

Octal transceiver with direction pin (3-State)

74ABT245

FEATURES

- Octal bidirectional bus interface
- 3-State buffers
- Output capability: +64mA/−32mA
- Latch-up protection exceeds 500mA 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.

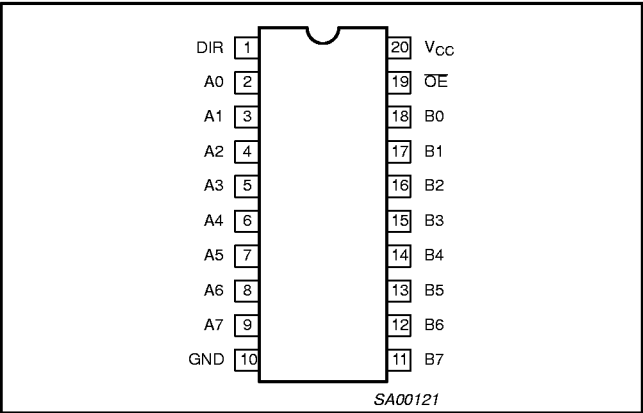
QUICK REFERENCE DATA

| SYMBOL                 | PARAMETER                                 | CONDITIONS<br>$T_{amb} = 25^{\circ}\text{C}$ ; GND = 0V | TYPICAL    | UNIT          |
|------------------------|-------------------------------------------|---------------------------------------------------------|------------|---------------|
| $t_{PLH}$<br>$t_{PHL}$ | Propagation delay<br>An to Bn or Bn to An | $C_L = 50\text{pF}$ ; $V_{CC} = 5\text{V}$              | 2.2<br>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 | OUTSIDE NORTH AMERICA | NORTH AMERICA | DWG NUMBER |
|-----------------------------|-------------------|-----------------------|---------------|------------|
| 20-Pin Plastic DIP          | −40°C to +85°C    | 74ABT245 N            | 74ABT245 N    | SOT146-1   |
| 20-Pin plastic SO           | −40°C to +85°C    | 74ABT245 D            | 74ABT245 D    | SOT163-1   |
| 20-Pin Plastic SSOP Type II | −40°C to +85°C    | 74ABT245 DB           | 74ABT245 DB   | SOT339-1   |
| 20-Pin Plastic TSSOP Type I | −40°C to +85°C    | 74ABT245 PW           | 74ABT245PW DH | SOT360-1   |

PIN CONFIGURATION



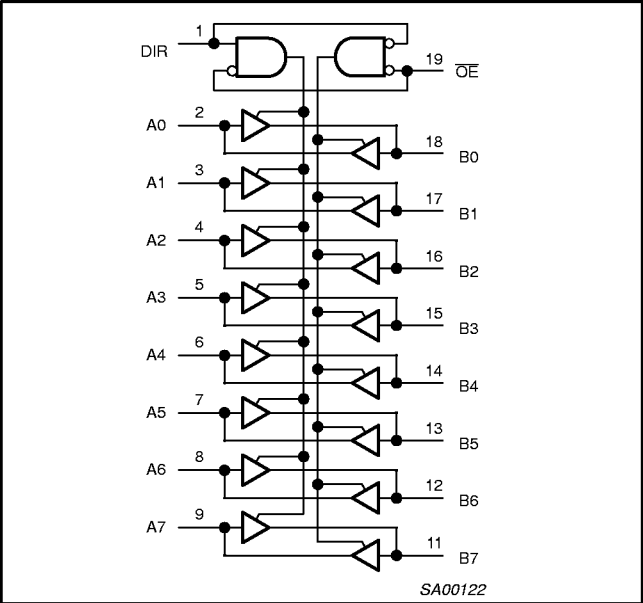
PIN DESCRIPTION

| 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 (0V)                      |
| 20                             | $V_{CC}$        | Positive supply voltage          |

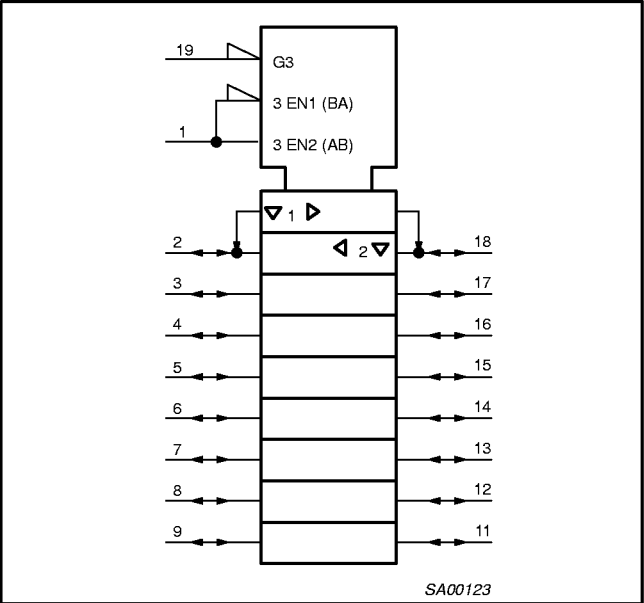
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LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



FUNCTION TABLE

| INPUTS |     | INPUTS/OUTPUTS |         |
|--------|-----|----------------|---------|
| 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 <sub>CC</sub>  | DC supply voltage              |                             | −0.5 to +7.0 | V    |
| I <sub>IK</sub>  | DC input diode current         | V <sub>I</sub> < 0          | −18          | mA   |
| V <sub>I</sub>   | DC input voltage <sup>3</sup>  |                             | −1.2 to +7.0 | V    |
| I <sub>OK</sub>  | DC output diode current        | V <sub>O</sub> < 0          | −50          | mA   |
| V <sub>OUT</sub> | DC output voltage <sup>3</sup> | output in Off or High state | −0.5 to +5.5 | V    |
| I <sub>OUT</sub> | DC output current              | output in Low state         | 128          | mA   |
| T <sub>stg</sub> | 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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## 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 <sub>amb</sub> = +25°C |       |      | T <sub>amb</sub> = −40°C to +85°C |      |      |
|                                    |                                                      |              |                                                                                                                       | Min                      | Typ   | Max  | Min                               | Max  |      |
| V <sub>IK</sub>                    | Input clamp voltage                                  |              | V <sub>CC</sub> = 4.5V; I <sub>IK</sub> = −18mA                                                                       |                          | −0.9  | −1.2 |                                   | −1.2 | V    |
| V <sub>OH</sub>                    | High-level output voltage                            |              | V <sub>CC</sub> = 4.5V; I <sub>OH</sub> = −3mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                   | 2.5                      | 2.9   |      | 2.5                               |      | V    |
|                                    |                                                      |              | V <sub>CC</sub> = 5.0V; I <sub>OH</sub> = −3mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                   | 3.0                      | 3.4   |      | 3.0                               |      | V    |
|                                    |                                                      |              | V <sub>CC</sub> = 4.5V; I <sub>OH</sub> = −32mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                  | 2.0                      | 2.4   |      | 2.0                               |      | V    |
| V <sub>OL</sub>                    | Low-level output voltage                             |              | V <sub>CC</sub> = 4.5V; I <sub>OL</sub> = 64mA; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                   |                          | 0.42  | 0.55 |                                   | 0.55 | V    |
| I <sub>I</sub>                     | Input leakage current                                | Control pins | V <sub>CC</sub> = 5.5V; V <sub>I</sub> = GND or 5.5V                                                                  |                          | ±0.01 | ±1.0 |                                   | ±1.0 | μA   |
|                                    |                                                      | Data pins    | V <sub>CC</sub> = 5.5V; V <sub>I</sub> = GND or 5.5V                                                                  |                          | ±5    | ±100 |                                   | ±100 | μA   |
| I <sub>OFF</sub>                   | Power-off leakage current                            |              | V <sub>CC</sub> = 0.0V; V <sub>I</sub> or V <sub>O</sub> ≤ 4.5V                                                       |                          | ±5.0  | ±100 |                                   | ±100 | μA   |
| I <sub>PU</sub> /I <sub>PD</sub>   | Power-up/down 3-State output current <sup>3</sup>    |              | V <sub>CC</sub> = 2.0V; V <sub>O</sub> = 0.5V; V <sub>I</sub> = GND or V <sub>CC</sub> ; V <sub>OE</sub> = Don't care |                          | ±5.0  | ±50  |                                   | ±50  | μA   |
| I <sub>IH</sub> + I <sub>OZH</sub> | 3-State output High current                          |              | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 2.7V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                    |                          | 5.0   | 50   |                                   | 50   | μA   |
| I <sub>IL</sub> + I <sub>OZL</sub> | 3-State output Low current                           |              | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 0.5V; V <sub>I</sub> = V <sub>IL</sub> or V <sub>IH</sub>                    |                          | −5.0  | −50  |                                   | −50  | μA   |
| I <sub>CEX</sub>                   | Output high leakage current                          |              | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 5.5V; V <sub>I</sub> = GND or V <sub>CC</sub>                                |                          | 5.0   | 50   |                                   | 50   | μA   |
| I <sub>O</sub>                     | Output current <sup>1</sup>                          |              | V <sub>CC</sub> = 5.5V; V <sub>O</sub> = 2.5V                                                                         | −40                      | −100  | −180 | −40                               | −180 | mA   |
| I <sub>CCH</sub>                   | Quiescent supply current                             |              | V <sub>CC</sub> = 5.5V; Outputs High, V <sub>I</sub> = GND or V <sub>CC</sub>                                         |                          | 50    | 250  |                                   | 250  | μA   |
| I <sub>CCL</sub>                   |                                                      |              | V <sub>CC</sub> = 5.5V; Outputs Low, V <sub>I</sub> = GND or V <sub>CC</sub>                                          |                          | 24    | 30   |                                   | 30   | mA   |
| I <sub>CCZ</sub>                   |                                                      |              | V <sub>CC</sub> = 5.5V; Outputs 3-State; V <sub>I</sub> = GND or V <sub>CC</sub>                                      |                          | 50    | 250  |                                   | 250  | μA   |
| ΔI <sub>CC</sub>                   | Additional supply current per input pin <sup>2</sup> |              | Outputs enabled, one input at 3.4V, other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5V                    |                          | 0.5   | 1.5  |                                   | 1.5  | mA   |
|                                    |                                                      |              | Outputs 3-State, one data input at 3.4V, other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 5.5V               |                          | 50    | 250  |                                   | 250  | μA   |
|                                    |                                                      |              | Outputs 3-State, one enable input at 3.4V, other inputs at V <sub>CC</sub> or GND; V <sub>CC</sub> = 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  $V_{CC} = 2.1\text{V}$  to  $V_{CC} = 5\text{V} \pm 10\%$ , a transition time of up to 100 $\mu\text{sec}$  is permitted.

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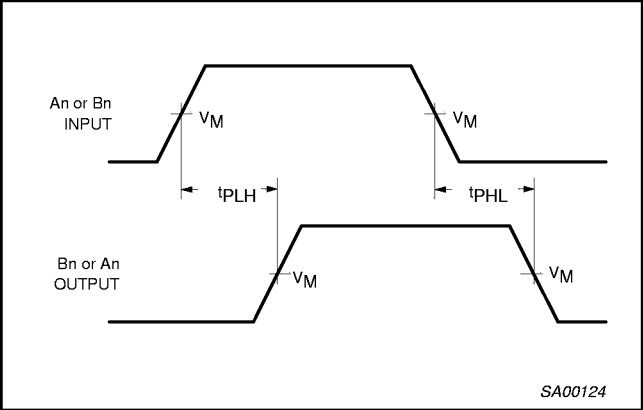
AC CHARACTERISTICS

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

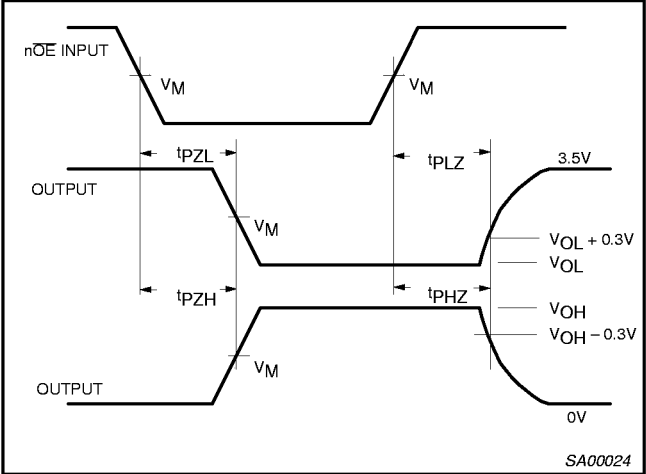
| SYMBOL                               | PARAMETER                                      | WAVEFORM | LIMITS                                              |            |            |                                                                    |            | UNIT |
|--------------------------------------|------------------------------------------------|----------|-----------------------------------------------------|------------|------------|--------------------------------------------------------------------|------------|------|
|                                      |                                                |          | T <sub>amb</sub> = +25°C<br>V <sub>CC</sub> = +5.0V |            |            | T <sub>amb</sub> = −40°C to +85°C<br>V <sub>CC</sub> = +5.0V ±0.5V |            |      |
|                                      |                                                |          | Min                                                 | Typ        | Max        | Min                                                                | Max        |      |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation delay<br>An to Bn or Bn to An      | 1        | 1.0<br>1.0                                          | 2.2<br>2.9 | 4.1<br>4.2 | 1.0<br>1.0                                                         | 4.6<br>4.6 | ns   |
| t <sub>PZH</sub><br>t <sub>PZL</sub> | Output enable time<br>to High and Low level    | 2        | 1.3<br>2.3                                          | 3.0<br>4.0 | 4.8<br>5.8 | 1.3<br>2.3                                                         | 5.3<br>6.3 | ns   |
| t <sub>PHZ</sub><br>t <sub>PLZ</sub> | Output disable time<br>from High and Low Level | 2        | 1.0<br>1.0                                          | 4.7<br>4.1 | 6.2<br>5.8 | 1.0<br>1.0                                                         | 7.2<br>6.3 | ns   |

AC WAVEFORMS

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

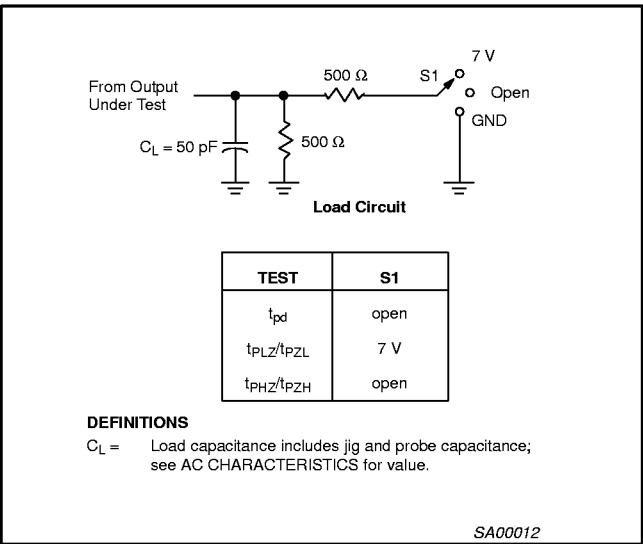


Waveform 1. Waveforms Showing the Input to Output Propagation Delays



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

TEST CIRCUIT AND WAVEFORMS

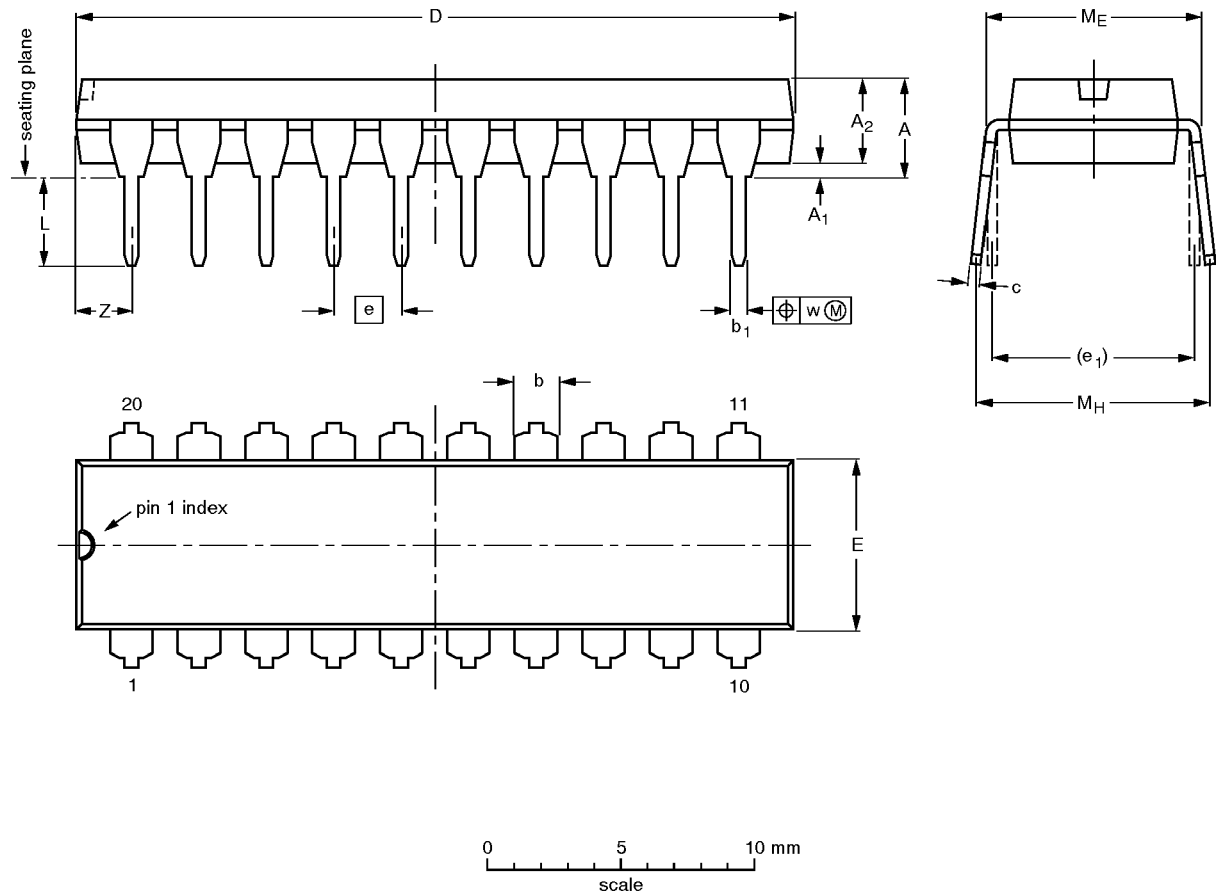


Octal transceiver with direction pin (3-State)

74ABT245

DIP20: plastic dual in-line package; 20 leads (300 mil)

SOT146-1

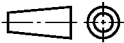


DIMENSIONS (inch dimensions are derived from the original mm dimensions)

| UNIT   | A<br>max. | A <sub>1</sub><br>min. | A <sub>2</sub><br>max. | b              | b <sub>1</sub> | c              | D <sup>(1)</sup> | E <sup>(1)</sup> | e    | e <sub>1</sub> | L            | M <sub>E</sub> | M <sub>H</sub> | w     | Z <sup>(1)</sup><br>max. |
|--------|-----------|------------------------|------------------------|----------------|----------------|----------------|------------------|------------------|------|----------------|--------------|----------------|----------------|-------|--------------------------|
| mm     | 4.2       | 0.51                   | 3.2                    | 1.73<br>1.30   | 0.53<br>0.38   | 0.36<br>0.23   | 26.92<br>26.54   | 6.40<br>6.22     | 2.54 | 7.62           | 3.60<br>3.05 | 8.25<br>7.80   | 10.0<br>8.3    | 0.254 | 2.0                      |
| inches | 0.17      | 0.020                  | 0.13                   | 0.068<br>0.051 | 0.021<br>0.015 | 0.014<br>0.009 | 1.060<br>1.045   | 0.25<br>0.24     | 0.10 | 0.30           | 0.14<br>0.12 | 0.32<br>0.31   | 0.39<br>0.33   | 0.01  | 0.078                    |

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

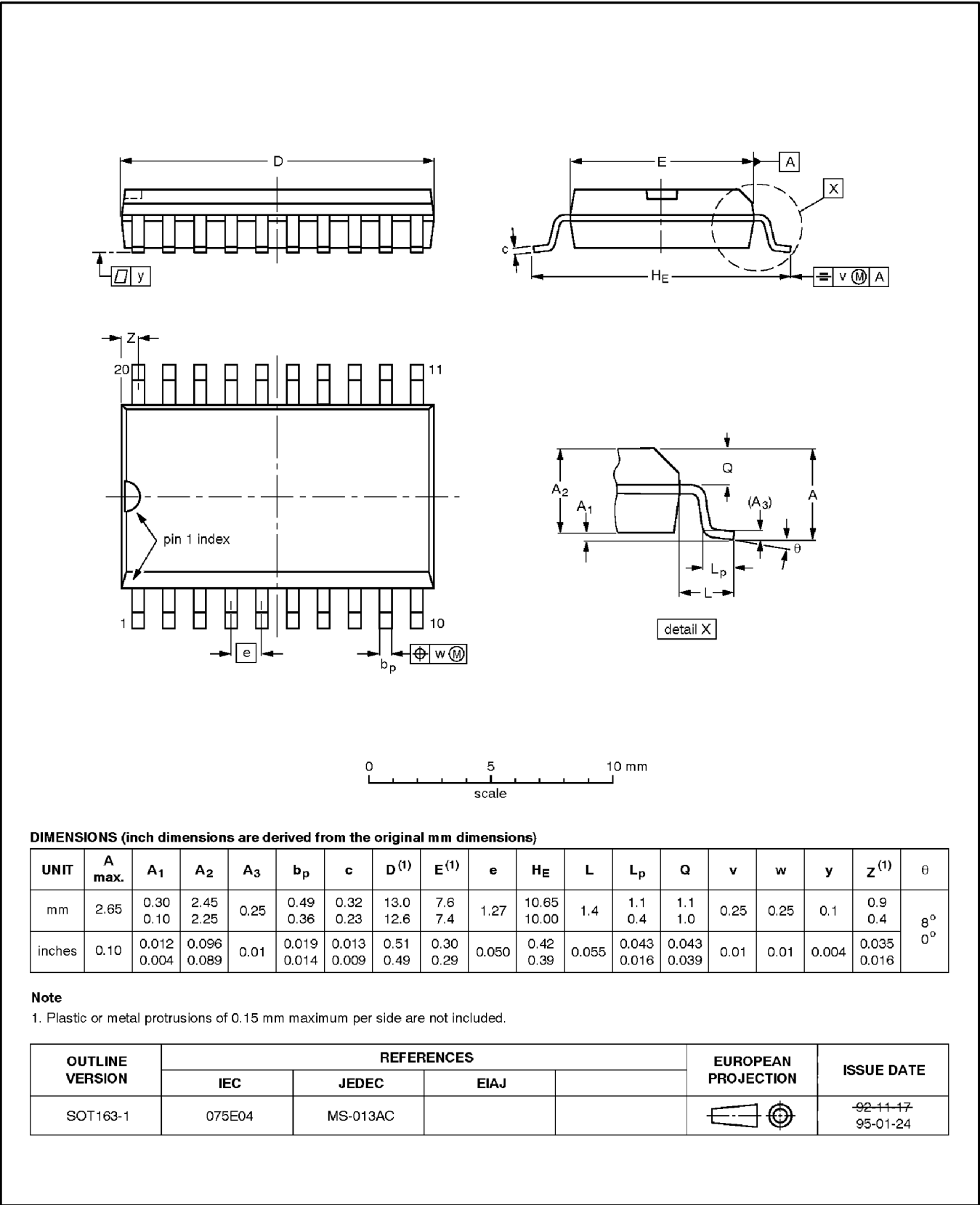
| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE           |
|--------------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|----------------------|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

Octal transceiver with direction pin (3-State)

74ABT245

SO20: plastic small outline package; 20 leads; body width 7.5 mm

SOT163-1

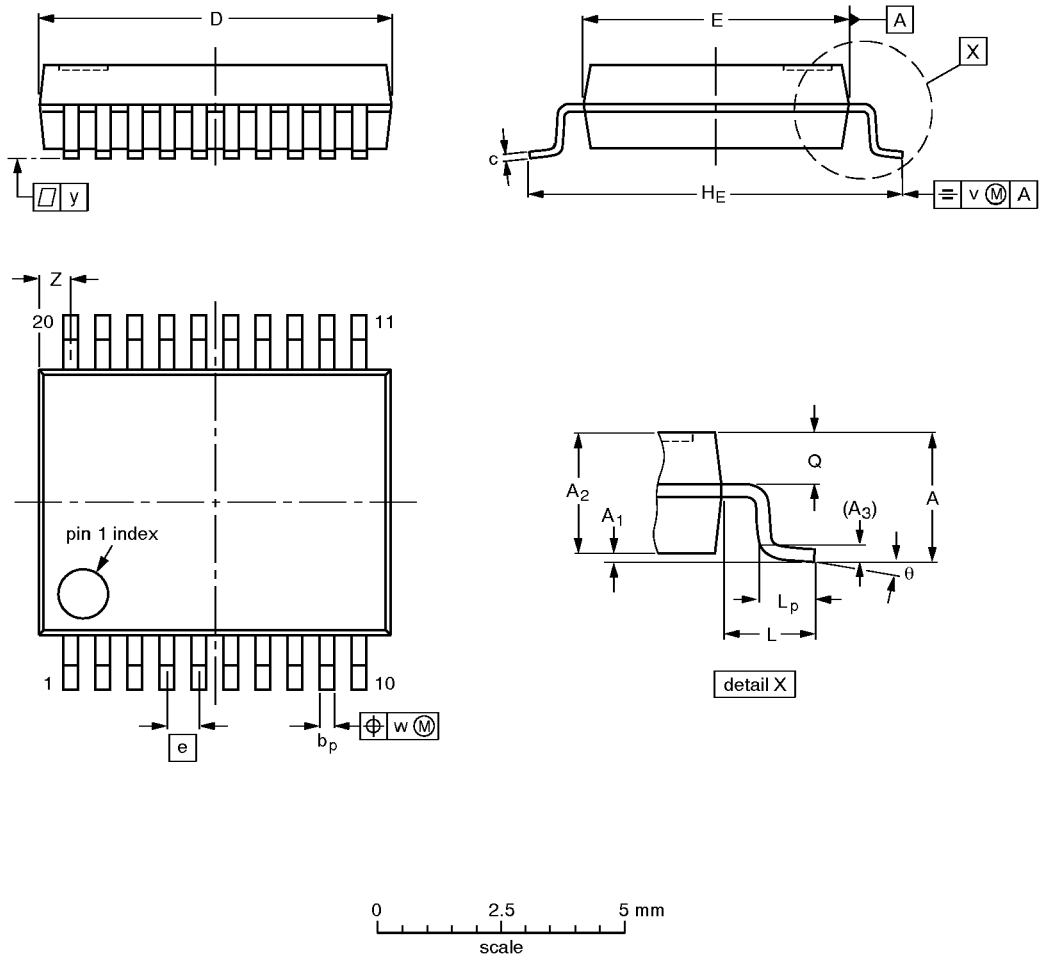


Octal transceiver with direction pin (3-State)

74ABT245

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

SOT339-1



DIMENSIONS (mm are the original dimensions)

| UNIT | A<br>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> | θ        |
|------|-----------|----------------|----------------|----------------|----------------|--------------|------------------|------------------|------|----------------|------|----------------|------------|-----|------|-----|------------------|----------|
| mm   | 2.0       | 0.21<br>0.05   | 1.80<br>1.65   | 0.25           | 0.38<br>0.25   | 0.20<br>0.09 | 7.4<br>7.0       | 5.4<br>5.2       | 0.65 | 7.9<br>7.6     | 1.25 | 1.03<br>0.63   | 0.9<br>0.7 | 0.2 | 0.13 | 0.1 | 0.9<br>0.5       | 8°<br>0° |

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

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

Octal transceiver with direction pin (3-State)

74ABT245

TSSOP20: plastic thin shrink small outline package; 20 leads; body width 4.4 mm

SOT360-1

