

DATA SHEET

74ABT540

Octal buffer, inverting (3-State)

Product specification
Supersedes data of 1996 Oct 08
IC23 Data Handbook

1998 Jan 16

Octal buffer, inverting (3-State)

74ABT540

FEATURES

- Octal bus interface
- 3-State buffers
- Live insertion/extraction permitted
- Efficient pinout to facilitate PC board layout
- Output capability: +64mA/−32mA
- Latch-up protection exceeds 500mA per Jedec JC40.2 Std 17
- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model
- Power-up 3-State

DESCRIPTION

The 74ABT540 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed and high output drive.

The 74ABT540 device is an octal inverting buffer that is ideal for driving bus lines. The device features input and outputs on opposite sides of the package to facilitate printed circuit board layout.

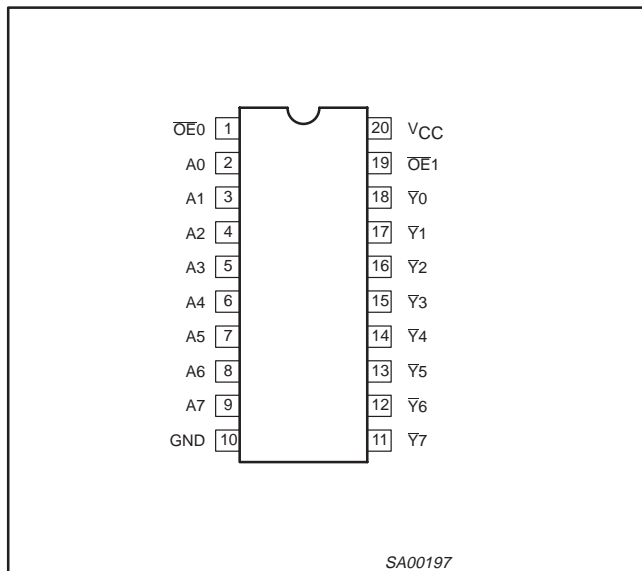
QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS $T_{amb} = 25^{\circ}\text{C}; \text{GND} = 0\text{V}$ | TYPICAL | UNIT |
|------------------------|--|--|---------|---------------|
| t_{PLH} t_{PHL} | Propagation delay An to \bar{Y}_n | $C_L = 50\text{pF}; V_{CC} = 5\text{V}$ | 3.1 | 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 |

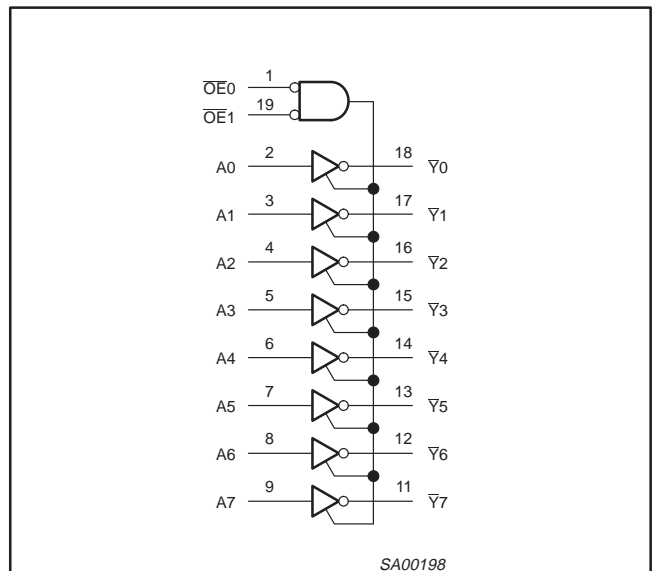
ORDERING INFORMATION

| PACKAGES | TEMPERATURE RANGE | OUTSIDE NORTH AMERICA | NORTH AMERICA | DWG NUMBER |
|-----------------------------|-------------------|-----------------------|---------------|------------|
| 20-Pin Plastic DIP | −40°C to +85°C | 74ABT540 N | 74ABT540 N | SOT146-1 |
| 20-Pin plastic SO | −40°C to +85°C | 74ABT540 D | 74ABT540 D | SOT163-1 |
| 20-Pin Plastic SSOP Type II | −40°C to +85°C | 74ABT540 DB | 74ABT540 DB | SOT339-1 |
| 20-Pin Plastic TSSOP Type I | −40°C to +85°C | 74ABT540 PW | 74ABT540PW DH | SOT360-1 |

PIN CONFIGURATION



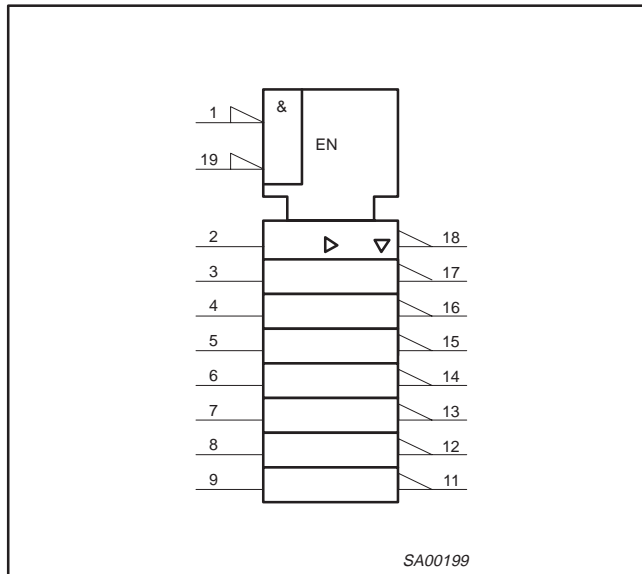
LOGIC SYMBOL



Octal buffer, inverting (3-State)

74ABT540

LOGIC SYMBOL (IEEE/IEC)



PIN DESCRIPTION

| PIN NUMBER | SYMBOL | NAME AND FUNCTION |
|--------------------------------|----------------------------------|-------------------------|
| 2, 3, 4, 5, 6, 7, 8, 9 | A0 – A7 | Data inputs |
| 18, 17, 16, 15, 14, 13, 12, 11 | $\bar{Y}0 - \bar{Y}7$ | Data outputs |
| 1, 19 | $\overline{OE}0, \overline{OE}1$ | Output enables |
| 10 | GND | Ground (0V) |
| 20 | V _{CC} | Positive supply voltage |

FUNCTION TABLE

| INPUTS | | | OUTPUTS |
|------------------|------------------|----------------|-------------|
| $\overline{OE}0$ | $\overline{OE}1$ | A _n | \bar{Y}_n |
| L | L | L | H |
| L | L | H | L |
| X | H | X | Z |
| H | X | X | 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.

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74ABT540

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 | 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} = 4.5V; 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 | V _{CC} = 5.5V; V _I = GND or 5.5V | | ±0.01 | ±1.0 | | ±1.0 | μA |
| I _{OFF} | Power-off leakage current | V _{CC} = 0.0V; V _I or V _O ≤ 4.5V | | ±5.0 | ±100 | | ±100 | μA |
| I _{PU} /I _{PD} | Power-up/down 3-State output current ³ | V _{CC} = 2.1V; V _O = 0.5V; V _I = GND or V _{CC} ; V _{OE} = Don't care | | ±5.0 | ±50 | | ±50 | μA |
| 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 _{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 | mA |
| 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 | | 250 | μA |
| ΔI _{CC} | Additional supply current per input pin ² | Outputs enabled, one 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 | | 0.5 | 50 | | 50 | 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. From V_{CC} = 2.1V to V_{CC} = 5V ± 10% a transition time of up to 100μsec is permitted.

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74ABT540

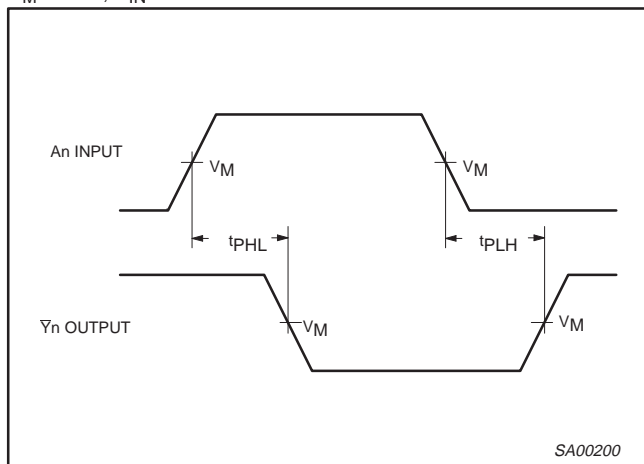
AC CHARACTERISTICS

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

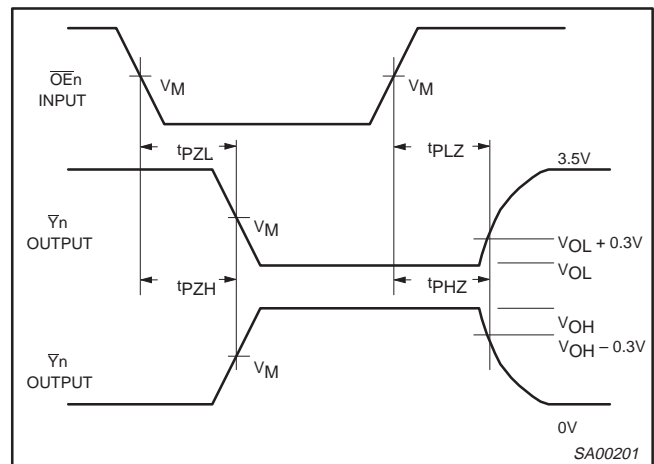
| SYMBOL | PARAMETER | WAVEFORM | LIMITS | | | | | UNIT |
|--------------------------------------|--|----------|--|------------|------------|--|------------|------|
| | | | $T_{\text{amb}} = +25^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V}$ | | | $T_{\text{amb}} = -40^\circ\text{C to } +85^\circ\text{C}$ $V_{\text{CC}} = +5.0\text{V} \pm 0.5\text{V}$ | | |
| | | | Min | Typ | Max | Min | Max | |
| t_{PLH} t_{PHL} | Propagation delay An to \bar{Y}_n | 1 | 1.0 1.0 | 2.9 3.1 | 4.1 4.3 | 1.0 1.0 | 4.8 4.8 | ns |
| t_{PZH} t_{PZL} | Output enable time to High and Low level | 2 | 1.1 1.1 | 4.1 4.6 | 4.9 5.8 | 1.1 1.1 | 5.9 6.4 | ns |
| t_{PHZ} t_{PLZ} | Output disable time from High and Low level | 2 | 1.5 1.2 | 3.6 2.9 | 6.8 5.7 | 1.5 1.2 | 7.3 6.2 | 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

From Output Under Test

$C_L = 50\text{ pF}$

500 Ω

500 Ω

S1

7 V

Open

GND

Load Circuit

| TEST | S1 |
|---------------------------------|------|
| t_{pd} | open |
| $t_{\text{PLZ}}/t_{\text{PZL}}$ | 7 V |
| $t_{\text{PHZ}}/t_{\text{PZH}}$ | open |

DEFINITIONS

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

SA00012

Octal buffer, inverting (3-State)

74ABT540

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 buffer, inverting (3-State)

74ABT540

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 buffer, inverting (3-State)

74ABT540

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 buffer, inverting (3-State)

74ABT540

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 buffer, inverting (3-State)

74ABT540

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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