

DATA SHEET

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74ABT2240

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

Product specification
Supersedes data of 1996 Oct 08
IC23 Data Handbook

1998 Jan 16

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

74ABT2240

FEATURES

- Octal bus interface
- 3-State buffers
- Live insertion/extraction permitted
- Outputs include series resistance of 30Ω, making external termination resistors unnecessary
- Output capability: +12mA/−32mA
- Latch-up protection exceeds 500mA 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 30Ω 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.

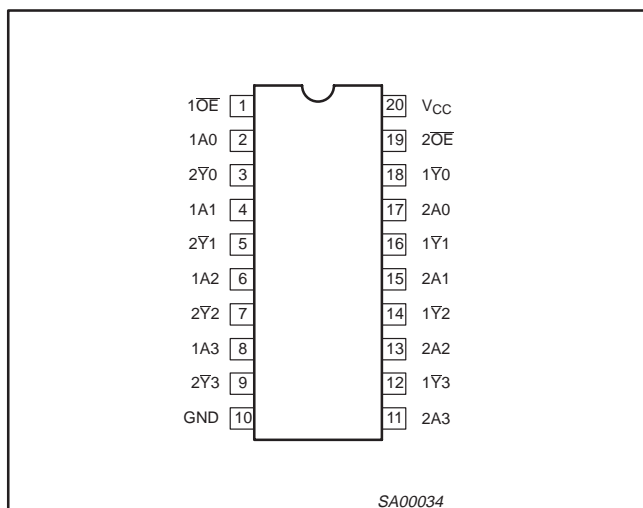
QUICK REFERENCE DATA

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

ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
20-Pin Plastic DIP	−40°C to +85°C	74ABT2240 N	74ABT2240 N	SOT146-1
20-Pin plastic SO	−40°C to +85°C	74ABT2240 D	74ABT2240 D	SOT163-1
20-Pin Plastic SSOP Type II	−40°C to +85°C	74ABT2240 DB	74ABT2240 DB	SOT339-1
20-Pin Plastic TSSOP Type I	−40°C to +85°C	74ABT2240 PW	74ABT2240PW DH	SOT360-1

PIN CONFIGURATION



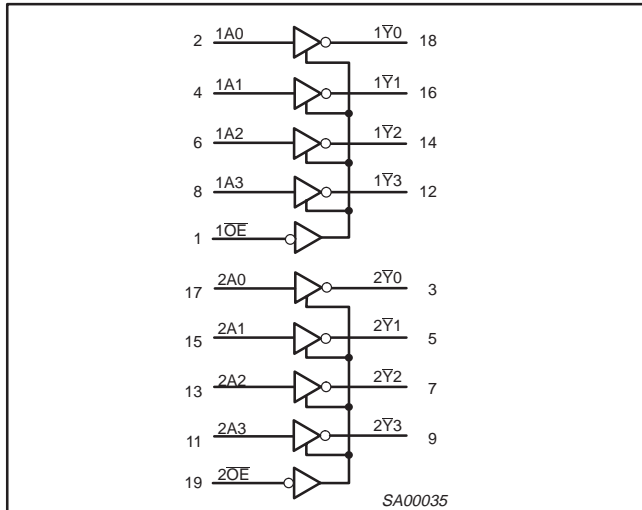
PIN DESCRIPTION

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	$1\overline{Y0} - 1\overline{Y3}$	Data outputs
9, 7, 5, 3	$2\overline{Y0} - 2\overline{Y3}$	Data outputs
1, 19	$1\overline{OE}, 2\overline{OE}$	Output enables
10	GND	Ground (0V)
20	V_{CC}	Positive supply voltage

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

74ABT2240

LOGIC SYMBOL

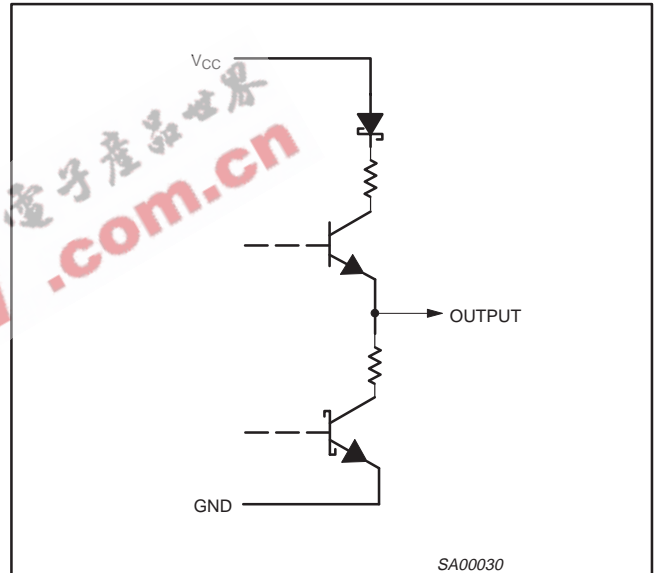


FUNCTION TABLE

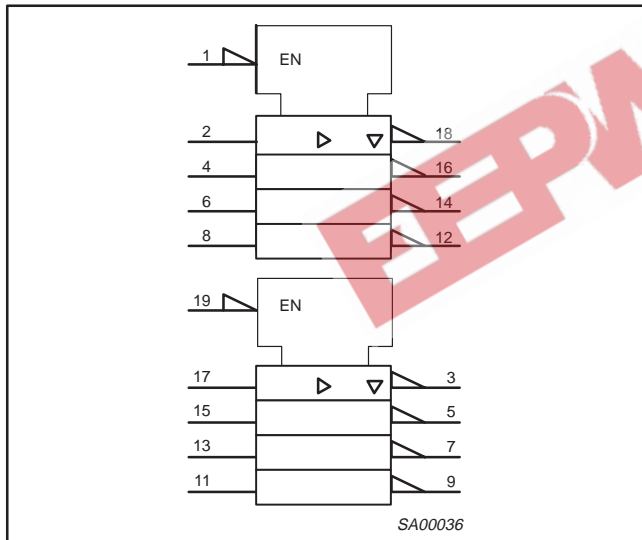
INPUTS				OUTPUTS	
1OE	1An	2OE	2An	1Yn	2Yn
L	L	L	L	H	H
L	H	L	H	L	L
H	X	H	X	Z	Z

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

SCHEMATIC OF EACH OUTPUT



LOGIC SYMBOL (IEE/IEC)



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	-18	mA
V _I	DC input voltage ³		-1.2 to +7.0	V
I _{OK}	DC output diode current	V _O < 0	-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:

- 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.

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

74ABT2240

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
			$T_{amb} = +25^{\circ}\text{C}$			$T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$		
			Min	Typ	Max	Min	Max	
V_{IK}	Input clamp voltage	$V_{CC} = 4.5\text{V}; I_{IK} = -18\text{mA}$		-0.9	-1.2		-1.2	V
V_{OH}	High-level output voltage	$V_{CC} = 4.5\text{V}; I_{OH} = -3\text{mA}; V_I = V_{IL}$ or V_{IH}	2.5	2.9		2.5		V
		$V_{CC} = 5.0\text{V}; I_{OH} = -3\text{mA}; V_I = V_{IL}$ or V_{IH}	3.0	3.4		3.0		V
		$V_{CC} = 4.5\text{V}; I_{OH} = -32\text{mA}; V_I = V_{IL}$ or V_{IH}	2.0	2.4		2.0		V
V_{OL}	Low-level output voltage	$V_{CC} = 4.5\text{V}; I_{OL} = 5\text{mA}; V_I = V_{IL}$ or V_{IH}		0.32	0.55		0.55	V
		$V_{CC} = 4.5\text{V}; I_{OL} = 12\text{mA}; V_I = V_{IL}$ or V_{IH}			0.8		0.8	V
I_I	Input leakage current	$V_{CC} = 5.5\text{V}; V_I = \text{GND}$ or 5.5V		± 0.01	± 1.0		± 1.0	μA
I_{OFF}	Power-off leakage current	$V_{CC} = 0.0\text{V}; V_O$ or $V_I \leq 4.5\text{V}$		± 5.0	± 100		± 100	μA
$I_{PU/PD}$	Power-up/down 3-State output current ³	$V_{CC} = 2.1\text{V}; V_O = 0.5\text{V}; V_I = \text{GND}$ or V_{CC} ; $V_{OE} = \text{Don't care}$		± 5.0	± 50		± 50	μA
I_{OZH}	3-State output High current	$V_{CC} = 5.5\text{V}; V_O = 2.7\text{V}; V_I = V_{IL}$ or V_{IH}		0.01	50		50	μA
I_{OZL}	3-State output Low current	$V_{CC} = 5.5\text{V}; V_O = 0.5\text{V}; V_I = V_{IL}$ or V_{IH}		-0.01	-50		-50	μA
I_{CEX}	Output high leakage current	$V_{CC} = 5.5\text{V}; V_O = 5.5\text{V}; V_I = \text{GND}$ or V_{CC}		5.0	50		50	μA
I_O	Output current ¹	$V_{CC} = 5.5\text{V}; V_O = 2.5\text{V}$	-50	-100	-180	-50	-180	mA
I_{CCH}	Quiescent supply current	$V_{CC} = 5.5\text{V}; \text{Outputs High}, V_I = \text{GND}$ or V_{CC}		50	250		250	μA
I_{CCL}		$V_{CC} = 5.5\text{V}; \text{Outputs Low}, V_I = \text{GND}$ or V_{CC}		24	30		30	mA
I_{CCZ}		$V_{CC} = 5.5\text{V}; \text{Outputs 3-State}; V_I = \text{GND}$ or V_{CC}		50	250		250	μA
ΔI_{CC}	Additional supply current per input pin ²	Outputs enabled, one data input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5\text{V}$		0.5	1.5		1.5	mA
		Outputs 3-State, one data input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5\text{V}$		50	250		250	μA
		Outputs 3-State, one enable input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5\text{V}$		0.5	1.5		1.5	mA

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 3.4V.
- This parameter is valid for any V_{CC} between 0V and 2.1V, with a transition time of up to 10msec. From $V_{CC} = 2.1\text{V}$ to $V_{CC} = 5\text{V} \pm 10\%$ a transition time of up to 100μsec is permitted.

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

74ABT2240

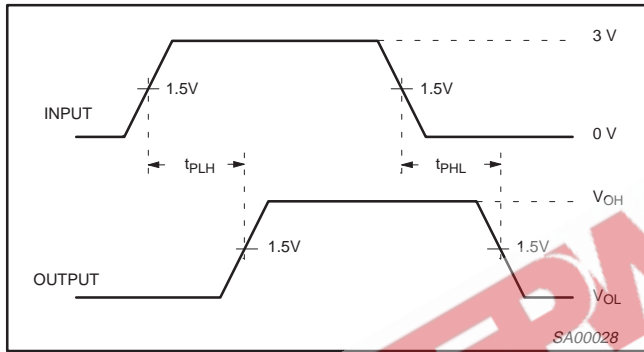
AC CHARACTERISTICS

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

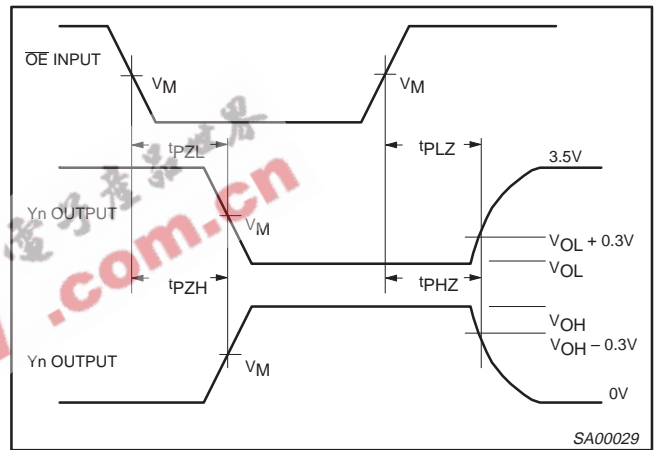
SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			$T_{\text{amb}} = +25^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V}$			$T_{\text{amb}} = -40^\circ\text{C to } +85^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V} \pm 0.5\text{V}$		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay An to \bar{Y}_n	1	1.0	2.8	4.0	1.0	4.9	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.5	3.4	4.7	1.5	5.8	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.9	4.1	5.0	1.9	5.6	ns

AC WAVEFORMS

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

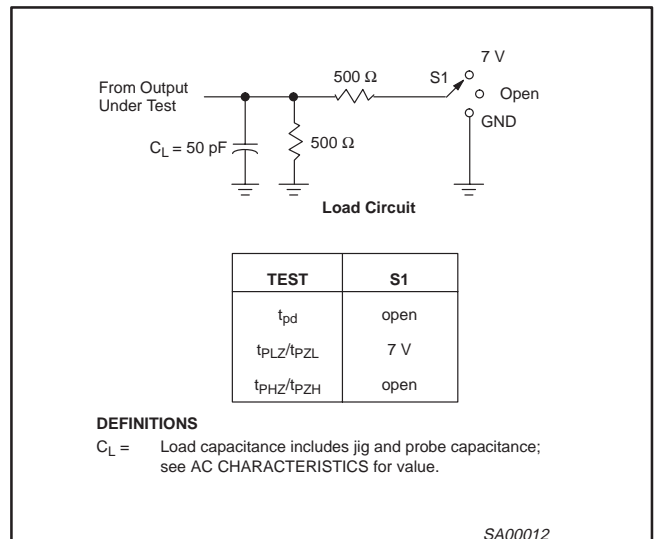


Waveform 1. Waveforms Showing the Input (An) to Output (\bar{Y}_n) Propagation Delays



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

TEST CIRCUIT AND WAVEFORMS

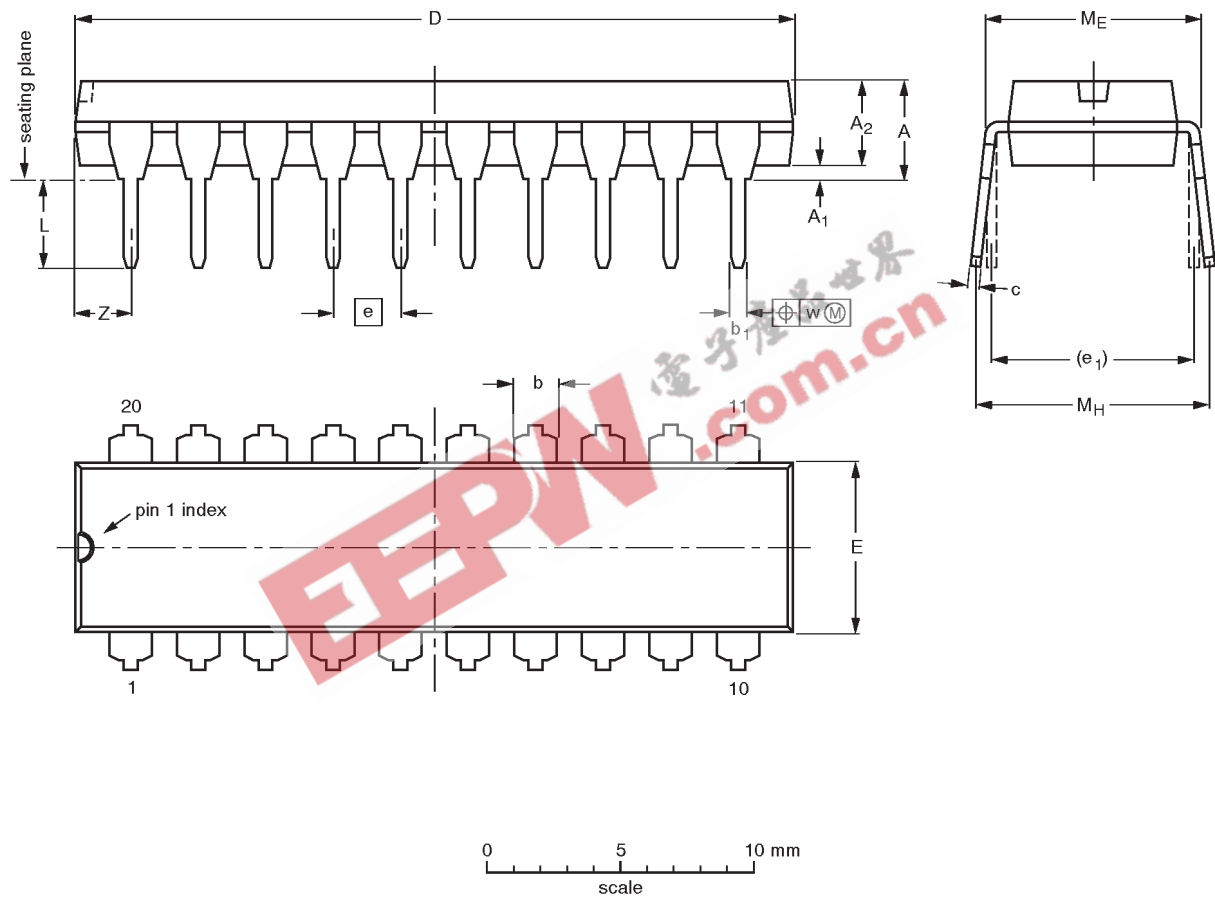


Octal inverting buffer with 30Ω series termination resistors (3-State)

74ABT2240

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	2.0
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.10	0.30	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 maximum per side are not included.

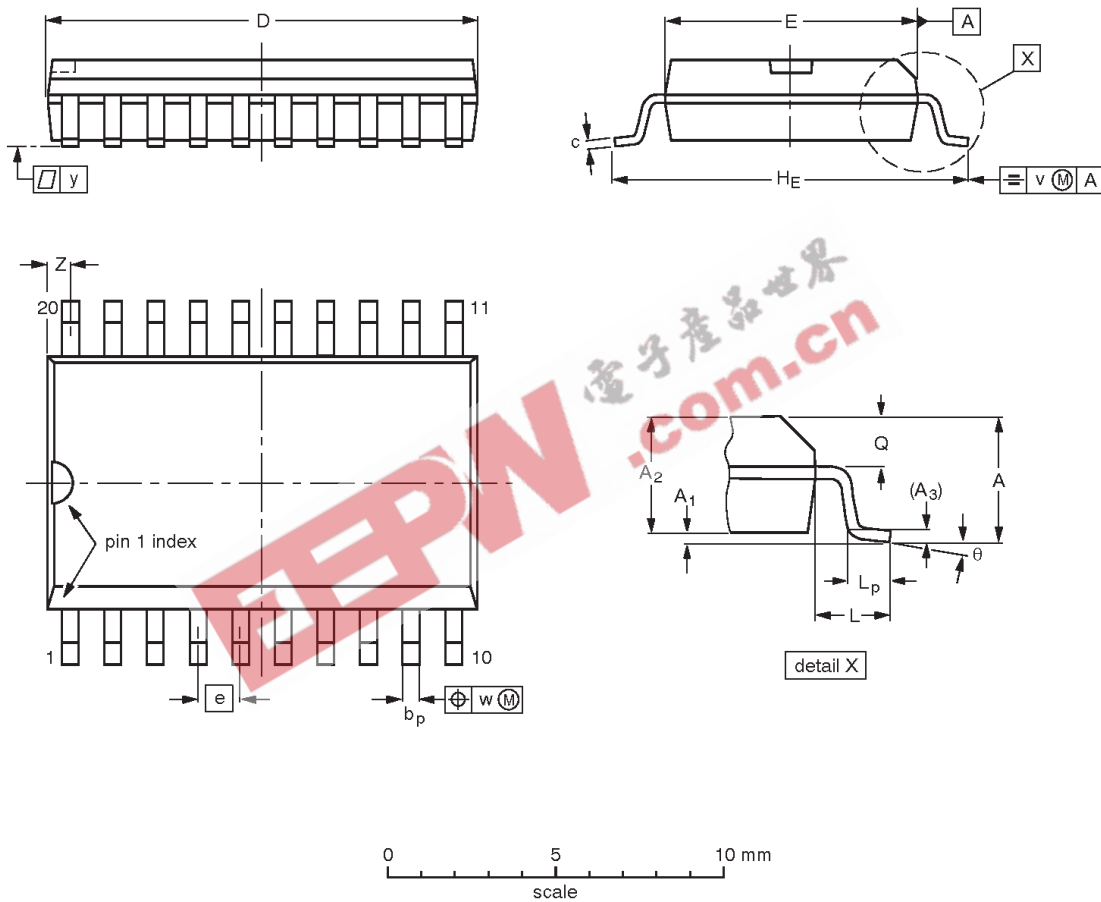
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			92-11-17 95-05-24

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

74ABT2240

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	0.30 0.10	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° 0°
inches	0.10	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	0.050	0.42 0.39	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 maximum per side are not included.

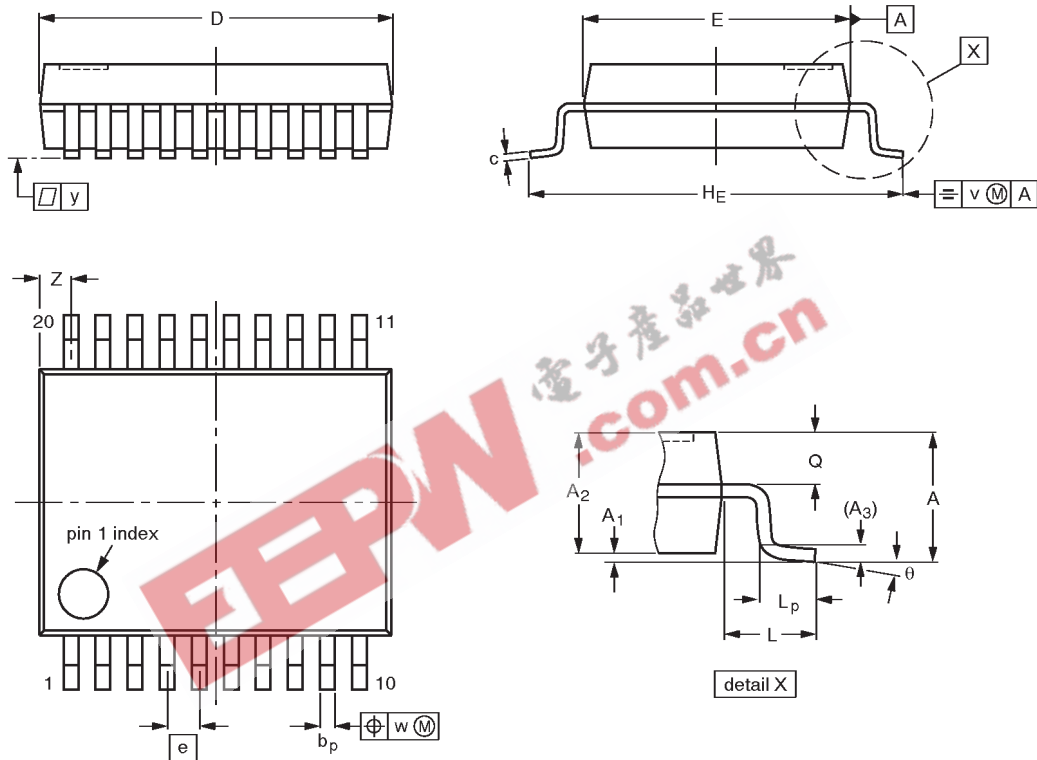
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT163-1	075E04	MS-013AC				92-11-17 95-01-24

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

74ABT2240

SSOP20: plastic shrink small outline package; 20 leads; body width 5.3 mm

SOT339-1



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	2.0	0.21 0.05	1.80 1.65	0.25	0.38 0.25	0.20 0.09	7.4 7.0	5.4 5.2	0.65	7.9 7.6	1.25	1.03 0.63	0.9 0.7	0.2	0.13	0.1	0.9 0.5	8° 0°

Note

1. Plastic or metal protrusions of 0.20 mm maximum per side are not included.

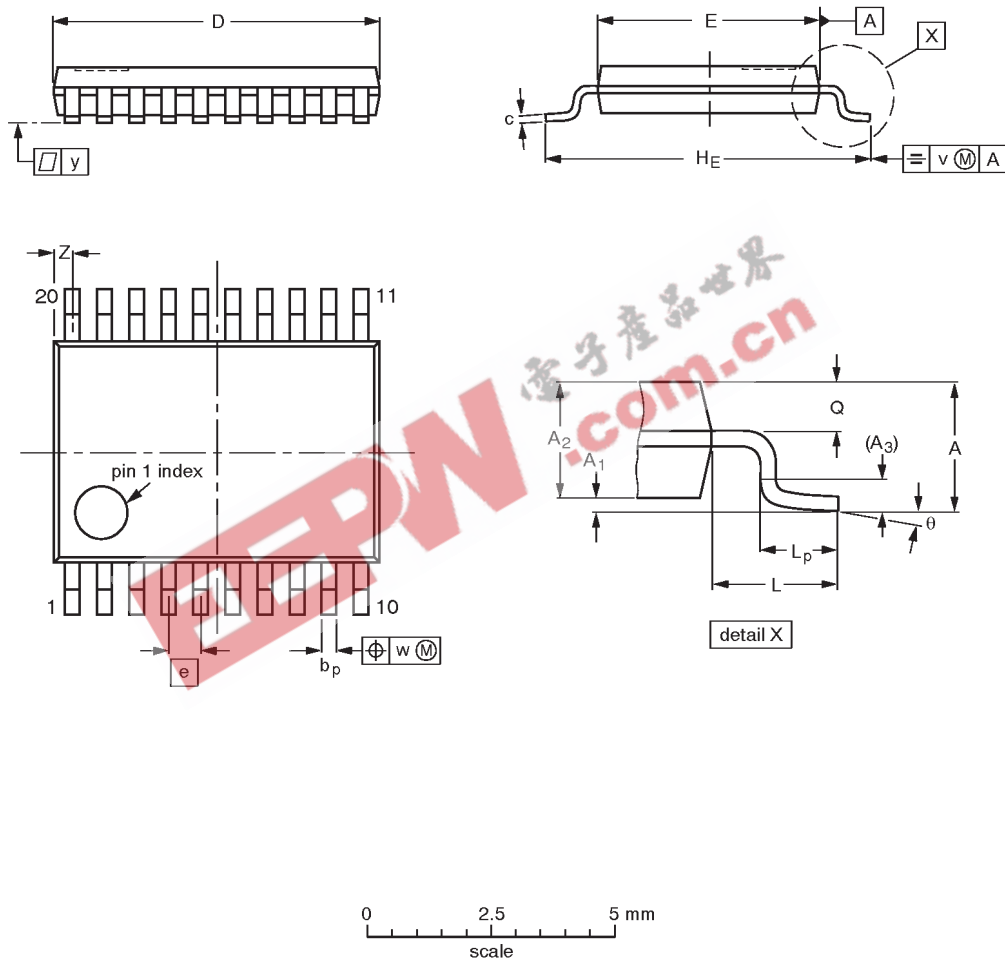
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT339-1		MO-150AE				93-09-08 95-02-04

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

74ABT2240

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	1.10	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	0.75 0.50	0.4 0.3	0.2	0.13	0.1	0.5 0.2	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			
SOT360-1		MO-153AC				93-06-16 95-02-04

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

74ABT2240

Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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[1] Please consult the most recently issued datasheet before initiating or completing a design.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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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print code

Date of release: 05-96

Document order number:

9397-750-03463

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