

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.

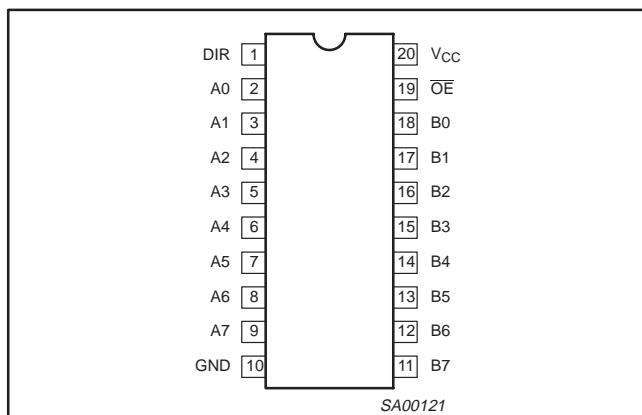
QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS $T_{amb} = 25\text{ }^{\circ}\text{C}; \text{GND} = 0\text{ V}$ | 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 | μA |

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



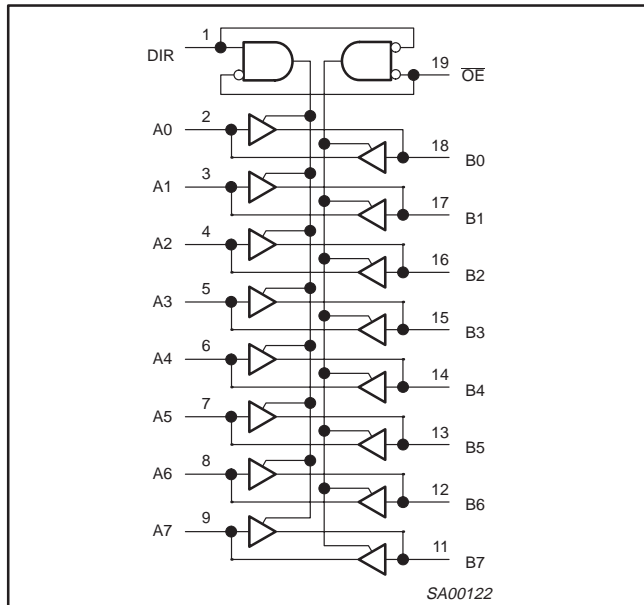
PIN DESCRIPTION

| 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 |

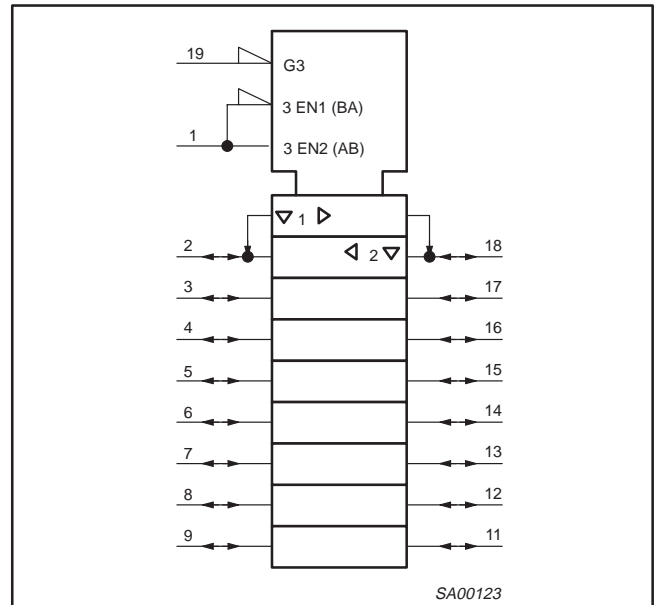
Octal transceiver with direction pin (3-State)

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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^{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 transceiver with direction pin (3-State)

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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 |
| Δt/Δv | 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 °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} = 64 mA; V _I = V _{IL} or V _{IH} | | 0.42 | 0.55 | | 0.55 | V |
| I _I | Input leakage current | Control pins V _{CC} = 5.5 V; V _I = GND or 5.5 V | | ±0.01 | ±1.0 | | ±1.0 | μA |
| | | Data pins V _{CC} = 5.5 V; V _I = GND or 5.5 V | | ±5 | ±100 | | ±100 | μA |
| I _{OFF} | Power-off leakage current | V _{CC} = 0.0 V; V _I or V _O ≤ 4.5 V | | ±5.0 | ±100 | | ±100 | μA |
| I _{PU} /I _{PD} | Power-up/down 3-State output current ³ | 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 = 2.7 V; V _I = V _{IL} or V _{IH} | | 5.0 | 50 | | 50 | μA |
| I _{IL} + I _{OZL} | 3-State output Low current | V _{CC} = 5.5 V; V _O = 0.5 V; V _I = V _{IL} or V _{IH} | | -5.0 | -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 | -40 | -100 | -180 | -40 | -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 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 | | 50 | 250 | | 250 | μA |
| | | 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:

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

Octal transceiver with direction pin (3-State)

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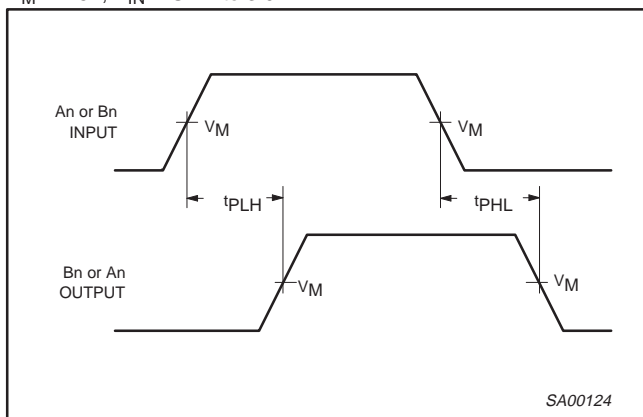
AC CHARACTERISTICS

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

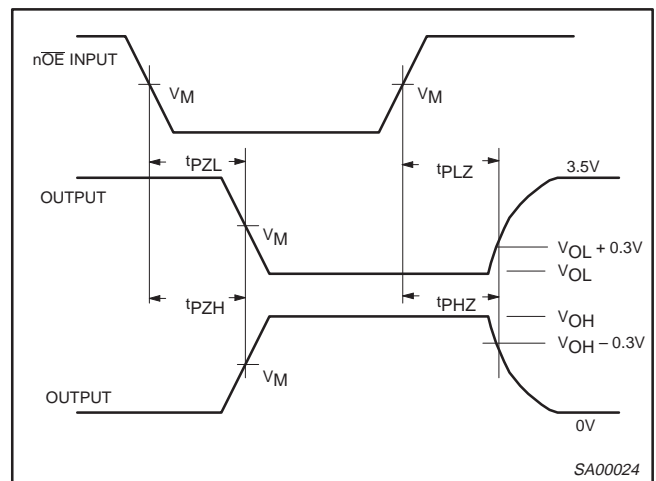
| SYMBOL | PARAMETER | WAVEFORM | LIMITS | | | | | UNIT |
|------------------------|--|----------|---|-----|-----|---|-----|------|
| | | | $T_{amb} = +25 \text{ }^\circ\text{C}$ $V_{CC} = +5.0 \text{ V}$ | | | $T_{amb} = -40 \text{ }^\circ\text{C to } +85 \text{ }^\circ\text{C}$ $V_{CC} = +5.0 \text{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

| 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.

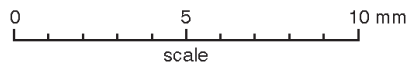
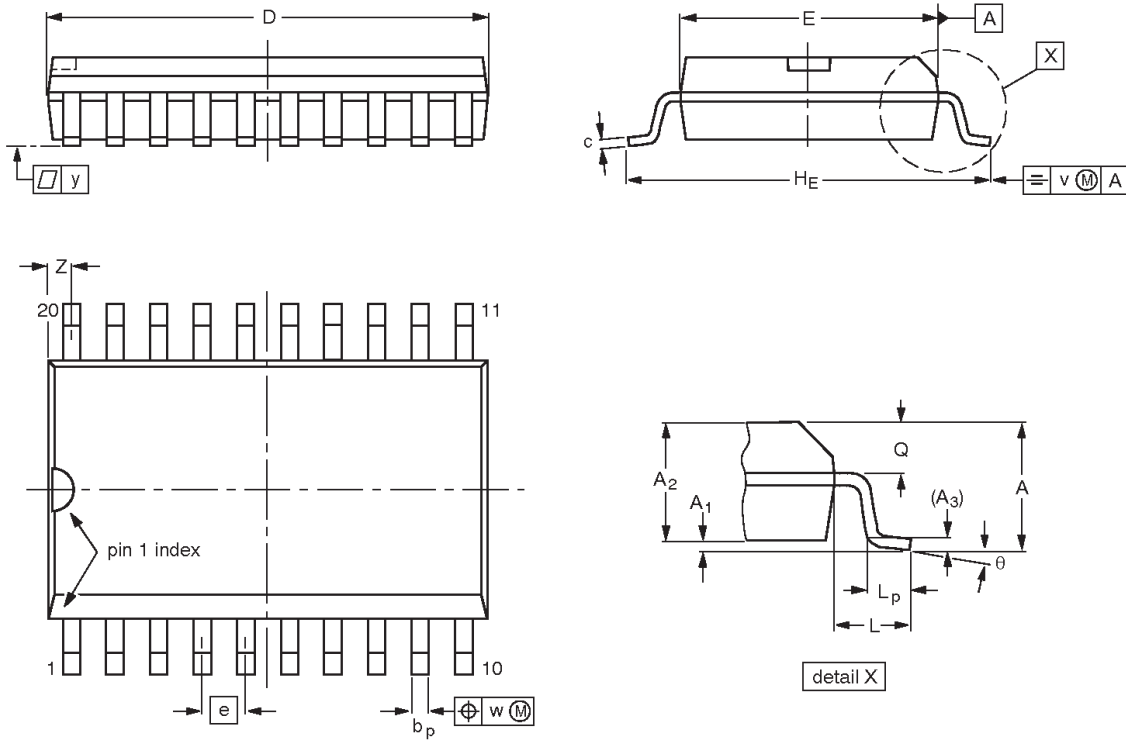
SA00012

Octal transceiver with direction pin (3-State)

74ABT245

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 | 0.419 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 maximum per side are not included.

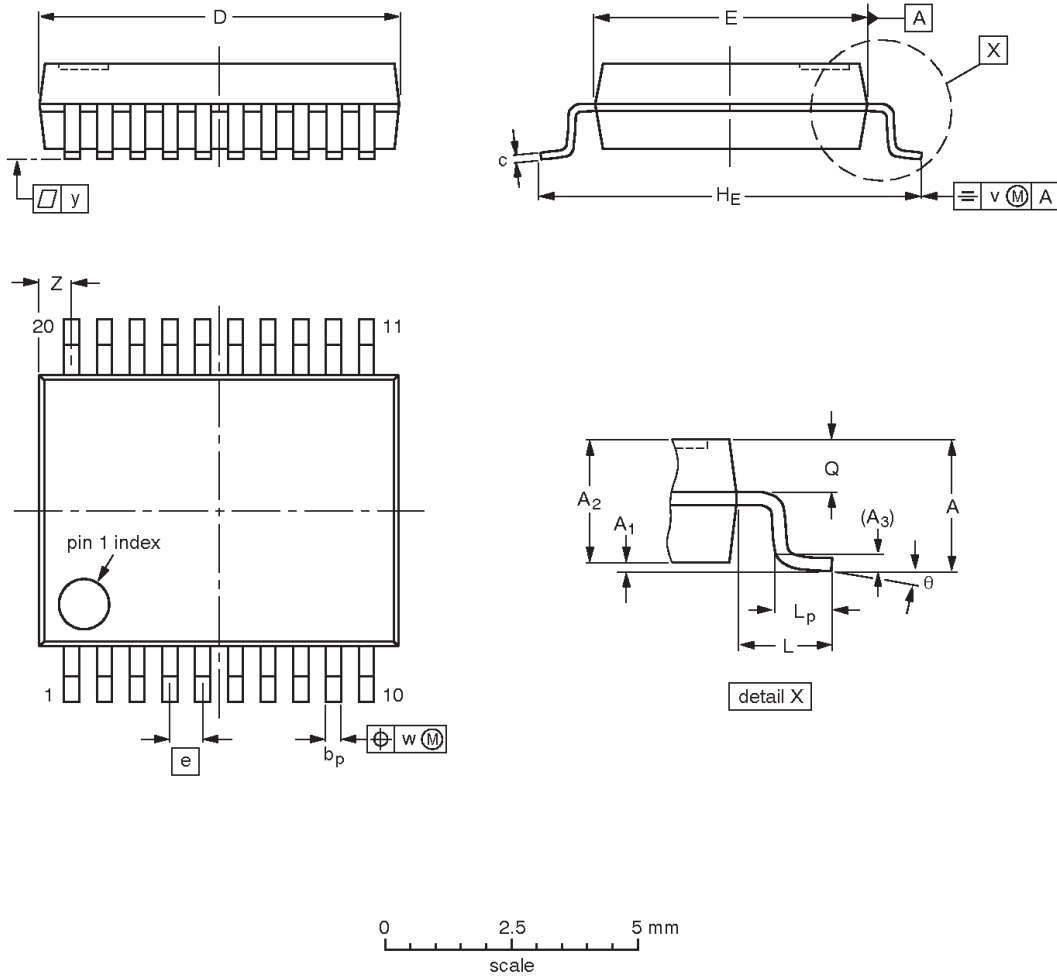
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT163-1 | 075E04 | MS-013 | | | | 97-05-22 99-12-27 |

Octal transceiver with direction pin (3-State)

74ABT245

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.

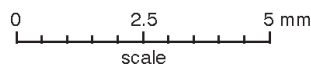
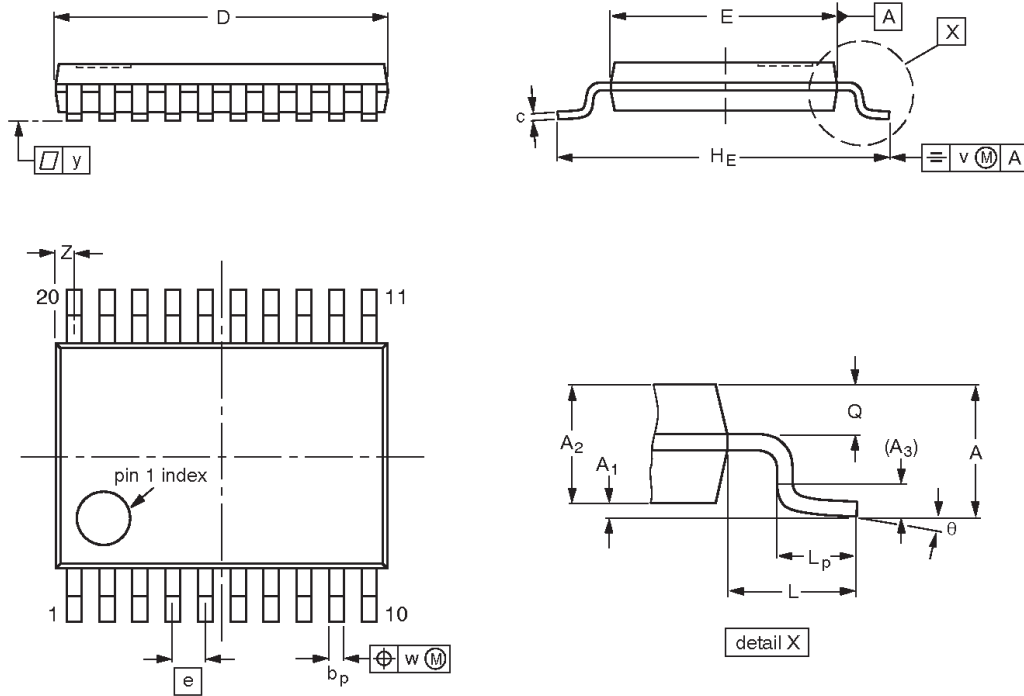
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|--------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT339-1 | | MO-150 | | | | 95-02-04 99-12-27 |

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 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-153 | | | | 95-02-04 99-12-27 |

Octal transceiver with direction pin (3-State)

74ABT245

REVISION HISTORY

| Rev | Date | Description |
|-----|----------|---|
| _3 | 20030206 | Product data (9397 750 11087); ECN 853-1447 29305 of 17 December 2002; Supersedes Product specification (9397 750 03467) of 1998 Jan 16. Modifications: • Delete all references to N package. DIP20 package option discontinued. |
| _2 | 19980116 | Product specification (9397 750 03467) 1998 Jan 16; ECN 853-1447 18867 of 16 January 1998. Supersedes data of 1996 Sep 10. |

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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[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.

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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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Document order number:

9397 750 11087

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