

DATA SHEET

74ABT623

Octal transceiver with dual enable,
non-inverting; (3-State)

Product specification

Supersedes data of 1996 Sep 25

IC23 Data Handbook

1998 Jan 16

Octal transceiver with dual enable, non-inverting (3-State)

74ABT623

FEATURES

- Octal bidirectional bus interface
- 3-State buffers
- Power-up 3-State
- Output capability: +64mA/-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
- Inputs are disabled during 3-State mode

DESCRIPTION

The 74ABT623 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT623 device is an octal transceiver featuring non-inverting 3-State bus compatible outputs in both send and receive directions. The 74ABT623 is designed for asynchronous two-way communication between data buses. The control function implementation allows for maximum flexibility in timing. This device allows data transmission from the A bus to the B bus or from the B bus to the A bus, depending upon the logic levels at the Enable inputs (OEBA and OEAB). The Enable inputs can be used to disable the device so that the buses are effectively isolated.

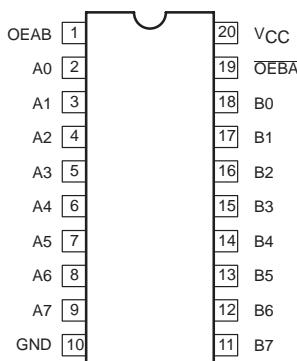
QUICK REFERENCE DATA

| 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 | $C_L = 50\text{pF}$; $V_{CC} = 5\text{V}$ | 2.6 2.7 | ns |
| C_{IN} | Input capacitance OEAB, OEBA | $V_I = 0\text{V}$ or V_{CC} | 4 | pF |
| $C_{I/O}$ | I/O 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 | 74ABT623 N | 74ABT623 N | SOT146-1 |
| 20-Pin plastic SO | −40°C to +85°C | 74ABT623 D | 74ABT623 D | SOT163-1 |
| 20-Pin Plastic SSOP Type II | −40°C to +85°C | 74ABT623 DB | 74ABT623 DB | SOT339-1 |
| 20-Pin Plastic TSSOP Type I | −40°C to +85°C | 74ABT623 PW | 74ABT623PW DH | SOT360-1 |

PIN CONFIGURATION



SA00189

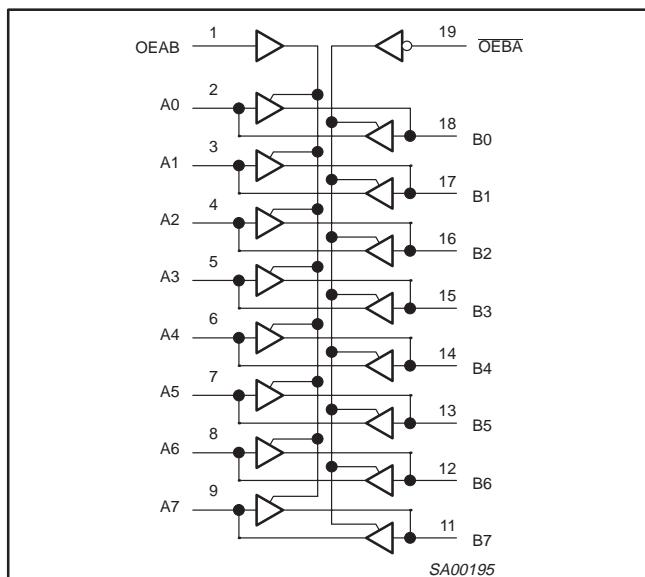
PIN DESCRIPTION

| PIN NUMBER | SYMBOL | NAME AND FUNCTION |
|--------------------------------|-----------------|-----------------------------------------------------|
| 1 | OEAB | Output enable input, A side to B side (active-High) |
| 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 | OEBA | Output enable input, B side to A side (active-Low) |
| 10 | GND | Ground (0V) |
| 20 | V _{CC} | Positive supply voltage |

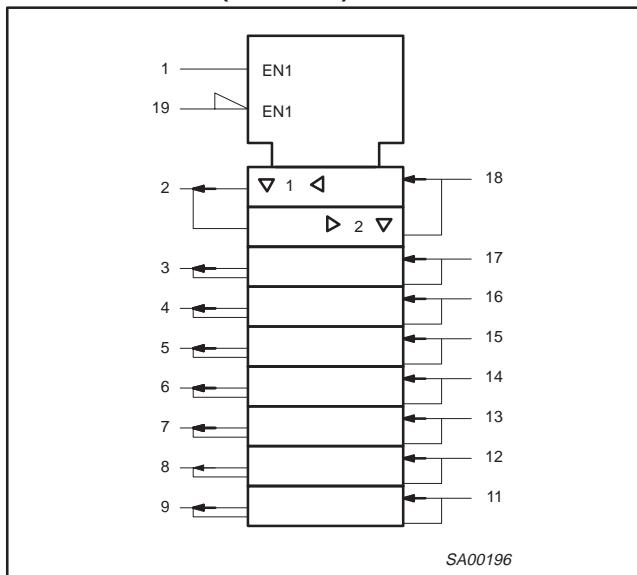
Octal transceiver with dual enable, non-inverting
(3-State)

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LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



FUNCTION TABLE

| INPUTS | | INPUTS/OUTPUTS | |
|--------|------|----------------|---------|
| OEBA | OEAB | An | Bn |
| L | L | An = Bn | Inputs |
| H | H | Inputs | Bn = An |
| H | L | Z | Z |
| L | H | An = Bn | Bn = An |

H = High voltage level

L = Low voltage level

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:

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.

Octal transceiver with dual enable, non-inverting
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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 | 10 | ns/V |
| T_{amb} | Operating free-air temperature range | -40 | +85 | °C |

DC ELECTRICAL CHARACTERISTICS

| SYMBOL | PARAMETER | TEST CONDITIONS | LIMITS | | | UNIT | | |
|--------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------|------------|--------------------------------------------|-----------|---------|---------|
| | | | $T_{amb} = +25^{\circ}C$ | | $T_{amb} = -40^{\circ}C$ to $+85^{\circ}C$ | | | |
| | | | Min | Typ | Max | | | |
| V_{IK} | Input clamp voltage | $V_{CC} = 4.5V$; $I_{IK} = -18mA$ | | -0.9 | -1.2 | -1.2 | V | |
| V_{OH} | High-level output voltage | $V_{CC} = 4.5V$; $I_{OH} = -3mA$; $V_I = V_{IL}$ or V_{IH} | 2.5 | 2.9 | | 2.5 | V | |
| | | $V_{CC} = 5.0V$; $I_{OH} = -3mA$; $V_I = V_{IL}$ or V_{IH} | 3.0 | 3.4 | | 3.0 | V | |
| | | $V_{CC} = 4.5V$; $I_{OH} = -32mA$; $V_I = V_{IL}$ or V_{IH} | 2.0 | 2.4 | | 2.0 | V | |
| V_{OL} | Low-level output voltage | $V_{CC} = 4.5V$; $I_{OL} = 64mA$; $V_I = V_{IL}$ or V_{IH} | | 0.42 | 0.55 | 0.55 | V | |
| I_I | Input leakage current Control pins | $V_{CC} = 5.5V$; $V_I = GND$ or $5.5V$ | | ± 0.01 | ± 1.0 | ± 1.0 | μA | |
| | | $V_{CC} = 5.5V$; $V_I = GND$ or $5.5V$ | | ± 5.0 | ± 100 | ± 100 | μA | |
| I_{OFF} | Power-off leakage current | $V_{CC} = 0.0V$; V_I or $V_O \leq 4.5V$ | | ± 5.0 | ± 100 | ± 100 | μA | |
| $I_{PU/IPD}$ | Power-up/down 3-State output current ³ | $V_{CC} = 2.0V$; $V_O = 0.5V$; $V_I = GND$ or V_{CC} ; $V_{OE} = V_{CC}$; $V_{OE} = GND$ | | ± 5.0 | ± 50 | ± 50 | μA | |
| $I_{IH} + I_{OZH}$ | 3-State output High current | $V_{CC} = 5.5V$; $V_O = 2.7V$; $V_I = V_{IL}$ or V_{IH} | | 5.0 | 50 | 50 | μA | |
| $I_{IL} + I_{OZL}$ | 3-State output Low current | $V_{CC} = 5.5V$; $V_O = 0.5V$; $V_I = V_{IL}$ or V_{IH} | | -5.0 | -50 | -50 | μA | |
| I_{CEX} | Output High leakage current | $V_{CC} = 5.5V$; $V_O = 5.5V$; $V_I = GND$ or V_{CC} | | 5.0 | 50 | 50 | μA | |
| I_O | Output current ¹ | $V_{CC} = 5.5V$; $V_O = 2.5V$ | -50 | -100 | -180 | -50 | -180 | mA |
| I_{CCH} | Quiescent supply current | $V_{CC} = 5.5V$; Outputs High, $V_I = GND$ or V_{CC} | | 50 | 250 | | 250 | μA |
| I_{CCL} | | $V_{CC} = 5.5V$; Outputs Low, $V_I = GND$ or V_{CC} | | 24 | 30 | | 30 | mA |
| I_{CCZ} | | $V_{CC} = 5.5V$; Outputs 3-State; $V_I = GND$ or V_{CC} | | 50 | 250 | | 50 | 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; $V_{CC} = 5.5V$ | | 0.5 | 1.5 | | 1.5 | mA |
| | | Outputs 3-State, one data input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5V$ | | 50 | 250 | | 250 | μA |
| | | Outputs 3-State, one enable input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5V$ | | 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. For $V_{CC} = 2.1V$ to $V_{CC} = 5V \pm 10\%$, a transition time of up to 100μsec is permitted.

Octal transceiver with dual enable, non-inverting (3-State)

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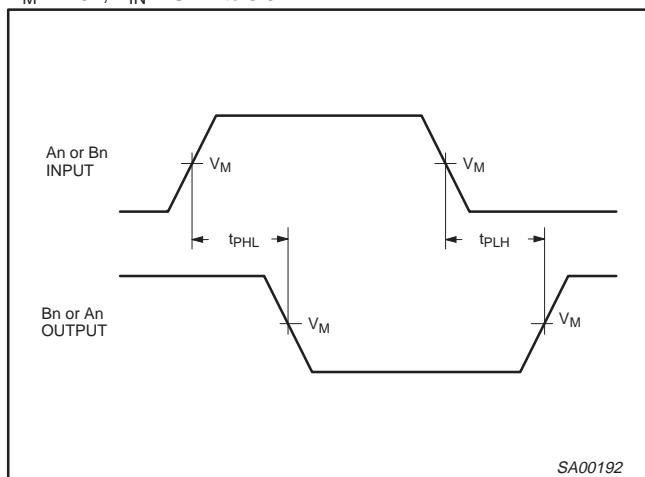
AC CHARACTERISTICS

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

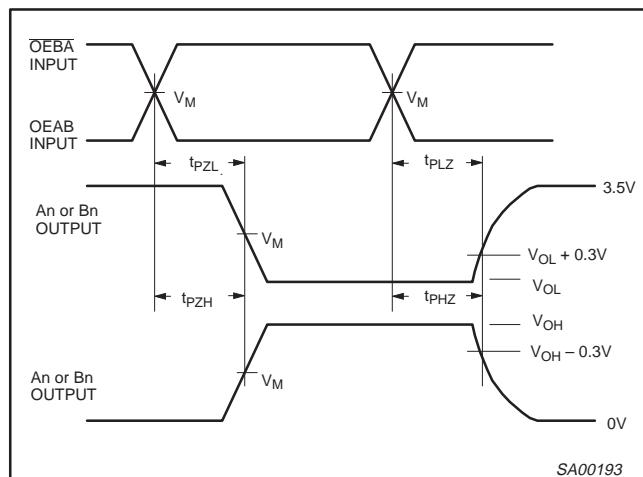
| SYMBOL | PARAMETER | WAVEFORM | LIMITS | | | | | UNIT | |
|------------------------|----------------------------------------------|----------|----------------------------------------------------------|------------|------------|------------------------------------------------------------------------------------------------|------------|------|--|
| | | | $T_{amb} = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ | | | $T_{amb} = -40^\circ\text{C to } +85^\circ\text{C}$ $V_{CC} = +5.0\text{V} \pm 0.5\text{V}$ | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t_{PLH} t_{PHL} | Propagation delay An to Bn or Bn to An | 1 | 1.0 1.0 | 2.6 2.7 | 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 | 1.7 1.7 | 3.4 4.8 | 6.5 6.5 | 1.7 1.7 | 7.5 7.5 | ns | |
| t_{PHZ} t_{PLZ} | Output disable time to High and Low level | 2 | 1.7 1.7 | 3.6 3.1 | 6.5 6.5 | 1.7 1.7 | 7.5 7.5 | ns | |

AC WAVEFORMS

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

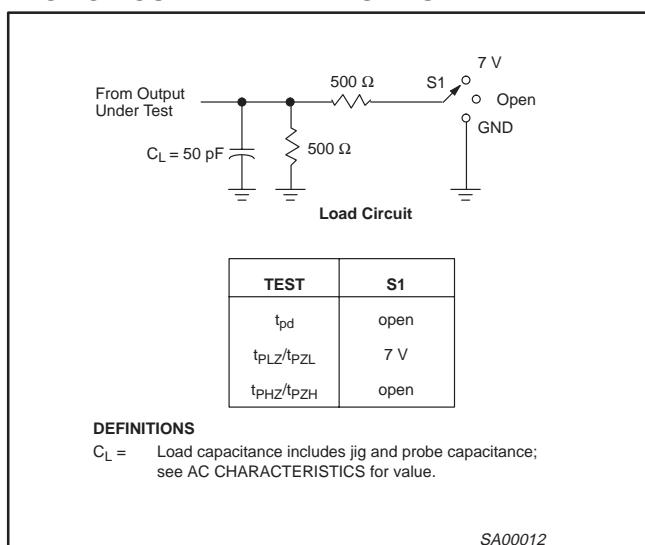


Waveform 1. Waveforms Showing the Input to Output Propagation Delays



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

TEST CIRCUIT AND WAVEFORMS

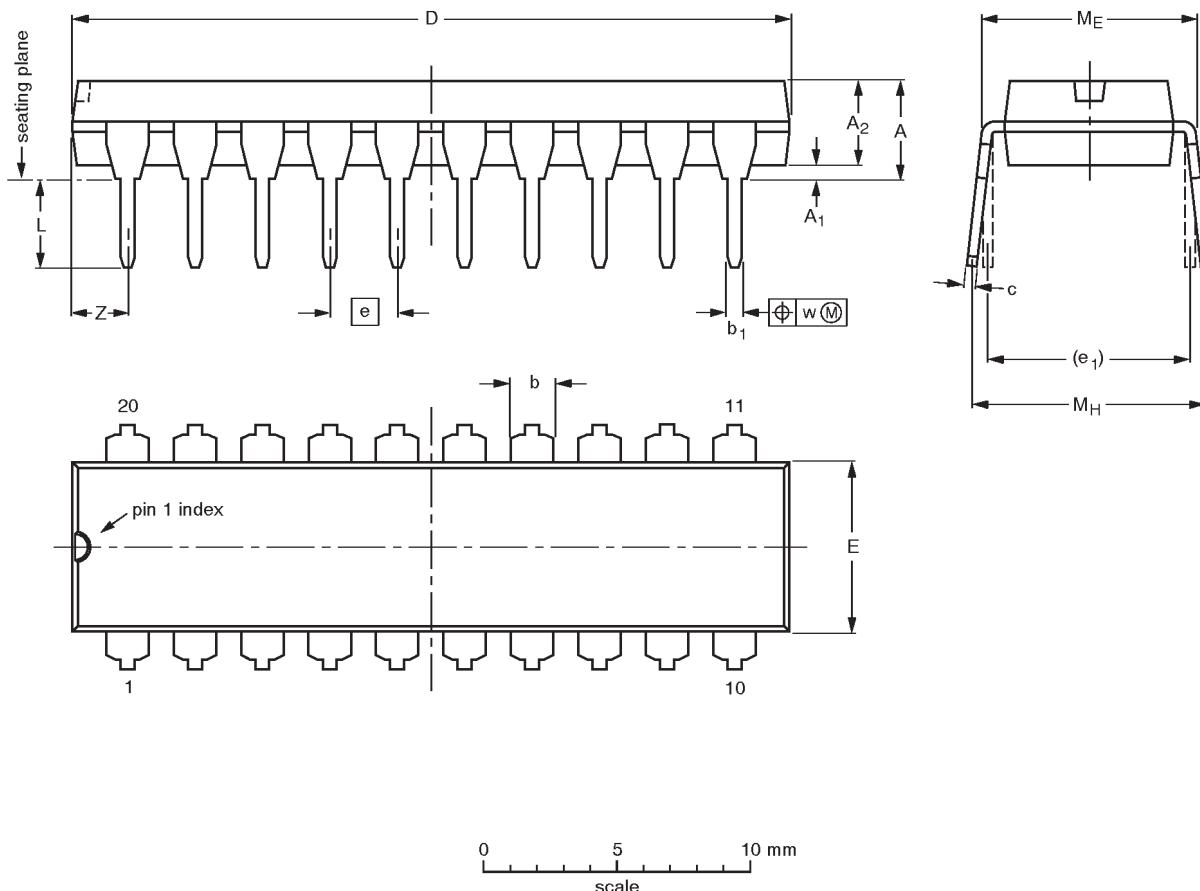


Octal transceiver with dual enable, non-inverting
(3-State)

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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.

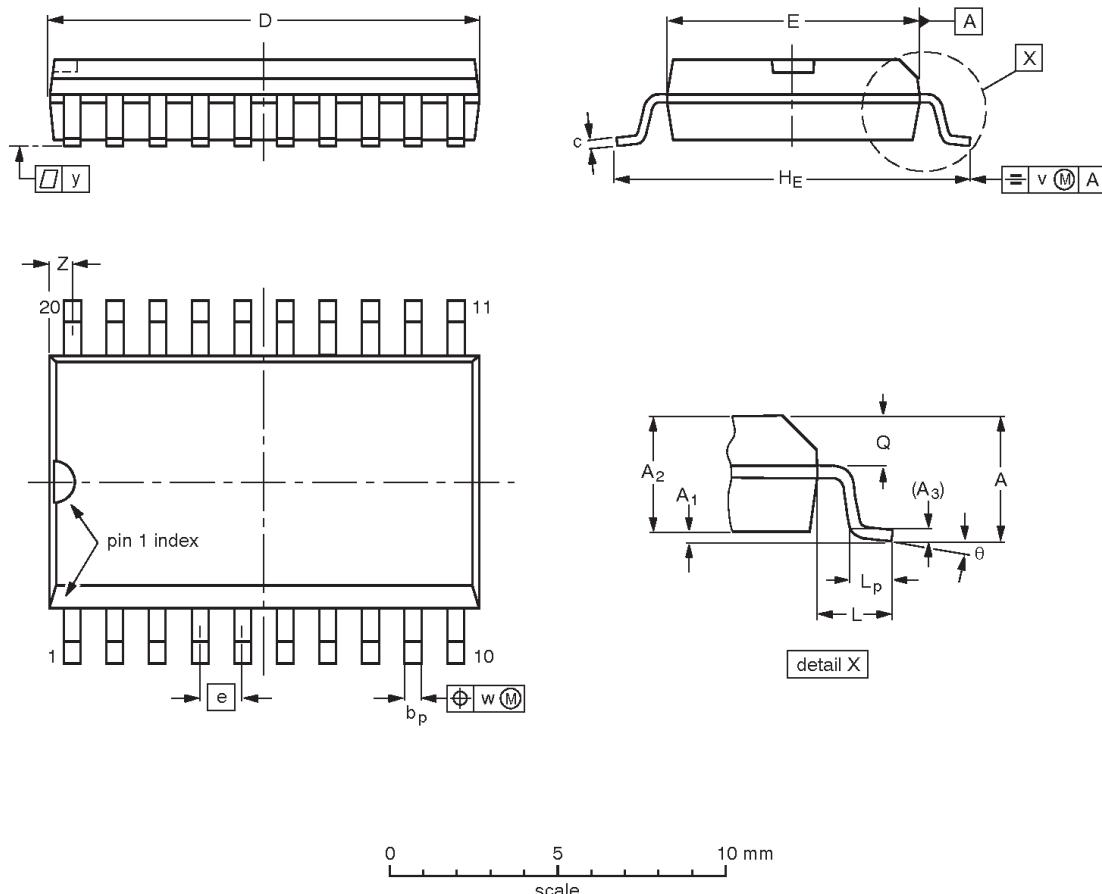
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|--|------------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT146-1 | | | SC603 | | | 92-11-17 95-05-24 |

Octal transceiver with dual enable, non-inverting
(3-State)

74ABT623

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 0.10 | 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 | 0.42 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.

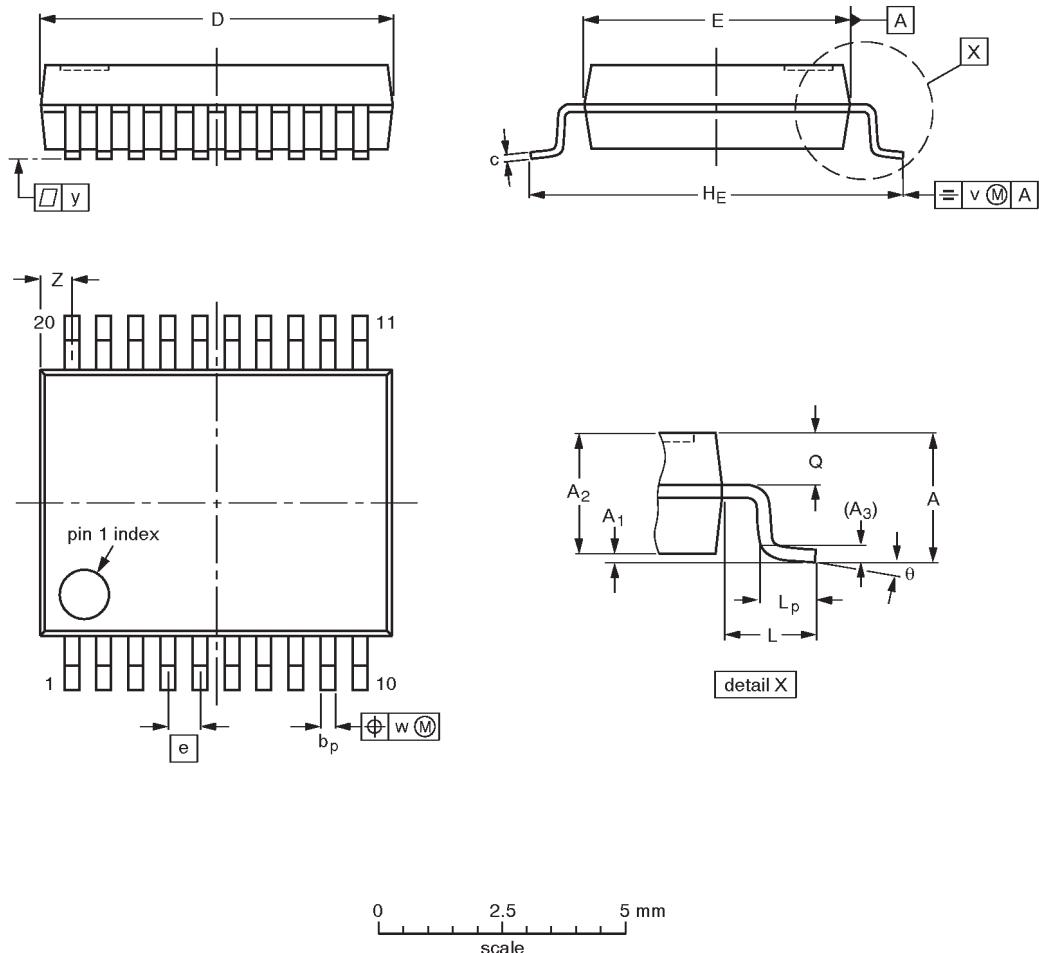
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|----------|------|------------------------|----------------------|
| | IEC | JEDEC | EIAJ | | |
| SOT163-1 | 075E04 | MS-013AC | | | 92-11-17 95-01-24 |

Octal transceiver with dual enable, non-inverting
(3-State)

74ABT623

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 0.05 | 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 | 1.03 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.

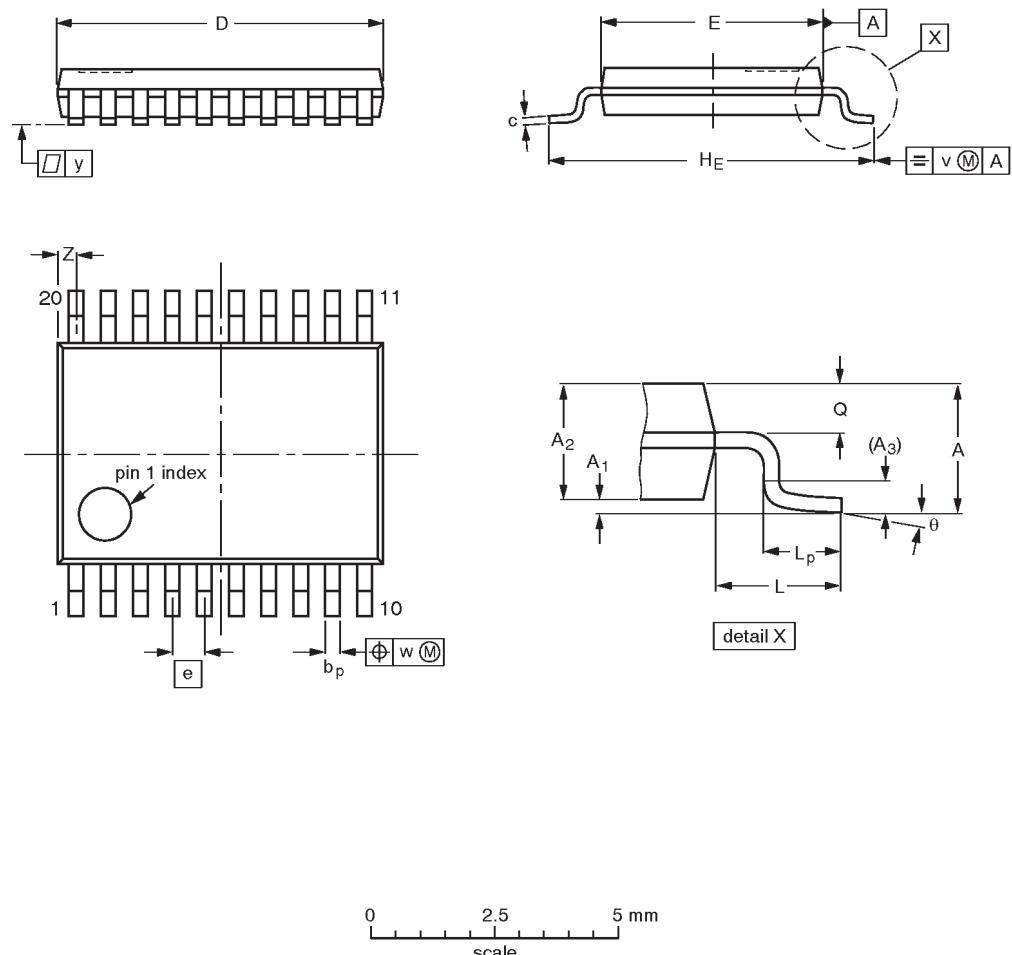
| OUTLINE VERSION | REFERENCES | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|----------|------|------------------------|----------------------|
| | IEC | JEDEC | EIAJ | | |
| SOT339-1 | | MO-150AE | | | 93-09-08 95-02-04 |

Octal transceiver with dual enable, non-inverting
(3-State)

74ABT623

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 0.05 | 0.15 0.08 | 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 transceiver with dual enable, non-inverting (3-State)

74ABT623

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. |
| Preliminary specification | Qualification | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
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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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