

# DATA SHEET

**74ABT245**

Octal transceiver with direction pin  
(3-State)

Product data

Supersedes data of 1998 Jan 16

2003 Feb 06

## Octal transceiver with direction pin (3-State)

74ABT245

## FEATURES

- Octal bidirectional bus interface
- 3-State buffers
- Output capability: +64 mA/-32 mA
- Latch-up protection exceeds 500 mA per Jedec Std 17
- ESD protection exceeds 2000 V per MIL STD 833 Method 3015 and 200 V per Machine Model
- Power-up 3-State
- Live insertion/extraction permitted
- Inputs are disabled during 3-State mode

## DESCRIPTION

The 74ABT245 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT245 device is an 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 an Output Enable ( $\overline{OE}$ ) input for easy cascading and a Direction (DIR) input for direction control.

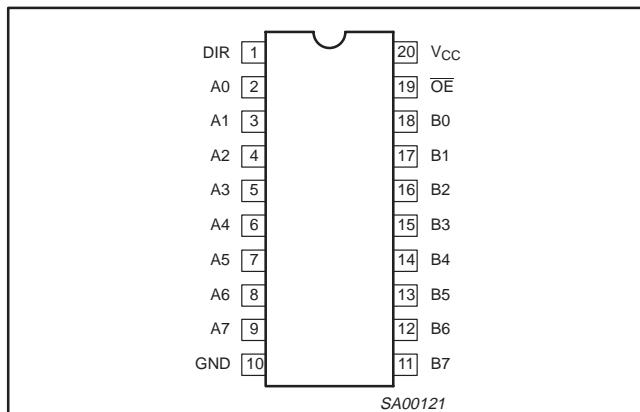
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS $T_{amb} = 25^{\circ}\text{C}$ ; $\text{GND} = 0 \text{ V}$	TYPICAL	UNIT
$t_{PLH}$ $t_{PHL}$	Propagation delay An to Bn or Bn to An	$C_L = 50 \text{ pF}$ ; $V_{CC} = 5 \text{ V}$	2.2 2.9	ns
$C_{IN}$	Input capacitance DIR, $\overline{OE}$	$V_I = 0 \text{ V}$ or $V_{CC}$	4	pF
$C_{I/O}$	I/O pin 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	$\mu\text{A}$

## ORDERING INFORMATION

PACKAGES	TEMPERATURE RANGE	PART NUMBER	DWG NUMBER
20-Pin plastic SO	−40 °C to +85 °C	74ABT245D	SOT163-1
20-Pin Plastic SSOP Type II	−40 °C to +85 °C	74ABT245DB	SOT339-1
20-Pin Plastic TSSOP Type I	−40 °C to +85 °C	74ABT245PW	SOT360-1

## PIN CONFIGURATION



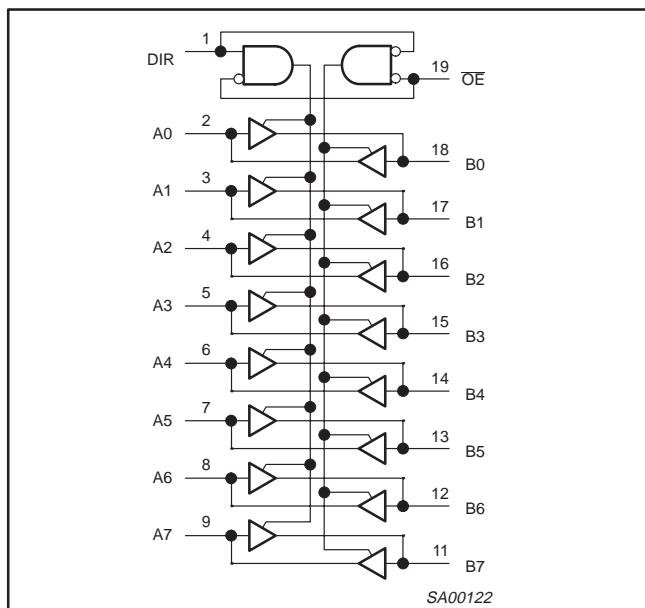
## PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
1	DIR	Direction control input
2, 3, 4, 5, 6, 7, 8, 9	A0 – A7	Data inputs/outputs (A side)
18, 17, 16, 15, 14, 13, 12, 11	B0 – B7	Data inputs/outputs (B side)
19	$\overline{OE}$	Output enable input (active-LOW)
10	GND	Ground (0 V)
20	$V_{CC}$	Positive supply voltage

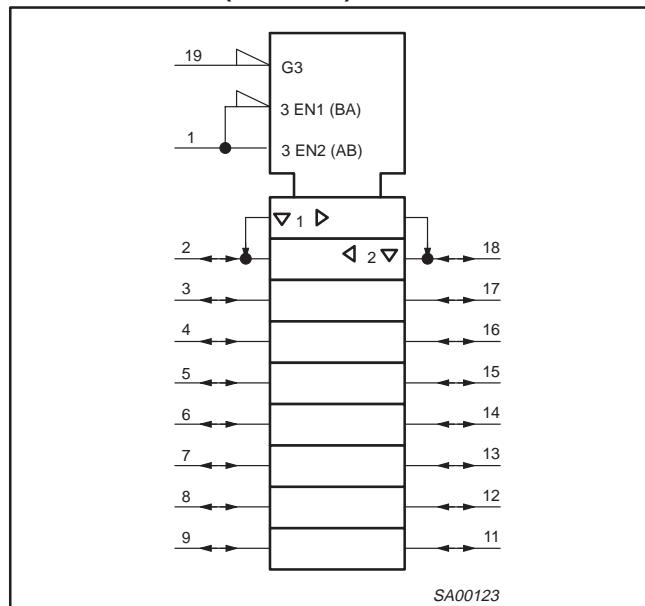
## Octal transceiver with direction pin (3-State)

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## LOGIC SYMBOL



## LOGIC SYMBOL (IEEE/IEC)



## FUNCTION TABLE

INPUTS		INPUTS/OUTPUTS	
$\overline{OE}$	DIR	An	Bn
L	L	An = Bn	Inputs
L	H	Inputs	Bn = An
H	X	Z	Z

H = High voltage level

L = Low voltage level

X = Don't care

Z = High impedance "off" state

ABSOLUTE MAXIMUM RATINGS<sup>1,2</sup>

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 <sup>3</sup>		-1.2 to +7.0	V
$I_{OK}$	DC output diode current	$V_O < 0$	-50	mA
$V_{OUT}$	DC output voltage <sup>3</sup>	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.

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## 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	5	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			
$V_{IK}$	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	$V_{CC} = 4.5\text{ V}$ ; $I_{OL} = 64\text{ mA}$ ; $V_I = V_{IL}$ or $V_{IH}$		0.42	0.55		0.55	V
$I_I$	Input leakage current	$V_{CC} = 5.5\text{ V}$ ; $V_I = \text{GND}$ or $5.5\text{ V}$		$\pm 0.01$	$\pm 1.0$		$\pm 1.0$	$\mu\text{A}$
		$V_{CC} = 5.5\text{ V}$ ; $V_I = \text{GND}$ or $5.5\text{ V}$		$\pm 5$	$\pm 100$		$\pm 100$	$\mu\text{A}$
$I_{OFF}$	Power-off leakage current	$V_{CC} = 0.0\text{ V}$ ; $V_I$ or $V_O \leq 4.5\text{ V}$		$\pm 5.0$	$\pm 100$		$\pm 100$	$\mu\text{A}$
$I_{PU}/I_{PD}$	Power-up/down 3-State output current <sup>3</sup>	$V_{CC} = 2.0\text{ V}$ ; $V_O = 0.5\text{ V}$ ; $V_I = \text{GND}$ or $V_{CC}$ ; $V_{OE} = \text{Don't care}$		$\pm 5.0$	$\pm 50$		$\pm 50$	$\mu\text{A}$
$I_{IH} + I_{OZH}$	3-State output High current	$V_{CC} = 5.5\text{ V}$ ; $V_O = 2.7\text{ V}$ ; $V_I = V_{IL}$ or $V_{IH}$		5.0	50		50	$\mu\text{A}$
$I_{IL} + I_{OZL}$	3-State output Low current	$V_{CC} = 5.5\text{ V}$ ; $V_O = 0.5\text{ V}$ ; $V_I = V_{IL}$ or $V_{IH}$		-5.0	-50		-50	$\mu\text{A}$
$I_{CEX}$	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	$\mu\text{A}$
$I_O$	Output current <sup>1</sup>	$V_{CC} = 5.5\text{ V}$ ; $V_O = 2.5\text{ V}$	-40	-100	-180	-40	-180	mA
$I_{CCH}$	Quiescent supply current	$V_{CC} = 5.5\text{ V}$ ; Outputs HIGH; $V_I = \text{GND}$ or $V_{CC}$		50	250		250	$\mu\text{A}$
$I_{CCL}$		$V_{CC} = 5.5\text{ V}$ ; Outputs LOW; $V_I = \text{GND}$ or $V_{CC}$		24	30		30	mA
$I_{CCZ}$		$V_{CC} = 5.5\text{ V}$ ; Outputs 3-State; $V_I = \text{GND}$ or $V_{CC}$		50	250		250	$\mu\text{A}$
$\Delta I_{CC}$	Additional supply current per input pin <sup>2</sup>	Outputs enabled, one input at 3.4 V, 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 3.4 V, other inputs at $V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$		50	250		250	$\mu\text{A}$
		Outputs 3-State, one enable input at 3.4 V, other inputs at $V_{CC}$ or GND; $V_{CC} = 5.5\text{ V}$		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. For  $V_{CC} = 2.1\text{ V}$  to  $V_{CC} = 5\text{ V} \pm 10\%$ , a transition time of up to 100  $\mu\text{sec}$  is permitted.

## Octal transceiver with direction pin (3-State)

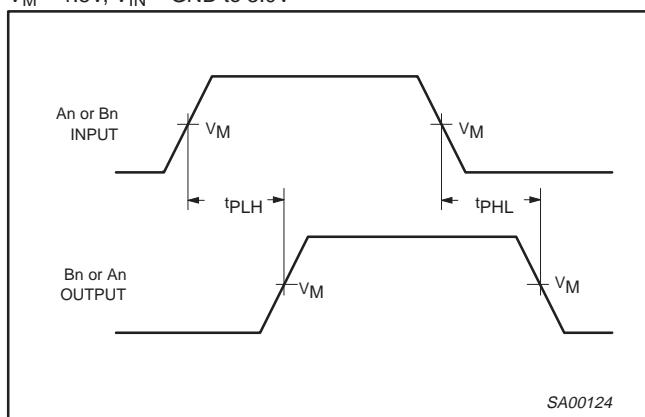
74ABT245

## AC CHARACTERISTICS

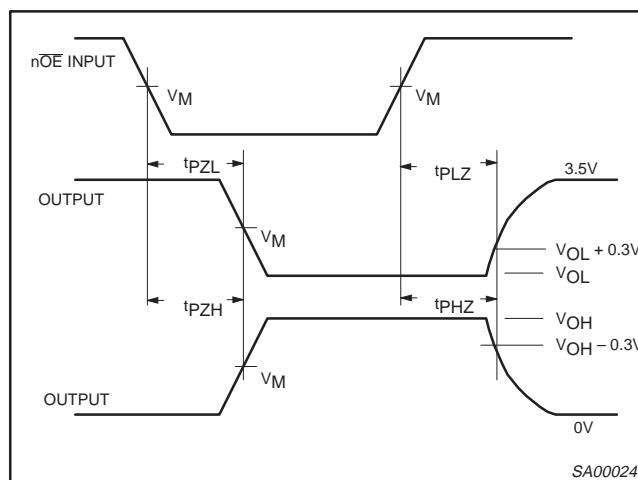
 $GND = 0 \text{ V}$ ;  $t_R = t_F = 2.5 \text{ ns}$ ;  $C_L = 50 \text{ pF}$ ,  $R_L = 500 \Omega$ 

SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT	
			$T_{amb} = +25 \text{ }^{\circ}\text{C}$ $V_{CC} = +5.0 \text{ V}$			$T_{amb} = -40 \text{ }^{\circ}\text{C} \text{ to } +85 \text{ }^{\circ}\text{C}$ $V_{CC} = +5.0 \text{ V} \pm 0.5 \text{ V}$			
			Min	Typ	Max	Min	Max		
$t_{PLH}$ $t_{PHL}$	Propagation delay An to Bn or Bn to An	1	1.0 1.0	2.2 2.9	4.1 4.2	1.0 1.0	4.6 4.6	ns	
$t_{PZH}$ $t_{PZL}$	Output enable time to HIGH and LOW level	2	1.3 2.3	3.0 4.0	4.8 5.8	1.3 2.3	5.3 6.3	ns	
$t_{PHZ}$ $t_{PLZ}$	Output disable time from HIGH and LOW Level	2	1.0 1.0	4.7 4.1	6.2 5.8	1.0 1.0	7.2 6.3	ns	

## AC WAVEFORMS

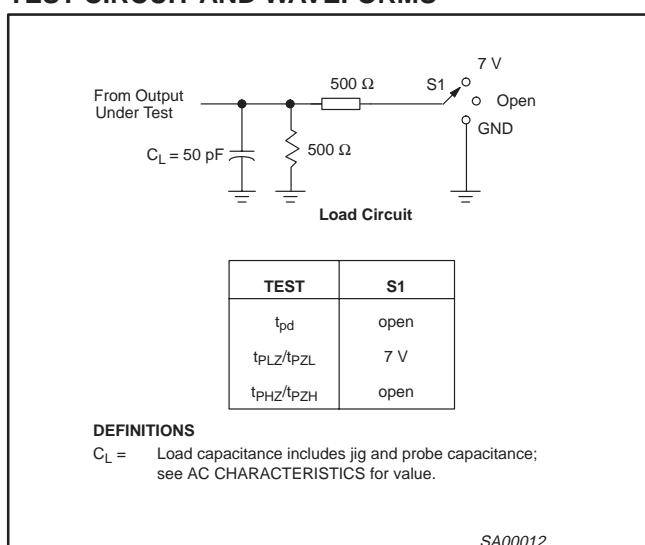
 $V_M = 1.5 \text{ V}$ ,  $V_{IN} = \text{GND to } 3.0 \text{ V}$ 

Waveform 1. Waveforms showing the input to output propagation delays



Waveform 2. Waveforms showing the 3-State Output Enable and Disable times

## TEST CIRCUIT AND WAVEFORMS

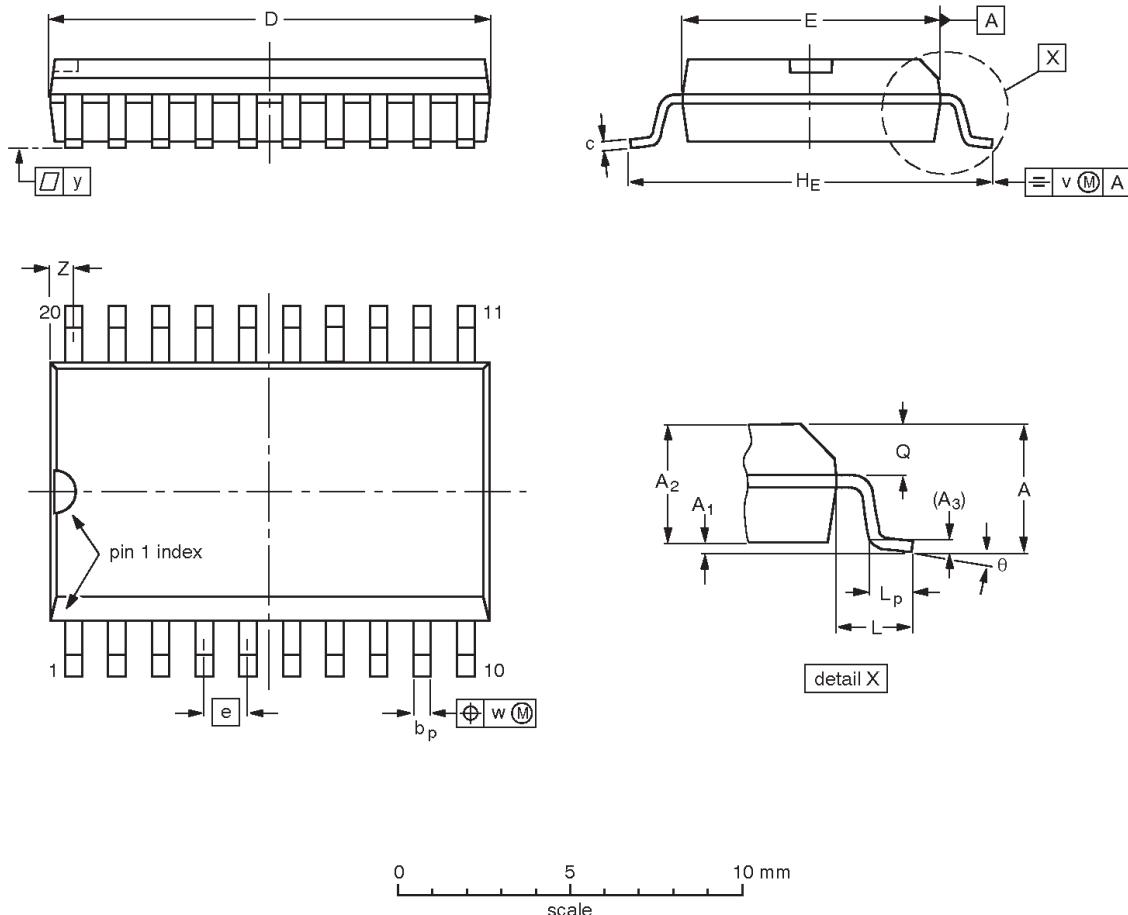


## Octal transceiver with direction pin (3-State)

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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 <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>	theta
mm	2.65 0.10	0.30 2.25	2.45	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 0.004	0.012 0.089	0.096	0.01	0.019 0.014	0.013 0.009	0.51 0.49	0.30 0.29	0.050	0.419 0.394	0.055	0.043 0.016	0.043 0.039	0.01	0.01	0.004 0.016	0.035 0.016	

## Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

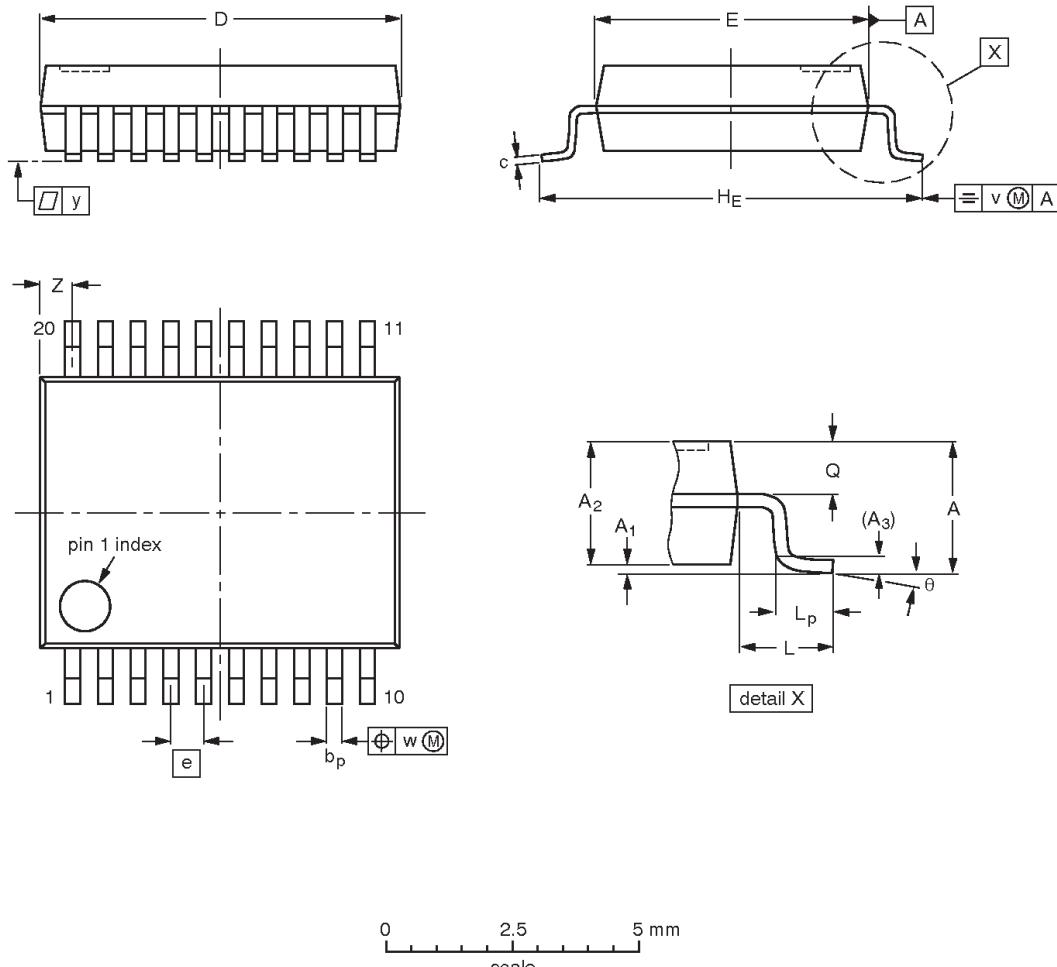
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT163-1	075E04	MS-013				97-05-22 99-12-27

## Octal transceiver with direction pin (3-State)

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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 <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>	$\theta$
mm	2.0 0.05	0.21 1.65	1.80	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 0.5	0.9 0.5	8° 0°

## Note

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

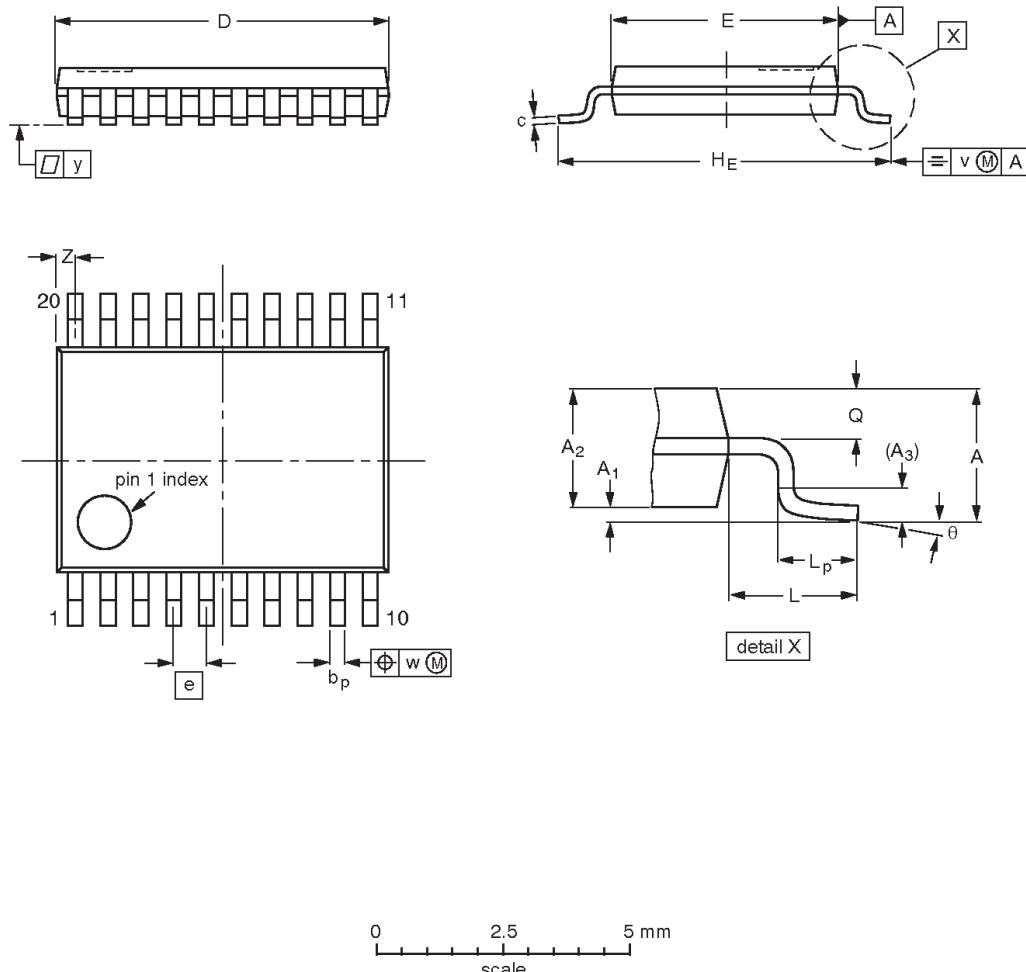
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT339-1		MO-150				95-02-04 99-12-27

## Octal transceiver with direction pin (3-State)

74ABT245

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 <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 <sup>(1)</sup>	θ
mm	1.10 0.05	0.15 0.08	0.95 0.80	0.25 0.19	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-153				-95-02-04 99-12-27

## Octal transceiver with direction pin (3-State)

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## REVISION HISTORY

Rev	Date	Description
_3	20030206	<b>Product data (9397 750 11087); ECN 853-1447 29305 of 17 December 2002; Supersedes Product specification (9397 750 03467) of 1998 Jan 16.</b> Modifications: <ul style="list-style-type: none"><li>• Delete all references to N package. DIP20 package option discontinued.</li></ul>
_2	19980116	<b>Product specification (9397 750 03467) 1998 Jan 16; ECN 853-1447 18867 of 16 January 1998. Supersedes data of 1996 Sep 10.</b>

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Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> [3]	Definitions
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