

DATA SHEET

74ALS245A/74ALS245A-1 Octal transceiver (3-State)

Product specification
IC05 Data Handbook

1991 Jun 03

Octal transceiver (3-State)

74ALS245A/74ALS245A-1

FEATURES

- Octal bidirectional bus interface
- 3-State buffer outputs sink 24mA and source 15mA
- Outputs are placed in high impedance state during power-off conditions
- The -1 version sinks 48mA

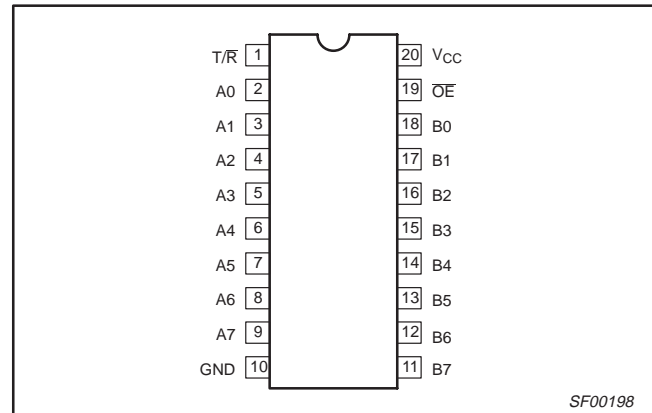
DESCRIPTION

The 74ALS245A is an octal transceiver featuring non-inverting 3-State bus compatible outputs in both transmit and receive directions. The device features an output enable (\overline{OE}) input for easy cascading and transmit/receive ($\overline{T/R}$) input for direction control.

The 74ALS245A-1 is the same as the 74ALS245A except that both ports sink 48mA within the $\pm 5\%$ V_{CC} range.

| TYPE | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|-------------|---------------------------|--------------------------------|
| 74ALS245A | 7.0ns | 34mA |
| 74ALS245A-1 | 7.0ns | 34mA |

PIN CONFIGURATION



ORDERING INFORMATION

| DESCRIPTION | ORDER CODE | DRAWING NUMBER |
|--------------------------------|--|----------------|
| | COMMERCIAL RANGE $V_{CC} = 5V \pm 10\%$, $T_{amb} = 0^{\circ}C$ to $+70^{\circ}C$ | |
| 20-pin plastic DIP | 74ALS245AN, 74ALS245A-1N | SOT146-1 |
| 20-pin plastic SOL | 74ALS245AD, 74ALS245A-1D | SOT163-1 |
| 20-pin plastic SSOP Type II | 74ALS245ADB, 74ALS245A-1DB | SOT339-1 |

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

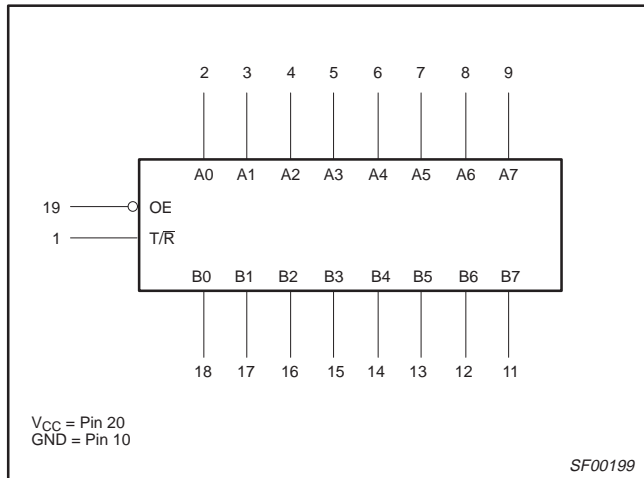
| PINS | DESCRIPTION | 74ALS (U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|------------------|----------------------------------|-----------------------|---------------------|
| A0 – A7, B0 – B7 | Data inputs | 1.0/1.0 | 20 μ A/0.1mA |
| \overline{OE} | Output Enable input (active-Low) | 1.0/1.0 | 20 μ A/0.1mA |
| $\overline{T/R}$ | Transmit/receive input | 1.0/1.0 | 20 μ A/0.1mA |
| A0 – A7 | A port outputs | 750/240 | 15mA/24mA |
| B0 – B7 | B port outputs | 750/240 | 15mA/24mA |
| A0 – A7 | A port outputs (-1 version) | 750/480 | 15mA/48mA |
| B0 – B7 | B port outputs (-1 version) | 750/480 | 15mA/48mA |

NOTE: One (1.0) ALS unit load is defined as: 20 μ A in the High state and 0.1mA in the Low state.

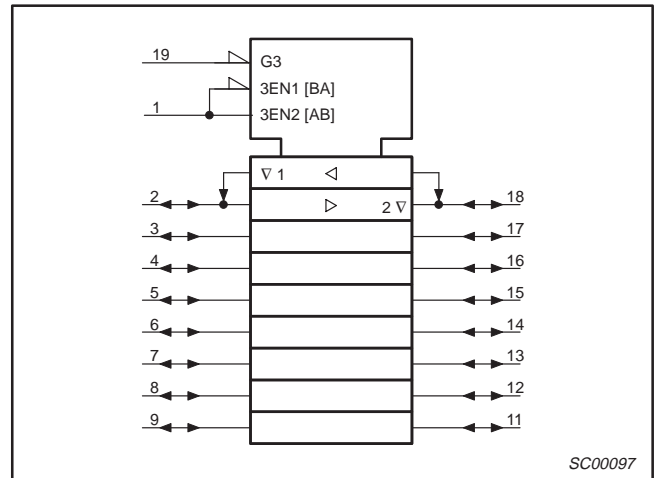
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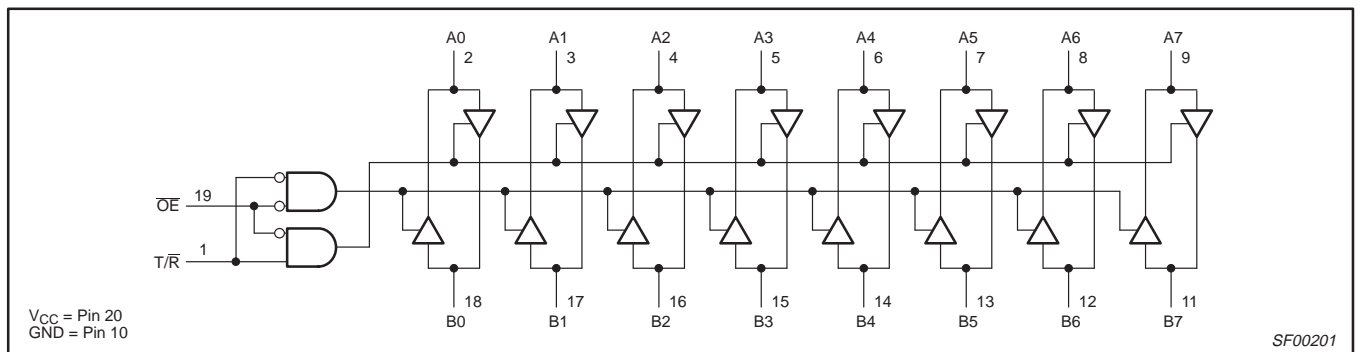
LOGIC SYMBOL



IEC/IEEE SYMBOL



LOGIC DIAGRAM



FUNCTION TABLE

| INPUTS | | OUTPUTS |
|--------|-----|---------------------|
| OE | T/R | |
| L | L | Bus B data to Bus A |
| L | H | Bus A data to Bus B |
| H | X | Z |

- H = High voltage level
- L = Low voltage level
- X = Don't care
- Z = High impedance "off" state

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ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limit set forth in this table may impair the useful life of the device.
Unless otherwise noted these limits are over the operating free air temperature range.)

| SYMBOL | PARAMETER | | RATING | UNIT |
|-----------|--|--------------|------------------|------|
| V_{CC} | Supply voltage | | -0.5 to +7.0 | V |
| V_{IN} | Input voltage | | -0.5 to +7.0 | V |
| I_{IN} | Input current | | -30 to +5 | mA |
| V_{OUT} | Voltage applied to output in High output state | | -0.5 to V_{CC} | V |
| I_{OUT} | Current applied to output in Low output state | All versions | 48 | mA |
| | | -1 version | 96 | mA |
| T_{amb} | Operating free-air temperature range | | 0 to +70 | °C |
| T_{stg} | Storage temperature range | | -65 to +150 | °C |

RECOMMENDED OPERATING CONDITIONS

| SYMBOL | PARAMETER | LIMITS | | | UNIT |
|-----------|--------------------------------------|--------------|-----|-----------------|------|
| | | MIN | NOM | MAX | |
| V_{CC} | Supply voltage | 4.5 | 5.0 | 5.5 | V |
| V_{IH} | High-level input voltage | 2.0 | | | V |
| V_{IL} | Low-level input voltage | | | 0.8 | V |
| I_{IK} | Input clamp current | | | -18 | mA |
| I_{OH} | High-level output current | | | -15 | mA |
| I_{OL} | Low-level output current | All versions | | 24 | mA |
| | | -1 version | | 48 ¹ | mA |
| T_{amb} | Operating free-air temperature range | 0 | | +70 | °C |

NOTES:

- The 48mA limit applies only under the condition of $V_{CC} = 5.0V \pm 5\%$.

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DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

| SYMBOL | PARAMETER | | TEST CONDITIONS ¹ | | LIMITS | | | UNIT |
|-----------------|--|------------------------|--|--------------------------|---------------------|------------------|------|------|
| | | | | | MIN | TYP ² | MAX | |
| V _{OH} | High-level output voltage | | V _{CC} ±10%, V _{IL} = MAX, V _{IH} = MIN | I _{OH} = -0.4mA | V _{CC} - 2 | 2.4 | 3.2 | V |
| | | | | I _{OH} = -3mA | | | | |
| | | | V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN | I _{OH} = -15mA | 2.0 | | V | |
| V _{OL} | Low-level output voltage | All versions | V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN | I _{OL} = 12mA | | 0.25 | 0.40 | V |
| | | | | I _{OL} = 24mA | | 0.35 | 0.50 | V |
| | | -1 version | V _{CC} = 4.75V, V _{IL} = MAX, V _{IH} = MIN | I _{OL} = 48mA | | 0.35 | 0.50 | V |
| V _{IK} | Input clamp voltage | | V _{CC} = MIN, I _I = I _{IK} | | | -0.73 | -1.5 | V |
| I _I | Input current at maximum input voltage | \overline{OE} or T/R | V _{CC} = MAX, V _I = 7.0V | | | | 0.1 | mA |
| | | A or B ports | V _{CC} = MAX, V _I = 5.5V | | | | 0.1 | mA |
| I _{IH} | High-level input current ³ | | V _{CC} = MAX, V _I = 2.7V | | | | 20 | μA |
| I _{IL} | Low-level input current ³ | | V _{CC} = MAX, V _I = 0.4V | | | | -0.1 | mA |
| I _O | Output current ⁴ | | V _{CC} = MAX, V _O = 2.25V | | -30 | | -112 | mA |
| I _{CC} | Supply current (total) | I _{CCH} | V _{CC} = MAX | | | 28 | 45 | mA |
| | | I _{CCL} | | | | 40 | 55 | mA |
| | | I _{CCZ} | | | | 44 | 58 | mA |

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V_{CC} = 5V, T_{amb} = 25°C.
- For I/O ports, the parameter I_{IH} and I_{IL} include the off-state current.
- The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS}.

AC ELECTRICAL CHARACTERISTICS

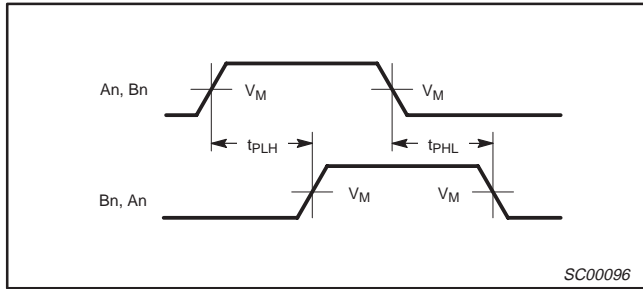
| SYMBOL | PARAMETER | | TEST CONDITION | LIMITS | | UNIT |
|--------------------------------------|---|--|--------------------------|--|--------------|------|
| | | | | T _{amb} = 0°C to +70°C V _{CC} = +5.0V ± 10% C _L = 50pF, R _L = 500Ω | | |
| | | | | MIN | MAX | |
| t _{PLH} t _{PHL} | Propagation delay An to Bn, Bn to An | | Waveform 1 | 2.0 2.0 | 10.0 10.0 | ns |
| t _{PZH} t _{PZL} | Output enable time to High or Low level | | Waveform 2 Waveform 3 | 3.0 3.0 | 20.0 20.0 | ns |
| t _{PHZ} t _{PLZ} | Output disable time from High or Low level | | Waveform 2 Waveform 3 | 2.0 4.0 | 10.0 15.0 | ns |

Octal transceiver (3-State)

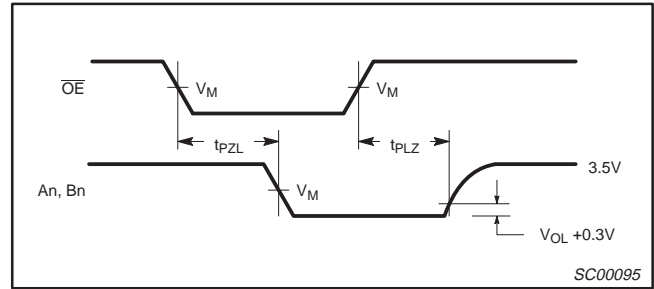
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AC WAVEFORMS

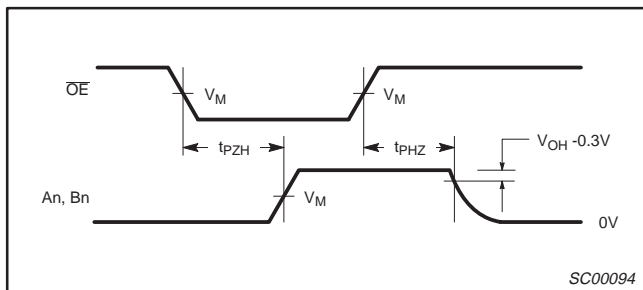
For all waveforms, $V_M = 1.3V$.



Waveform 1. Propagation Delay for Non-inverting Outputs



Waveform 3. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level



Waveform 2. 3-State Output Enable Time to High Level and Output Disable Time from High Level

TEST CIRCUIT AND WAVEFORMS

Test Circuit for 3-State Outputs

| SWITCH POSITION | |
|-----------------------|--------|
| TEST | SWITCH |
| t_{PZL} , t_{PZL} | closed |
| All other | open |

DEFINITIONS:
 R_L = Load resistor; see AC electrical characteristics for value.
 C_L = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
 R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

Input Pulse Definition

| Family | INPUT PULSE REQUIREMENTS | | | | | |
|--------|--------------------------|-------|----------|-------|-----------|-----------|
| | Amplitude | V_M | Rep.Rate | t_w | t_{TLH} | t_{THL} |
| 74ALS | 3.5V | 1.3V | 1MHz | 500ns | 2.0ns | 2.0ns |

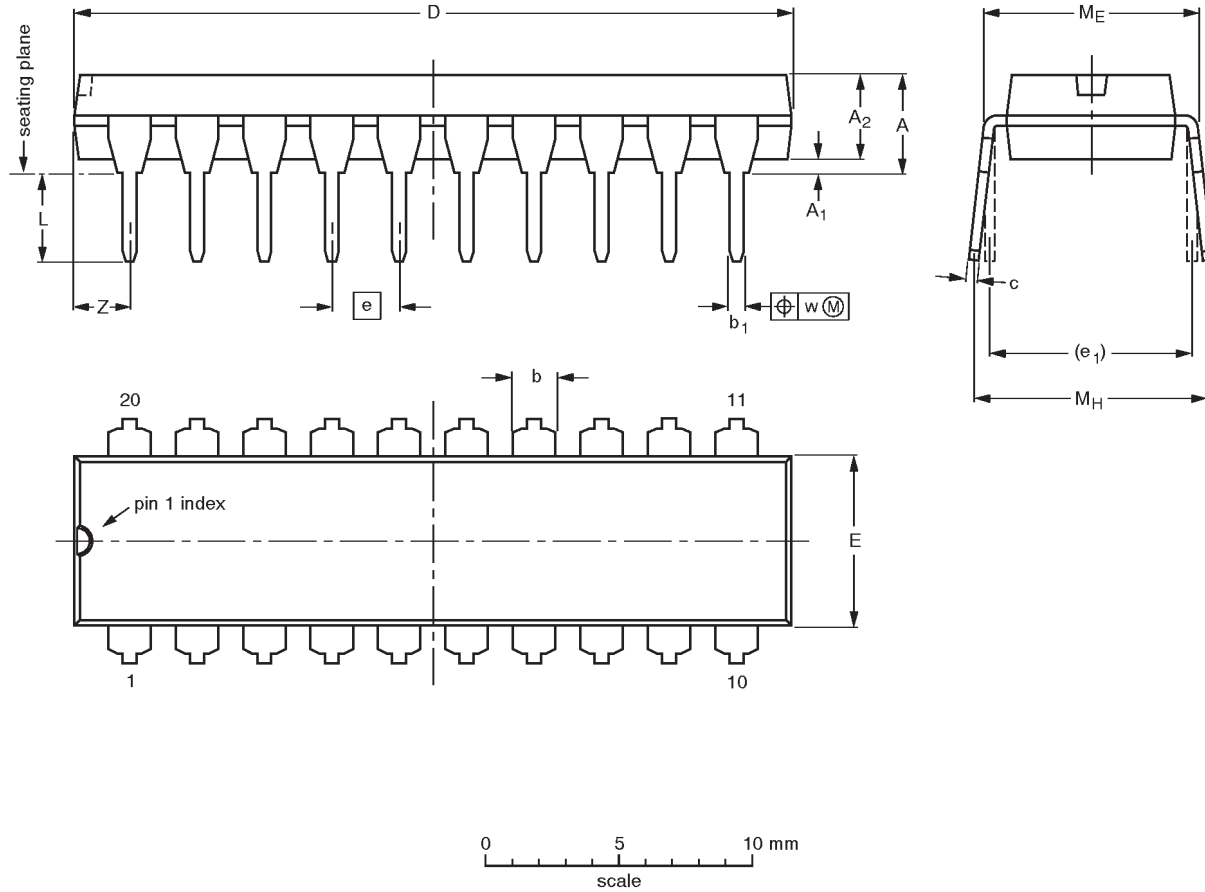
SC00072

Octal transceiver (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.

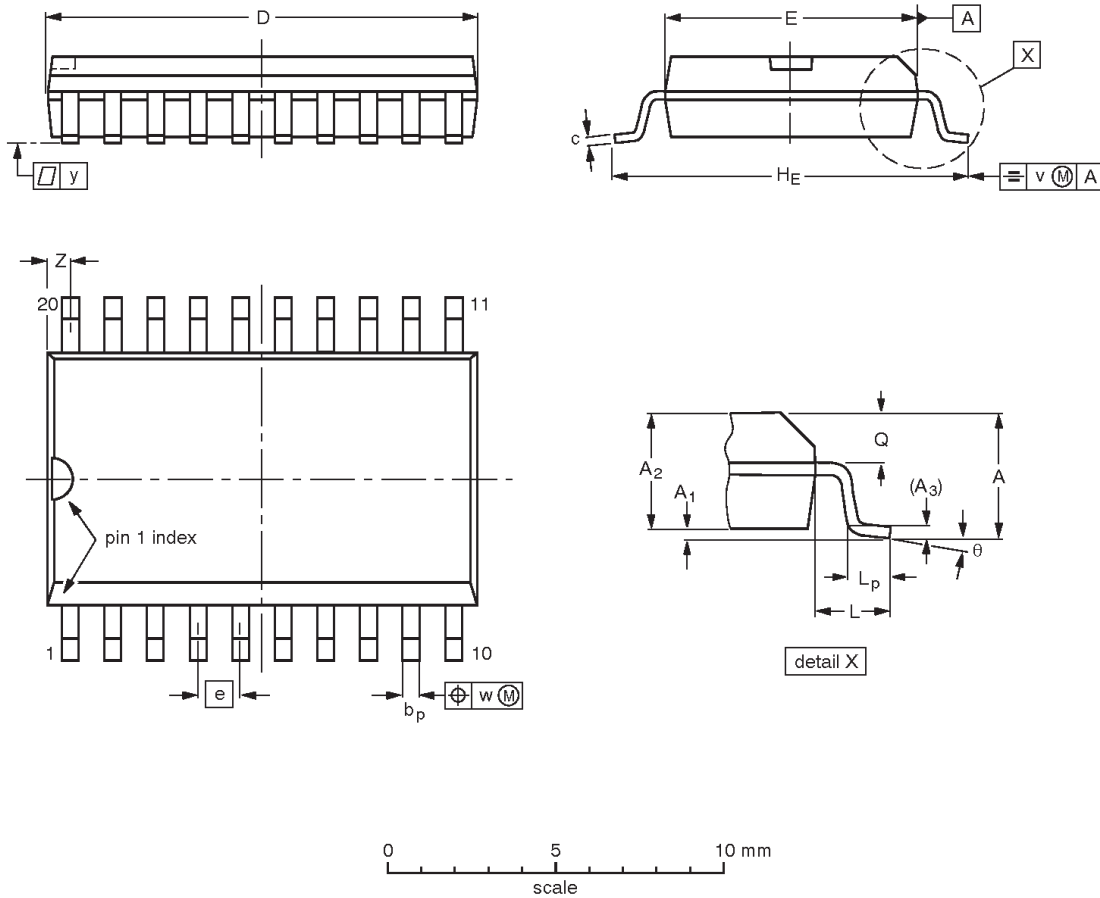
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT146-1 | | | SC603 | | | 92-11-17 95-05-24 |

Octal transceiver (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 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.

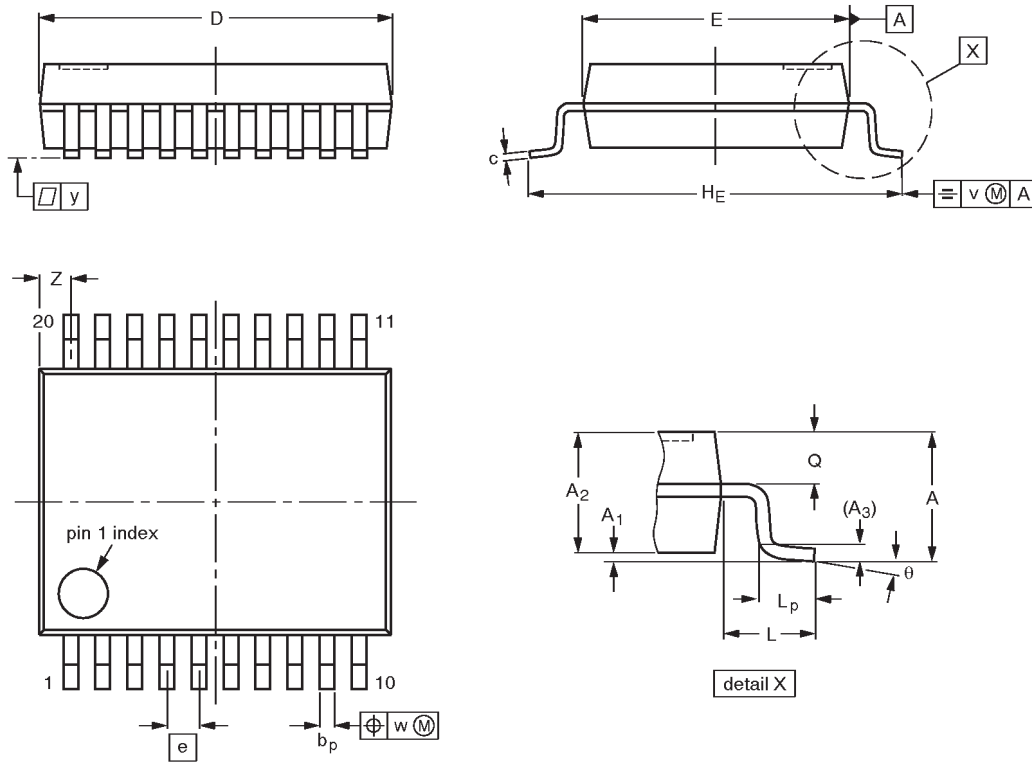
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|----------|------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT163-1 | 075E04 | MS-013AC | | | | 92-11-17 95-01-24 |

Octal transceiver (3-State)

74ALS245A/74ALS245A-1

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 transceiver (3–State)

74ALS245A/74ALS245A–1

DEFINITIONS

| Data Sheet Identification | Product Status | Definition |
|----------------------------------|-------------------------------|--|
| <i>Objective Specification</i> | Formative or in Design | This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice. |
| <i>Preliminary Specification</i> | Preproduction Product | 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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