DATA SHEET

74ABT2240

Octal inverting buffer with 30 Ω series termination resistors (3-State)

Product data
Supersedes data of 1998 Jan 16

2003 Apr 25

Philips
Semiconductors

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Octal inverting buffer with 30 Ω series termination resistors (3-State)

74ABT2240

FEATURES

- Octal bus interface
- 3-State buffers
- Live insertion/extraction permitted
- Outputs include series resistance of 30 Ω, making external termination resistors unnecessary
- Output capability: +12 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
- Power-up 3-State
- Same part as 74ABT240-1

DESCRIPTION

The 74ABT2240 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed.

The 74ABT2240 device is an octal inverting buffer that is ideal for driving bus lines. The device features two Output Enables ($1\overline{OE}$, $2\overline{OE}$), each controlling four of the 3-State outputs.

The 74ABT2240 is designed with 30 Ω series resistance in both the HIGH and LOW states of the output. This design reduces line noise in applications such as memory address drivers, clock drivers and bus receivers/transmitters.

The 74ABT2240 is the same as the 74ABT240-1. The part number has been changed to reflect industry standards.

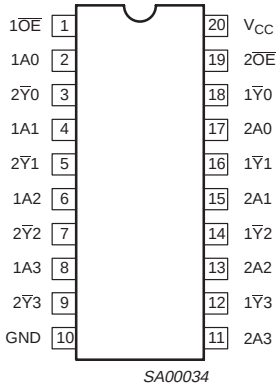
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25 °C; GND = 0 V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay An to $\overline{Y}$n	C_L = 50 pF; V_{CC} = 5 V	2.8 4.3	ns
C_{IN}	Input capacitance	V_I = 0 V or V_{CC}	3	pF
C_{OUT}	Output capacitance	Outputs disabled; V_O = 0 V or V_{CC}	7	pF
I_{CCZ}	Total supply current	Outputs disabled; V_{CC} = 5.5 V	50	µA

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	ORDER CODE	DWG NUMBER
20-Pin Plastic DIP	–40 °C to +85 °C	74ABT2240N	SOT146-1
20-Pin plastic SO	–40 °C to +85 °C	74ABT2240D	SOT163-1
20-Pin Plastic TSSOP Type I	–40 °C to +85 °C	74ABT2240PW	SOT360-1

PIN CONFIGURATION



SA00034

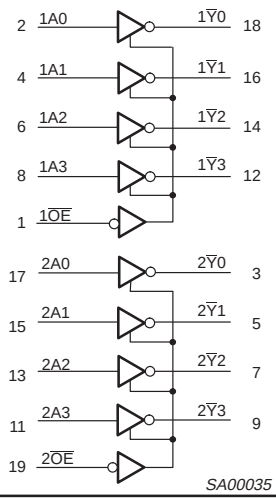
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
2, 4, 6, 8	1A0 – 1A3	Data inputs
11, 13, 15, 17	2A0 – 2A3	Data inputs
18, 16, 14, 12	$1\overline{Y}0$ – $1\overline{Y}3$	Data outputs
9, 7, 5, 3	$2\overline{Y}0$ – $2\overline{Y}3$	Data outputs
1, 19	$1\overline{OE}$, $2\overline{OE}$	Output enables
10	GND	Ground (0 V)
20	V_{CC}	Positive supply voltage

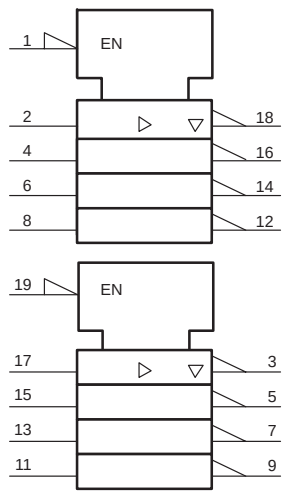
Octal inverting buffer with 30 Ω series termination resistors (3-State)

74ABT2240

LOGIC SYMBOL



LOGIC SYMBOL (IEE/IEC)

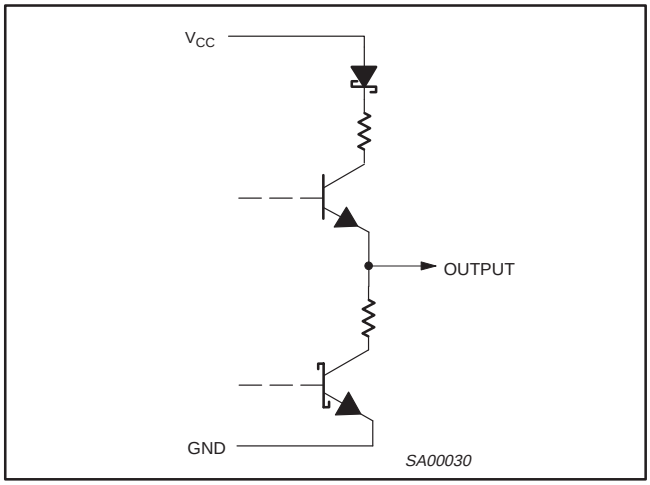


FUNCTION TABLE

INPUTS				OUTPUTS	
$1\overline{OE}$	1An	$2\overline{OE}$	2An	$1\overline{Y}n$	$2\overline{Y}n$
L	L	L	L	H	H
L	H	L	H	L	L
H	X	H	X	Z	Z

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

SCHEMATIC OF EACH OUTPUT



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
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	–	12	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	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} = 5 mA; V_I = V_{IL} or V_{IH}	–	0.32	0.55	–	0.55	V
		V_{CC} = 4.5 V; I_{OL} = 12 mA; V_I = V_{IL} or V_{IH}	–	–	0.8	–	0.8	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_{OFF}	Power-off leakage current	V_{CC} = 0.0 V; V_O or $V_I \leq$ 4.5 V	–	±5.0	±100	–	±100	µA
$I_{PU/PD}$	Power-up/down 3-State output current[3]	V_{CC} = 2.1 V; V_O = 0.5 V; V_I = GND or V_{CC}; $V_{\overline{OE}}$ = Don't care	–	±5.0	±50	–	±50	µA
I_{OZH}	3-State output HIGH current	V_{CC} = 5.5 V; V_O = 2.7 V; V_I = V_{IL} or V_{IH}	–	0.01	50	–	50	µA
I_{OZL}	3-State output LOW current	V_{CC} = 5.5 V; V_O = 0.5 V; V_I = V_{IL} or V_{IH}	–	–0.01	–50	–	–50	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	–100	–180	–50	–180	mA
I_{CCH}	Quiescent supply current	V_{CC} = 5.5 V; Outputs HIGH, V_I = GND or V_{CC}	–	50	250	–	250	µA
I_{CCL}		V_{CC} = 5.5 V; Outputs LOW, V_I = GND or V_{CC}	–	24	30	–	30	mA
I_{CCZ}		V_{CC} = 5.5 V; Outputs 3-State; V_I = GND or V_{CC}	–	50	250	–	250	µA
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	–	0.5	1.5	–	1.5	mA
		Outputs 3-State, one data input at 3.4 V, other inputs at V_{CC} or GND; V_{CC} = 5.5 V	–	0.5	1.5	–	1.5	mA
		Outputs 3-State, one enable input at 3.4 V, other inputs at V_{CC} or GND; V_{CC} = 5.5 V	–	0.5	1.5	–	1.5	mA

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 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 V to V_{CC} = 5 V ± 10% a transition time of up to 100 µsec is permitted.

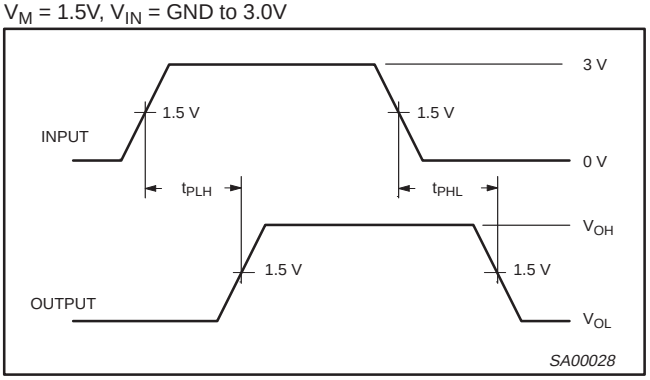
AC CHARACTERISTICS

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

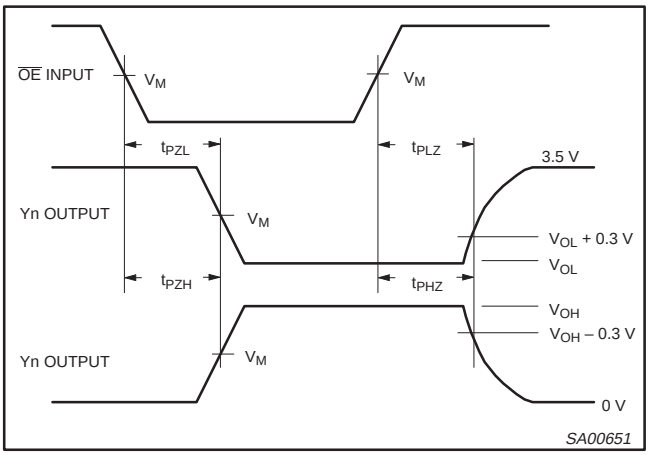
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T_{amb} = +25 °C, V_{CC} = +5.0 V			T_{amb} = −40 °C to +85 °C, V_{CC} = +5.0 V ±0.5 V		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay An to $\overline{Y}$n	1	1.0 3.0	2.8 4.3	4.0 5.8	1.0 3.0	4.9 6.0	ns
t_{PZH} t_{PZL}	Output enable time to HIGH and LOW level	2	1.5 4.2	3.4 5.5	4.7 7.6	1.5 4.2	5.8 8.4	ns
t_{PHZ} t_{PLZ}	Output disable time from HIGH and LOW level	2	1.9 2.5	4.1 3.4	5.0 5.8	1.9 2.5	5.6 6.4	ns

AC WAVEFORMS

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

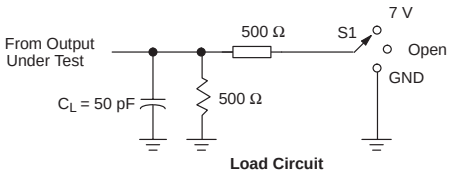


Waveform 1. Waveforms Showing the Input (An) to Output ($\overline{Y}$n) Propagation Delays



Waveform 2. Waveforms Showing the 3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORMS



Load Circuit

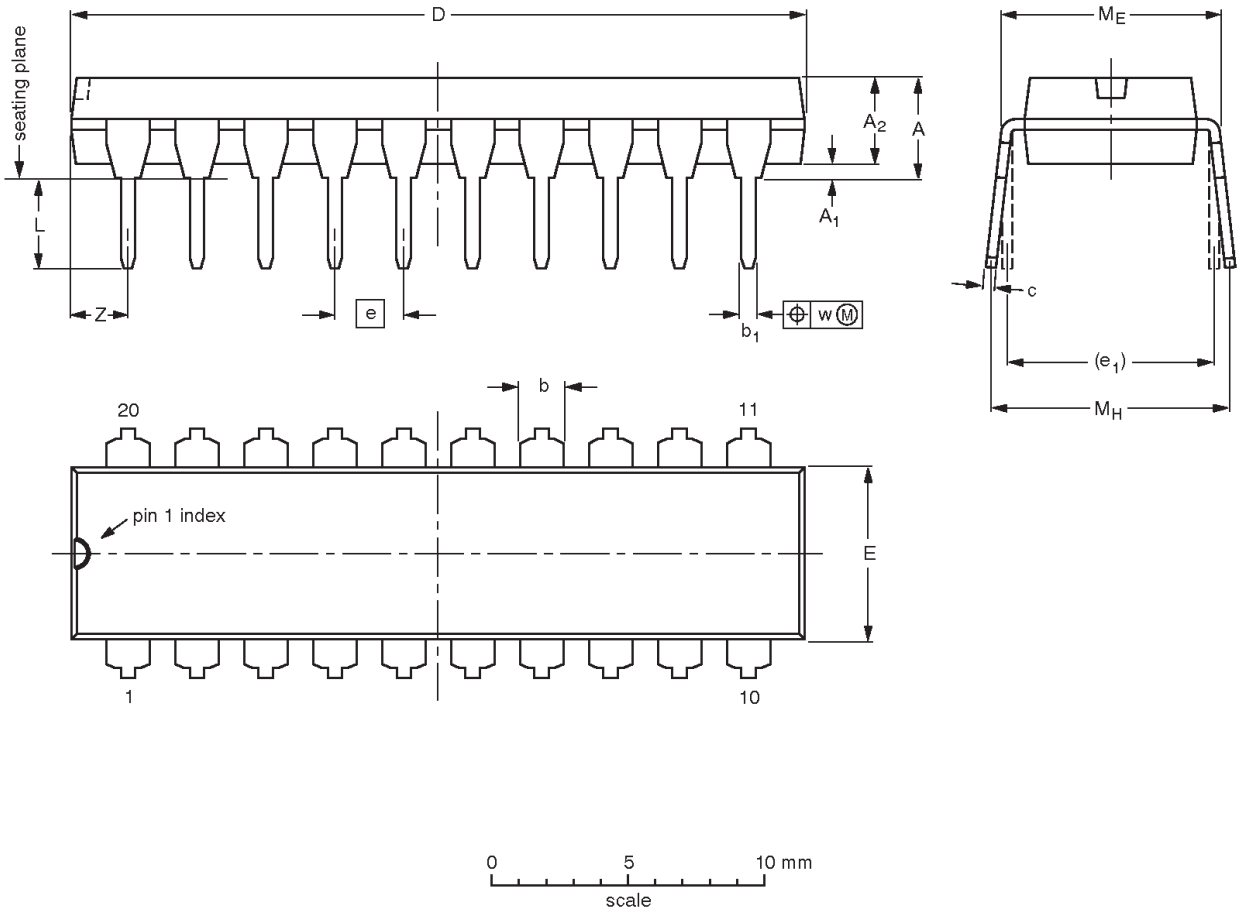
TEST	S1
t_{pd}	open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	open

DEFINITIONS

C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

SA00012

DIP20: plastic dual in-line package; 20 leads (300 mil) **SOT146-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

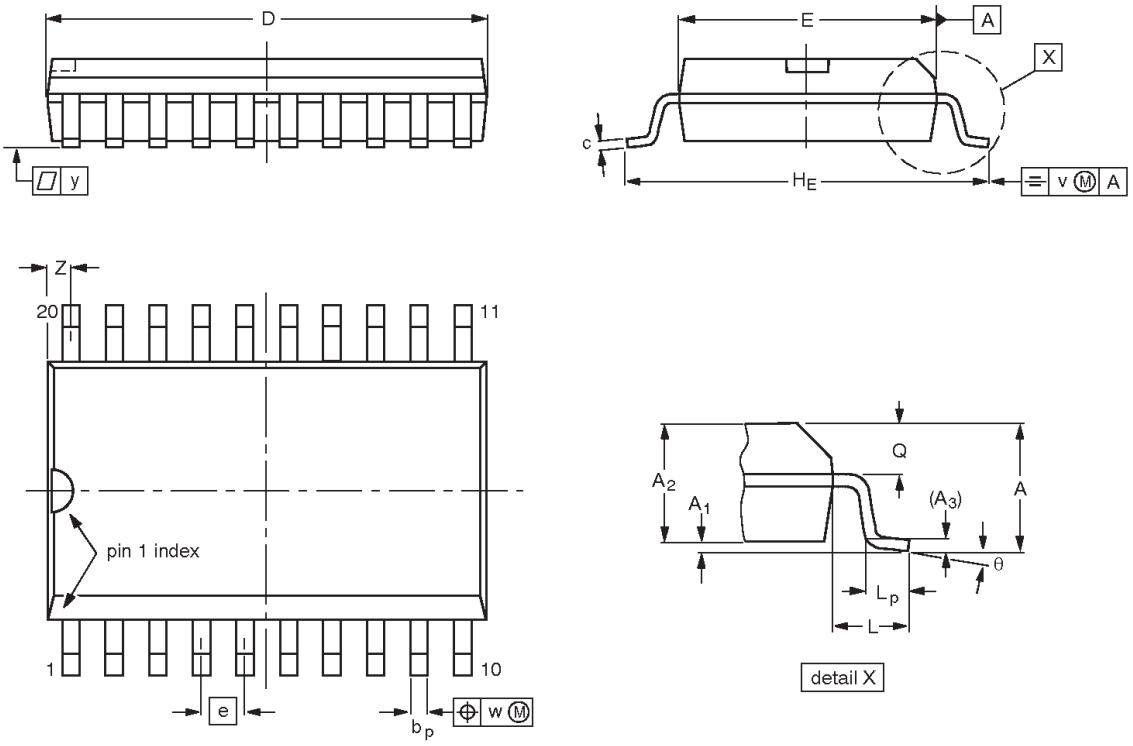
UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	0.36 0.23	26.92 26.54	6.40 6.22	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2
inches	0.17	0.02	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.1	0.3	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.078

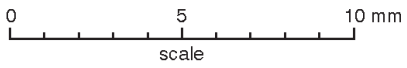
Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT146-1		MS-001	SC-603			~~99-12-27~~ 03-02-13

SO20: plastic small outline package; 20 leads; body width 7.5 mm **SOT163-1**





DIMENSIONS (inch dimensions are derived from the original mm dimensions)

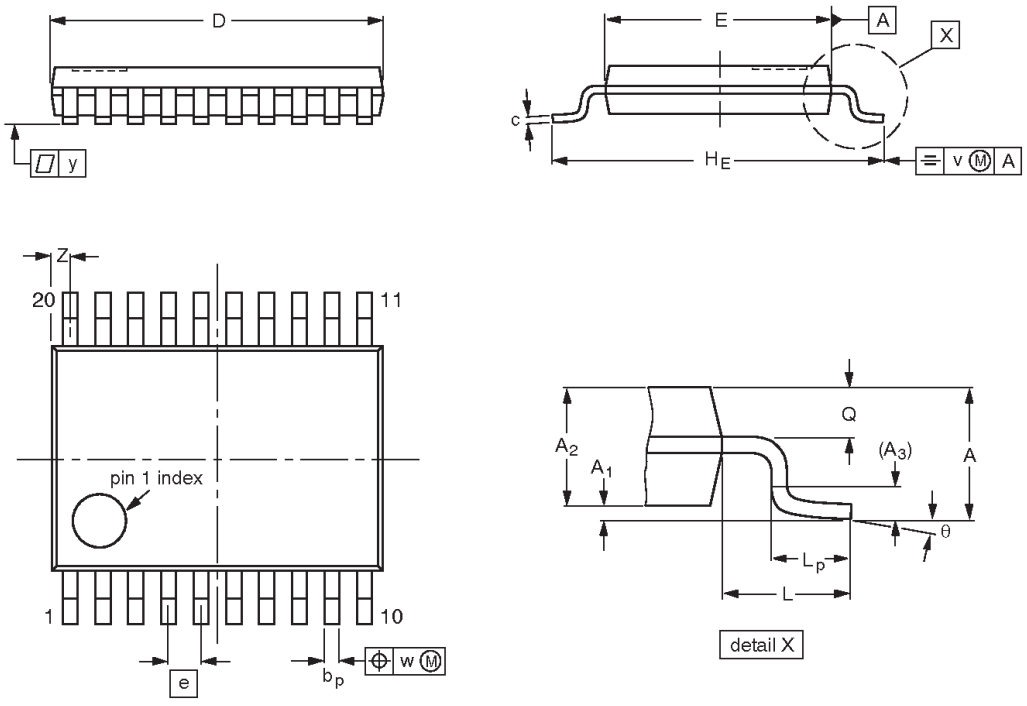
UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	2.65	0.3 0.1	2.45 2.25	0.25	0.49 0.36	0.32 0.23	13.0 12.6	7.6 7.4	1.27	10.65 10.00	1.4	1.1 0.4	1.1 1.0	0.25	0.25	0.1	0.9 0.4	8^o 0^o
inches	0.1	0.012 0.004	0.096 0.089	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.05	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004	0.035 0.016	

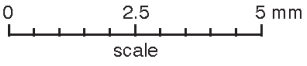
Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT163-1	075E04	MS-013				~~99-12-27~~ 03-02-19

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm SOT360-1





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 (1)	θ
mm	1.1	0.15 0.05	0.95 0.80	0.25	0.30 0.19	0.2 0.1	6.6 6.4	4.5 4.3	0.65	6.6 6.2	1	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.5 0.2	8^o 0^o

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			
SOT360-1		MO-153				~~99-12-27~~ 03-02-19

REVISION HISTORY

Rev	Date	Description
_3	20030425	**Product data (9397 750). ECN 853-1626 29854 of 22 April 2003.** **Supersedes Product specification of 16 January 1998 (9397 750 03463).** Modifications: ● Ordering information table on page 2: delete “North America” column; re-name “Outside Nort America” column to “Order code”; remove 74ABT2240DB variant. ● DC Electrical Characteristics table on page 4, Symbol ΔI_{CC}, Test Condition “Outputs 3-State, one data input at 3.4 V, other inputs at V_{CC} or GND; V_{CC} = 5.5 V”: – under Limit T_{amb} = 25 °C: change Typ. value **from** 50 μA **to** 0.5 mA; change Max. value **from** 250 μA **to** 1.5 mA. – under Limit T_{amb} = –40 °C to +85 °C: change Max **from** 250 μA **to** 1.5 mA.
_2	19980116	**Product specification (9397 750 03463). ECN 853-1626 18865 of 16 January 1998.** **Supersedes data of 1996 Oct 08.**

Octal inverting buffer with 30 Ω series termination resistors (3-State)

74ABT2240

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

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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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Date of release: 04-03

Document order number: 9397 750 11431

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