DATA SHEET

74ABT16373B

16-bit transparent latch (3-State)

Product data

Philips
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16-bit transparent latch (3-State)

74ABT16373B

FEATURES

- 16-bit transparent latch
- Multiple V_{CC} and GND pins minimize switching noise
- Power-up 3-State
- Live insertion/extraction permitted
- Power-up reset
- 3-State output buffers
- Output capability: +64 mA/–32 mA
- I_{CCL} –19 mA maximum
- 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 74ABT16373B high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.
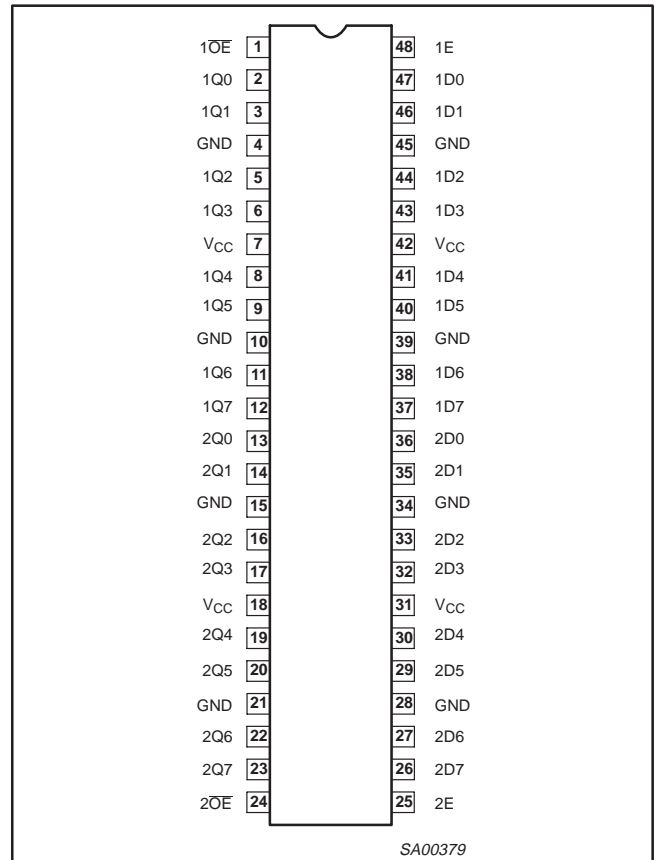
The 74ABT16373B device is a dual octal transparent latch coupled to two sets of eight 3-State output buffers. The two sections of the device are controlled independently by Enable (nE) and Output Enable (n$\overline{\text{OE}}$) control gates.

The data on each set of D inputs are transferred to the latch outputs when the Latch Enable (nE) input is HIGH. The latch remains transparent to the data inputs while nE is HIGH, and stores the data that is present one set-up time before the HIGH-to-LOW enable transition.

The 3-State output buffers are designed to drive heavily loaded 3-State buses, MOS memories, or MOS microprocessors. Each active-LOW Output Enable (n$\overline{\text{OE}}$) controls eight 3-State buffers independent of the latch operation.

When n$\overline{\text{OE}}$ is LOW, the latched or transparent data appears at the outputs. When n$\overline{\text{OE}}$ is HIGH, the outputs are in the high-impedance "OFF" state, which means they will neither drive nor load the bus.

PIN CONFIGURATION

	Pin		Pin	
1$\overline{\text{OE}}$	1		48	1E
1Q0	2		47	1D0
1Q1	3		46	1D1
GND	4		45	GND
1Q2	5		44	1D2
1Q3	6		43	1D3
V_{CC}	7		42	V_{CC}
1Q4	8		41	1D4
1Q5	9		40	1D5
GND	10		39	GND
1Q6	11		38	1D6
1Q7	12		37	1D7
2Q0	13		36	2D0
2Q1	14		35	2D1
GND	15		34	GND
2Q2	16		33	2D2
2Q3	17		32	2D3
V_{CC}	18		31	V_{CC}
2Q4	19		30	2D4
2Q5	20		29	2D5
GND	21		28	GND
2Q6	22		27	2D6
2Q7	23		26	2D7
2$\overline{\text{OE}}$	24		25	2E

SA00379

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25\ °C$; GND = 0 V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay Dn to Qn	C_L = 50 pF; V_{CC} = 5 V	2.5 2.0	ns
C_{IN}	Input capacitance	V_I = 0 V or V_{CC}	4	pF
C_{OUT}	Output 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}		Outputs low; V_{CC} = 5.5 V	8	mA

ORDERING INFORMATION

$T_{amb} = -40\ °C$ to $+85\ °C$

| Type number	Package			
	Name	Description		Version
74ABT16373BDL	SSOP48	plastic shrink small outline package; 48 leads; body width 7.5 mm		SOT370-1
74ABT16373BDGG	TSSOP48	plastic thin shrink small outline package; 48 leads; body width 6.1 mm		SOT362-1

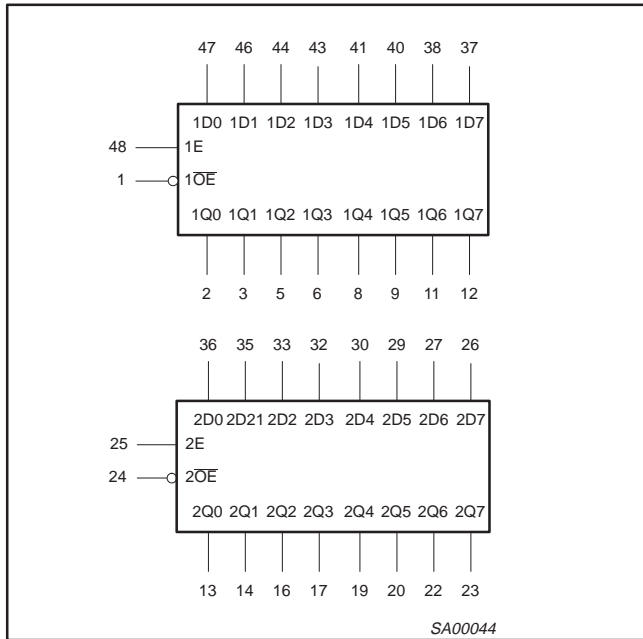## 16-bit transparent latch (3-State)

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PIN DESCRIPTION

| PIN NUMBER	SYMBOL	FUNCTION
47, 46, 44, 43, 41, 40, 38, 37, 36, 35, 33, 32, 30, 29, 27, 26	1D0 – 1D7 2D0 – 2D7	Data inputs
2, 3, 5, 6, 8, 9, 11, 12, 13, 14, 16, 17, 19, 20, 22, 23	1Q0 – 1Q7 2Q0 – 2Q7	Data outputs
1, 24	1$\overline{OE}$, 2$\overline{OE}$	Output enable inputs (active-LOW)
48, 25	1E, 2E	Enable inputs (active-HIGH)
4, 10, 15, 21, 28, 34, 39, 45	GND	Ground (0 V)
7, 18, 31, 42	V_{CC}	Positive supply voltage

LOGIC SYMBOL

SA00044

LOGIC SYMBOL (IEEE/IEC)

SA00380

LOGIC DIAGRAM

SA00046
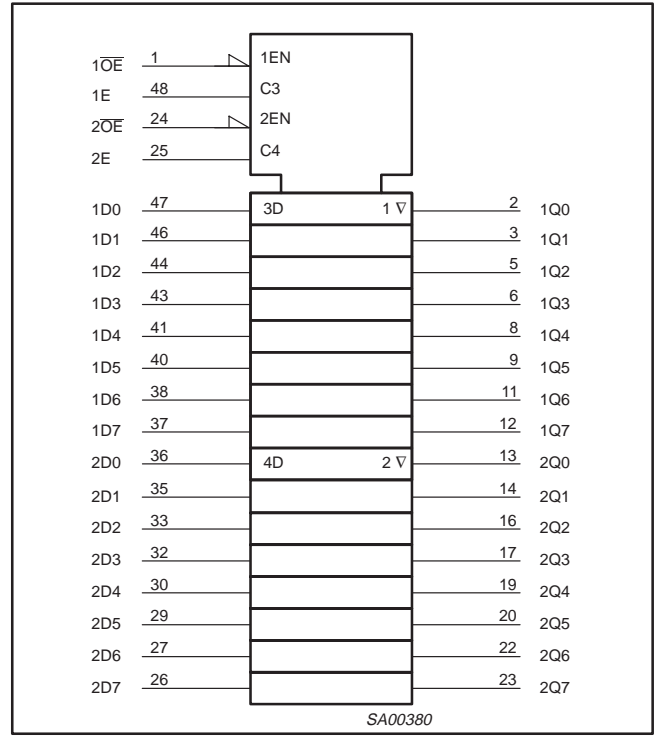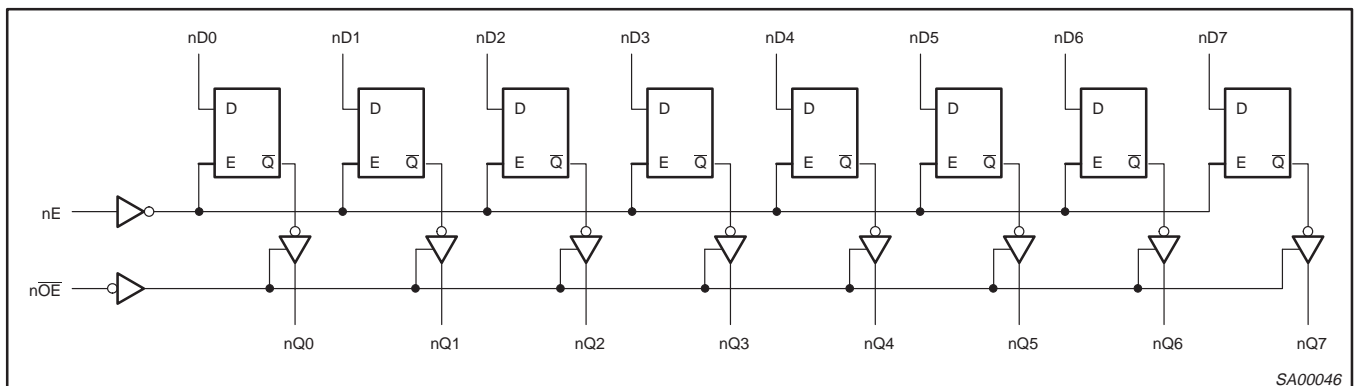
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FUNCTION TABLE

INPUTS			INTERNAL REGISTER	OUTPUTS	OPERATING MODE
n$\overline{OE}$	nE	nDx		nQ0 – nQ7	
L L	H H	L H	L H	L H	Enable and read register
L L	↓ ↓	i h	L H	L H	Latch and read register
L	L	X	NC	NC	Hold
H H	L H	X Dn	NC Dn	Z Z	Disable outputs

H = HIGH voltage level
h = HIGH voltage level one set-up time prior to the HIGH-to-LOW E transition
L = LOW voltage level
l = LOW voltage level one set-up time prior to the HIGH-to-LOW E transition
NC = No change
X = Don't care
Z = High-impedance "off" state
↓ = HIGH-to-LOW E transition

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
Δt/Δv	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	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
V_{RST}	Power-up output voltage[3]	V_{CC} = 5.5 V; I_O = 1 mA; V_I = GND or V_{CC}	–	0.13	0.55	–	0.55	V
I_I	Input leakage current	V_{CC} = 5.5 V; V_I = V_{CC} or GND	–	±0.01	±1	–	±1	µA
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[4]	V_{CC} = 2.1 V; V_O = 0.5 V; V_I = GND or V_{CC}; V_{OE} = GND	–	±5.0	±50	–	±50	µA
I_{OZH}	3-State output HIGH current	V_{CC} = 5.5 V; V_O = 5.5 V; V_I = V_{IL} or V_{IH}	–	0.5	10	–	10	µA
I_{OZL}	3-State output LOW current	V_{CC} = 5.5 V; V_O = 0.0 V; V_I = V_{IL} or V_{IH}	–	−0.5	−10		−10	µA
I_O	Output current[1]	V_{CC} = 5.5 V; V_O = 2.5 V	−50	−70	−180	−50	−180	mA
I_{CEX}	Output HIGH leakage current	V_{CC} = 5.5 V; V_O = 5.5 V; V_I = GND or V_{CC}	–	0.1	50	–	50	µA
I_{CCH}	Quiescent supply current	V_{CC} = 5.5 V; Outputs HIGH; V_I = GND or V_{CC}	–	0.5	2	–	2	mA
I_{CCL}		V_{CC} = 5.5 V; Outputs Low; V_I = GND or V_{CC}	–	8	19	–	19	mA
I_{CCZ}		V_{CC} = 5.5 V; Outputs 3-State; V_I = GND or V_{CC}	–	0.5	2	–	2	mA
ΔI_{CC}	Additional supply current per input pin[2]	V_{CC} = 5.5 V; one input at 3.4 V, other inputs at V_{CC} or GND	–	5	100	–	100	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. For valid test results, data must not be loaded into the flip-flops (or latches) after applying the power.
4. This parameter is valid for any V_{CC} between 0 V and 2.1 V, with a transition time of up to 10 msec. From V_{CC} = 2.1 to V_{CC} = 5 V ± 10% a transition time of up to 100 µsec is permitted.
5. Unused pins at V_{CC} or GND.

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AC CHARACTERISTICS

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

SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T_{amb} = +25 °C V_{CC} = +5.0 V			T_{amb} = −40 °C to +85 °C V_{CC} = +5.0V ± 0.5 V		
			MIN	TYP	MAX	MIN	MAX	
t_{PLH} t_{PHL}	Propagation delay nDx to nQx	2	1.5 1.1	2.5 2.0	3.8 3.1	1.5 1.1	4.4 3.8	ns
t_{PLH} t_{PHL}	Propagation delay nE to nQx	1	1.6 1.3	2.5 2.1	3.8 3.1	1.6 1.3	4.4 3.6	ns
t_{PZH} t_{PZL}	Output enable time to HIGH and LOW level	4 5	1.2 1.3	2.3 2.3	3.5 3.5	1.2 1.3	4.6 4.5	ns
t_{PHZ} t_{PLZ}	Output disable time from HIGH and LOW level	4 5	1.9 1.7	3.1 2.6	4.5 3.8	1.9 1.7	5.3 4.2	ns

AC SET-UP REQUIREMENTS

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

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	MIN	
t_s(H) t_s(L)	Set-up time, HIGH or LOW nDx to nE	3	1.0 1.0	0.0 0.3	1.0 1.0	ns
t_h(H) t_h(L)	Hold time, HIGH or LOW nDx to nE	3	0.5 0.5	−0.2 0.0	0.5 0.5	ns
t_w(H)	Enable pulse width HIGH	1	2.5	1.0	2.5	ns

AC WAVEFORMS

For all waveforms, V_M = 1.5 V.
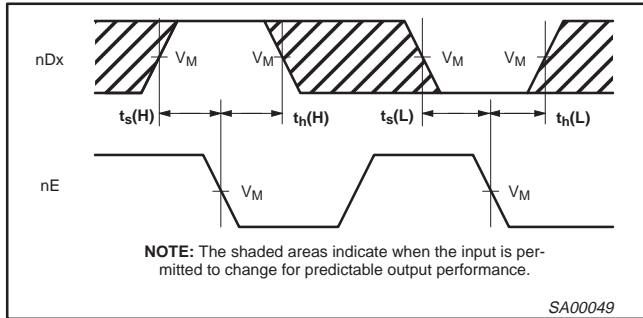

SA00047
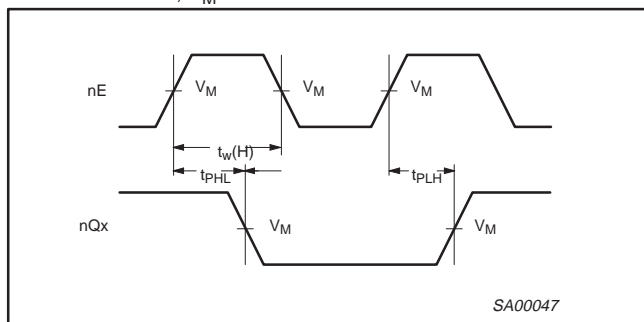
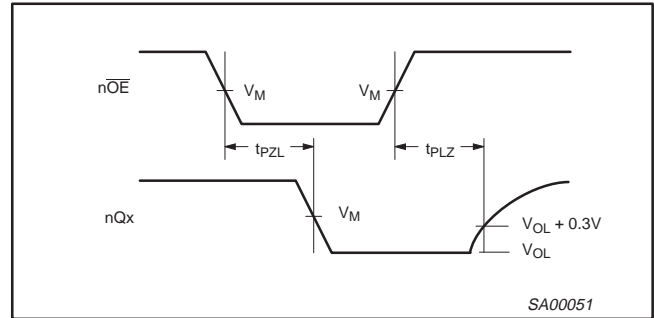**Waveform 1.** Propagation Delay, Enable to Output, and Enable Pulse Width

SA00048
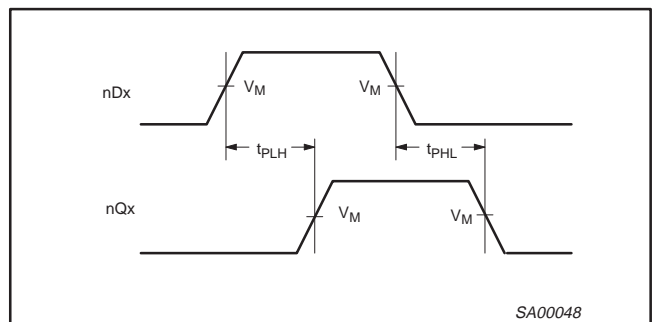
Waveform 2. Propagation Delay for Data to Outputs
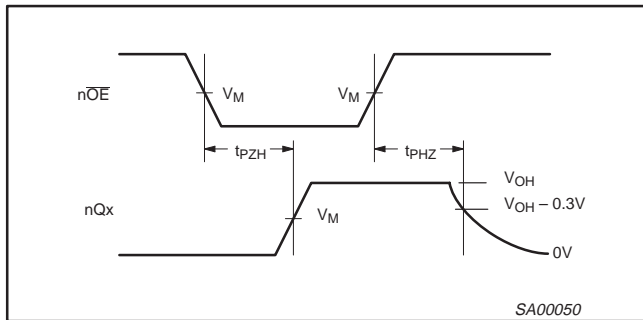
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NOTE: The shaded areas indicate when the input is permitted to change for predictable output performance.

SA00049

Waveform 3.   Data Set-up and Hold Times

SA00051

Waveform 5.   3-State Output Enable Time to LOW Level and Output Disable Time from LOW Level

SA00050

Waveform 4.   3-State Output Enable Time to HIGH Level and Output Disable Time from HIGH Level

TEST CIRCUIT AND WAVEFORM

Test Circuit for 3-State Outputs

SWITCH POSITION

TEST	SWITCH
t_{PLZ}	closed
t_{PZL}	closed
All other	open

$V_M = 1.5 V$
Input Pulse Definition

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.

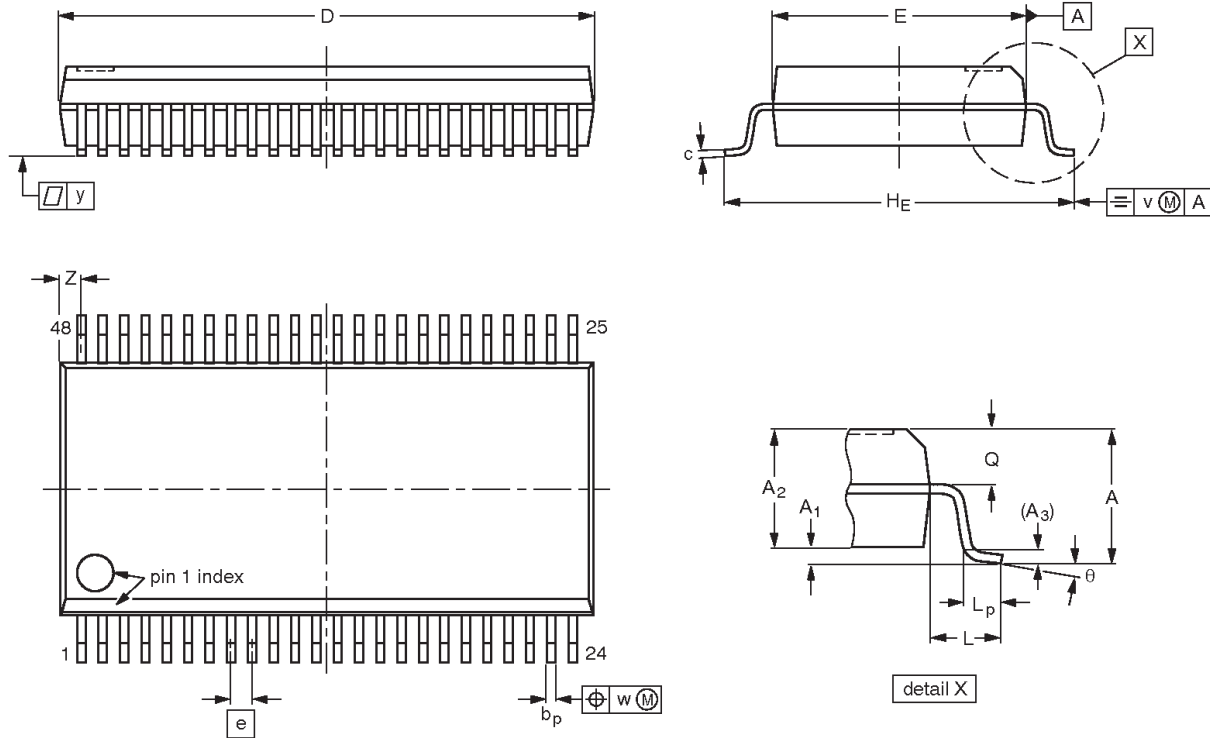| FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_R	t_F
74ABT	3.0 V	1 MHz	500 ns	2.5 ns	2.5 ns

SA00654

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

SOT370-1

pin 1 index

detail X

0   5   10 mm

scale

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	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

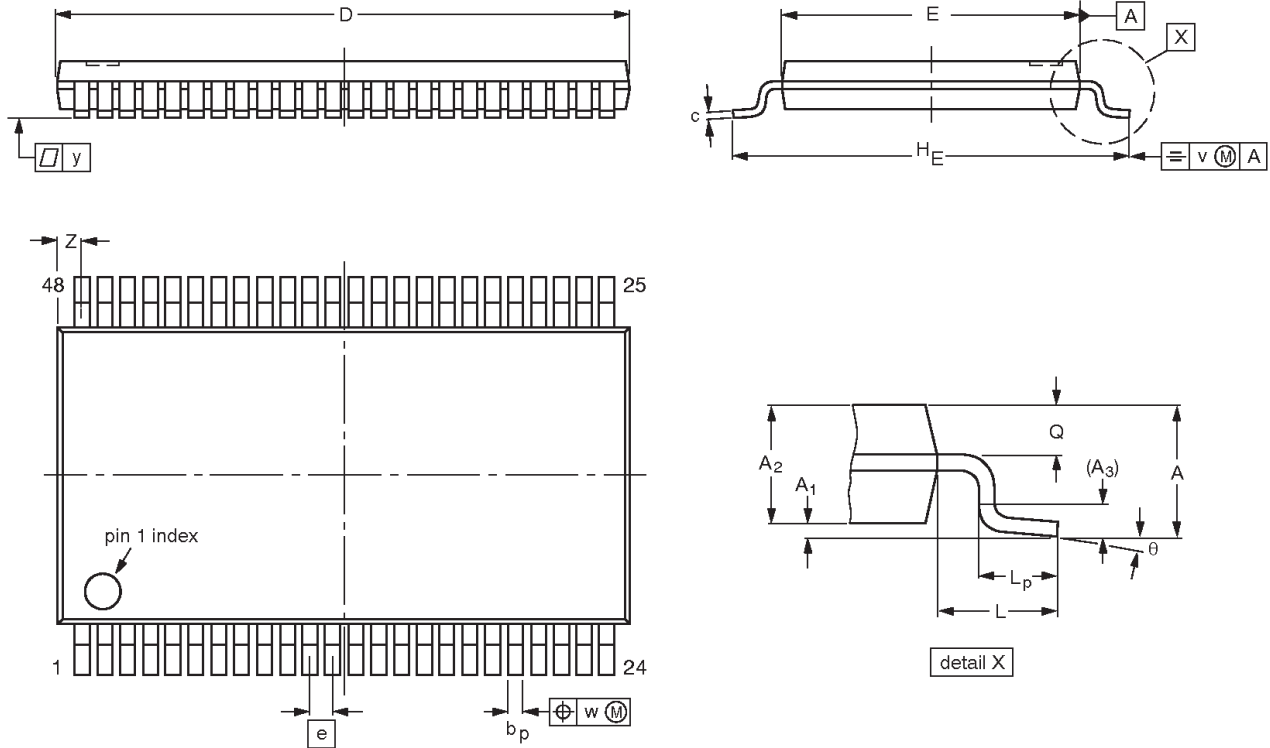1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT370-1		MO-118				99-12-27 03-02-19

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

pin 1 index

detail X

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	HE	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	JEITA			
SOT362-1		MO-153				~~99-12-27~~ 03-02-19

REVISION HISTORY

Rev	Date	Description
_3	20040227	**Product data (9397 750 12821); 853-1751 ECN 01–A15429 of 27 January 2004. Replaces data sheet 74ABT_H16373B_2 of 1998 Feb 27 (9397 750 03491).** Modifications: ● Delete all references to 74ABTH16373B (product discontinued).
_2	19980227	**Product specification (9397 750 03491); ECN 853-1751 19027 of 27 February 1998. Supersedes data of 1995 Aug 03.**
_1	19950803	

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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