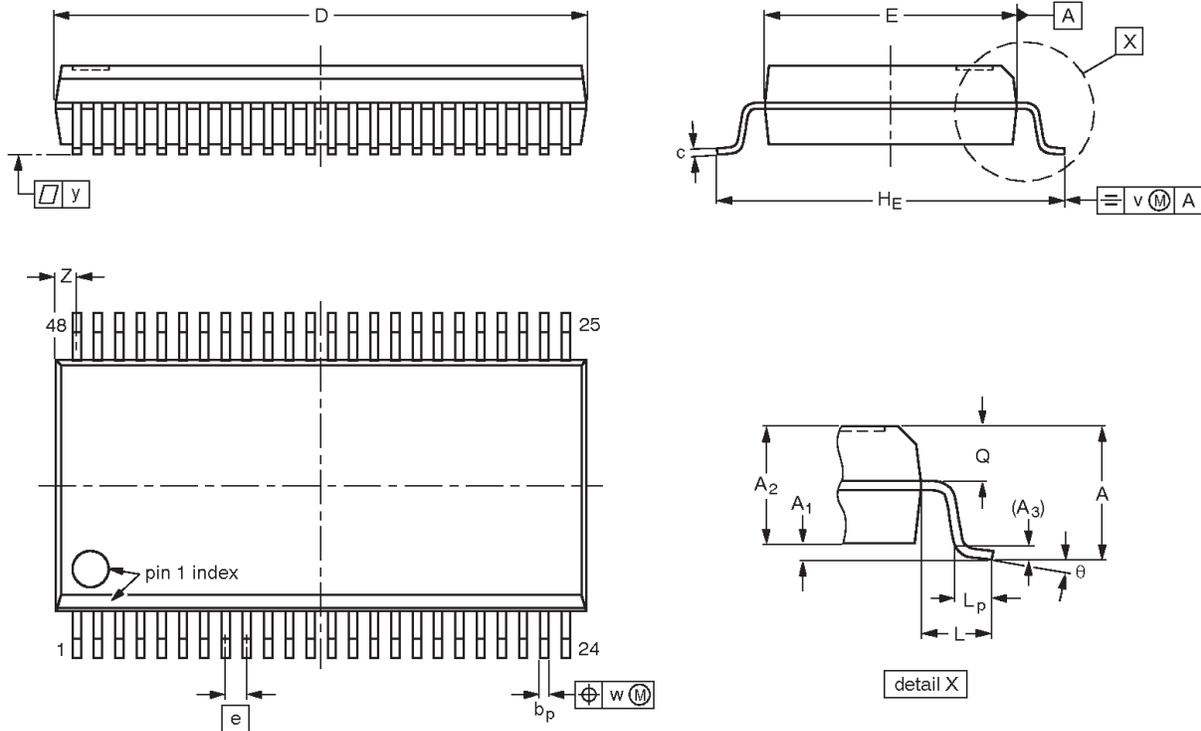
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT362-1		MO-153				~~95-02-10~~ 99-12-27

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.	A₁	A₂	A₃	bp	c	D (1)	E (1)	e	HE	L	Lp	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

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: ● 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.**

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.
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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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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