

DATA SHEET

74ALS620A/74ALS620A-1
74ALS623A/74ALS623A-1
Transceivers

Product specification
IC05 Data Handbook

1991 Feb 08

Transceivers

74ALS620A/74ALS620A-1 74ALS623A/74ALS623A-1

74ALS620A/74ALS620A-1 Octal bus transceiver, inverting (3-State)
74ALS623A/74ALS623A-1 Octal bus transceiver, non-inverting (3-State)

FEATURES

- Octal bidirectional bus interface
- 3-State buffer outputs sink 24mA and source 15mA
- The -1 version sinks 48mA I_{OL} within the +5% V_{CC} range

| TYPE | TYPICAL PROPAGATION DELAY | TYPICAL SUPPLY CURRENT (TOTAL) |
|------------------|---------------------------|--------------------------------|
| 74ALS620A/620A-1 | 4.0ns | 33mA |
| 74ALS623A/623A-1 | 4.0ns | 38mA |

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 | 74ALS620AN, 74ALS620A-1N 74ALS623AN, 74ALS623A-1N | SOT146-1 |
| 20-pin plastic SOL | 74ALS620AD, 74ALS620A-1D 74ALS623AD, 74ALS623A-1D | SOT163-1 |

DESCRIPTION

The 74ALS620A and 74ALS623A are octal transceiver featuring 3-State bus compatible outputs in both transmit and receive directions. The 74ALS620A is an inverting version of the 74ALS623A. The outputs are capable of sinking 24mA and sourcing up to 15mA, providing very good capacitive drive characteristics.

The outputs for the 74ALS620A-1 and 74ALS623A are capable of sinking up to 48mA when within the $\pm 5\%$ V_{CC} range.

These octal bus transceivers are designed for asynchronous two-way communication between data buses. The control function implementation allows for maximum flexibility in timing.

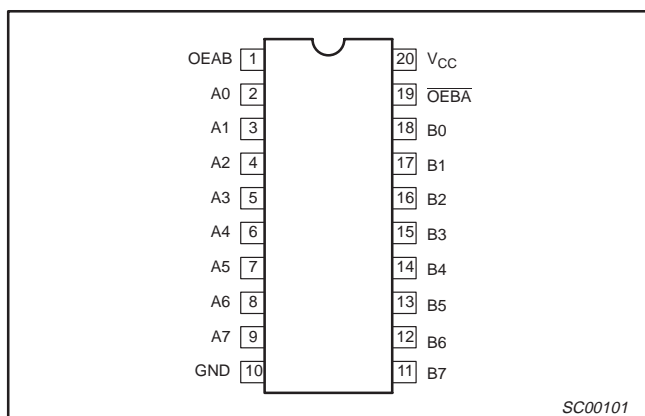
These devices allow data transmission from the A bus to the B bus or from B bus to A bus, depending on the logic levels at the enable inputs (\overline{OEBA} and OEAB). The enable inputs can be used to disable the device so that the buses are effectively isolated. The dual-enable configuration gives the 74ALS620A and 74ALS623A the capability to store data by the simultaneous enabling of \overline{OEBA} and OEAB. Each output reinforces its input in this transceiver configuration. Thus when both control inputs are enabled and all other data sources to the two sets of the bus lines are at high impedance, both sets of the bus lines (16 in all) will remain at their last states.

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

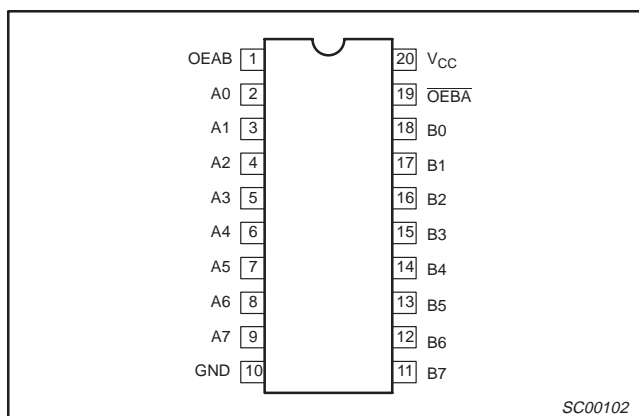
| PINS | DESCRIPTION | 74ALS (U.L.) HIGH/LOW | LOAD VALUE HIGH/LOW |
|--------------------------|---------------------------|-----------------------|---------------------|
| A0 – A7, B0 – B7 | Data inputs | 1.0/1.0 | 20 μ A/0.1mA |
| \overline{OEBA} , OEAB | Output Enable inputs | 1.0/1.0 | 20 μ A/0.1mA |
| A0 – A7, B0 – B7 | Data outputs | 750/240 | 15mA/24mA |
| A0 – A7, B0 – B7 | Data 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.

PIN CONFIGURATION – 74ALS620A/74ALS620A-1



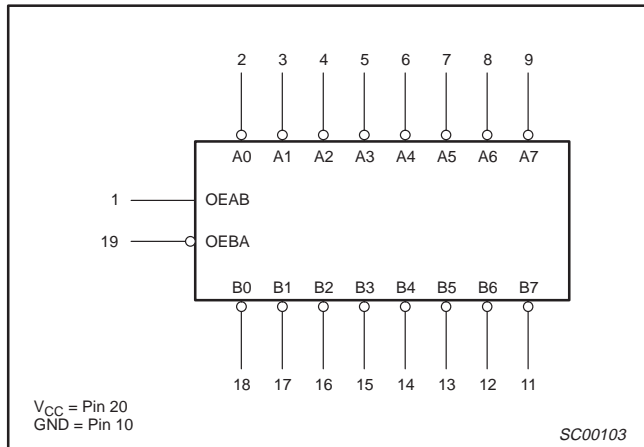
PIN CONFIGURATION – 74ALS623A/74ALS623A-1



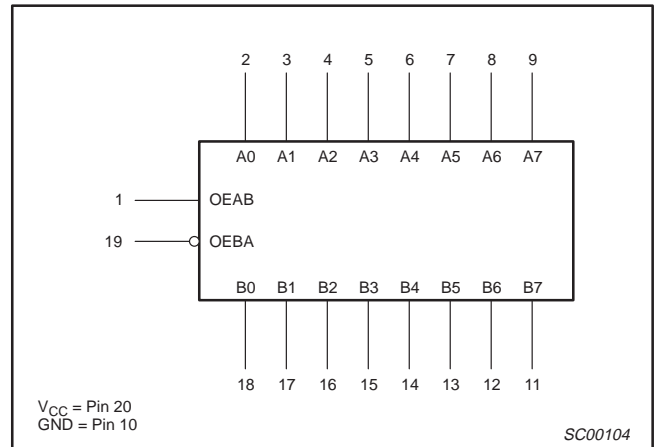
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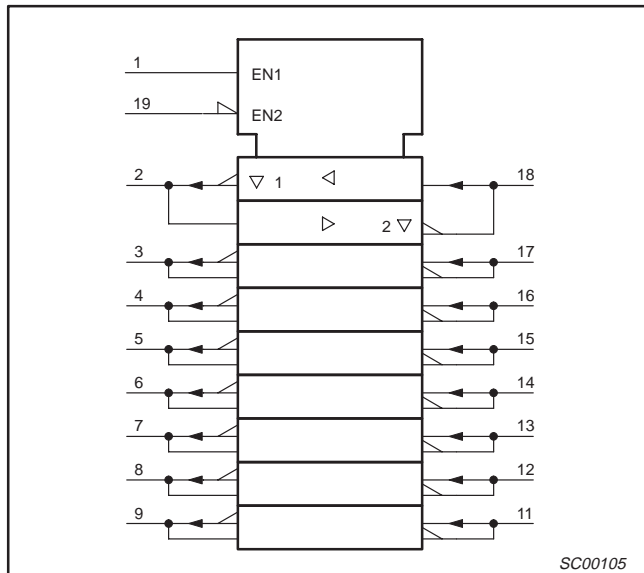
LOGIC SYMBOL – 74ALS620A/74ALS620A-1



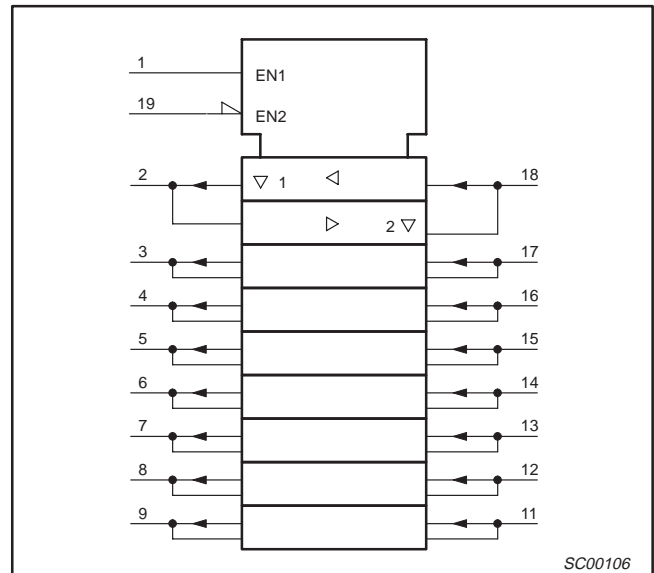
LOGIC SYMBOL – 74ALS623A/74ALS623A-1



IEC/IEEE SYMBOL – 74ALS620A/74ALS620A-1



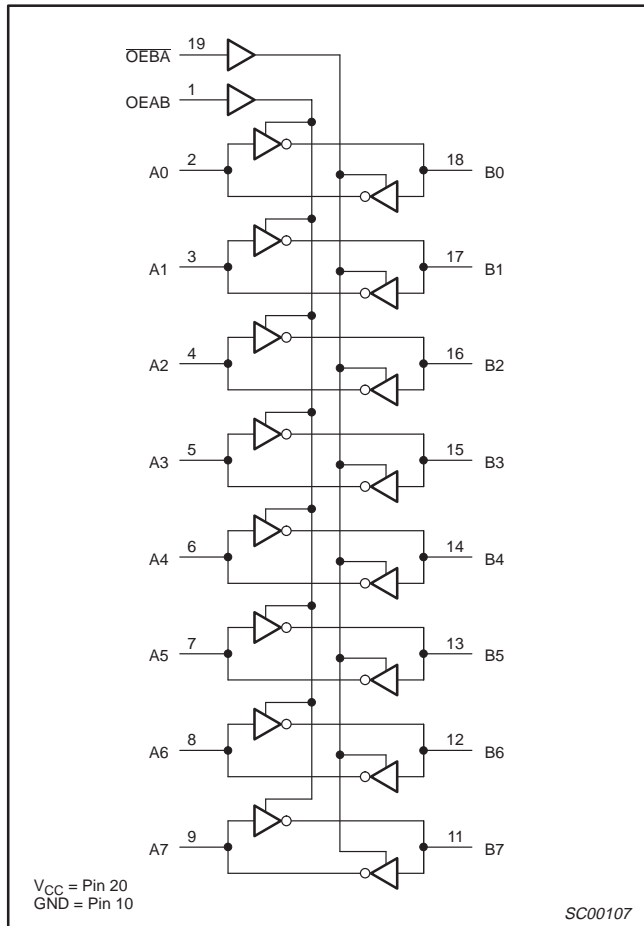
IEC/IEEE SYMBOL – 74ALS623A/74ALS623A-1



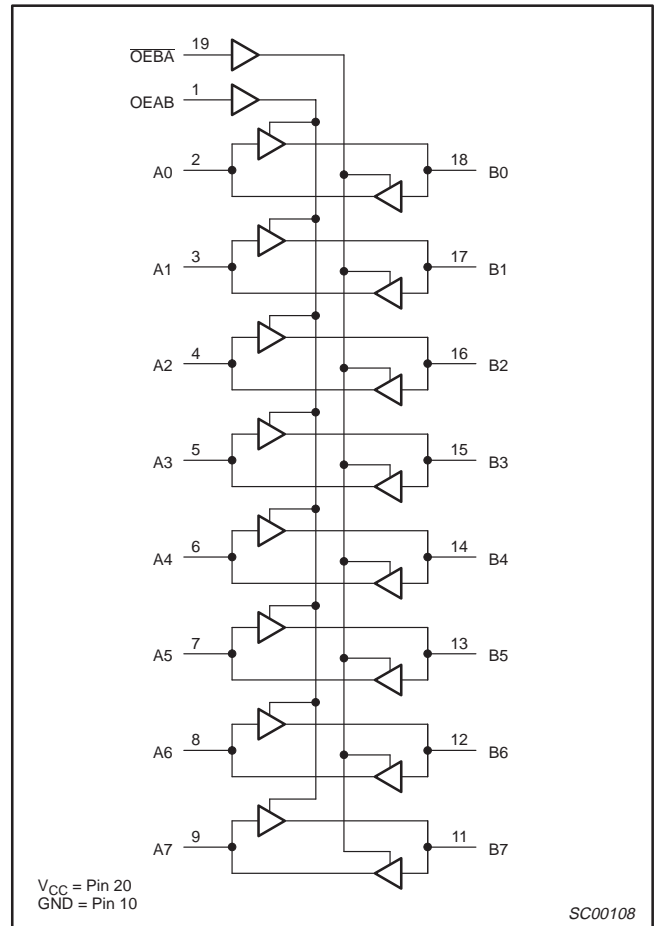
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74ALS620A/74ALS620A-1 74ALS623A/74ALS623A-1

LOGIC DIAGRAM – 74ALS620A/74ALS620A-1



LOGIC DIAGRAM – 74ALS623A/74ALS623A-1



FUNCTION TABLE

| INPUTS | | OPERATING MODES | |
|--------|------|-------------------------|-----------------|
| OEBA | OEAB | 74ALS620A | 74ALS623A |
| L | L | \bar{B} data to A Bus | B data to A Bus |
| L | H | \bar{A} data to B Bus | A data to B Bus |
| H | L | Z | Z |
| L | H | \bar{B} data to A Bus | B data to A Bus |
| L | H | \bar{A} data to B Bus | A data to B Bus |

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

Transceivers

74ALS620A/74ALS620A-1
74ALS623A/74ALS623A-1**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 |

NOTE:

1. The 48mA limit applies only under the condition of V_{CC} = 5.0V ±5%.

Transceivers

74ALS620A/74ALS620A-1
74ALS623A/74ALS623A-1**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 | | | V |
| | | | | I _{OH} = -3mA | 2.4 | 3.2 | | V |
| | | | 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 versions | 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 | OEBA or OEAB | 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) | 74ALS620A 74ALS620A-1 | I _{CCH} | V _{CC} = MAX | | 24 | 34 | mA |
| | | | I _{CCL} | | | 42 | 49 | mA |
| | | | I _{CCZ} | | | 45 | 52 | mA |
| | | 74ALS623A 74ALS623A-1 | I _{CCH} | | | 24 | 43 | mA |
| | | | I _{CCL} | | | 41 | 50 | mA |
| | | | I _{CCZ} | | | 46 | 55 | 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}.

Transceivers

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74ALS623A/74ALS623A-1

AC ELECTRICAL CHARACTERISTICS FOR 74ALS620A/74ALS620A-1

| SYMBOL | PARAMETER | TEST CONDITION | LIMITS | | UNIT |
|------------------------|---|--------------------------|---|--------------|------|
| | | | $T_{amb} = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}, R_L = 500\Omega$ | | |
| | | | 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 $\overline{\text{OEBA}}$ to An | Waveform 3 Waveform 4 | 2.0 3.0 | 17.0 25.0 | ns |
| t_{PHZ} t_{PLZ} | Output disable time $\overline{\text{OEBA}}$ to An | Waveform 3 Waveform 4 | 2.0 2.0 | 12.0 18.0 | ns |
| t_{PZH} t_{PZL} | Output enable time OEAB to Bn | Waveform 3 Waveform 4 | 2.0 3.0 | 18.0 25.0 | ns |
| t_{PHZ} t_{PLZ} | Output disable time OEAB to Bn | Waveform 3 Waveform 4 | 2.0 3.0 | 12.0 18.0 | ns |

AC ELECTRICAL CHARACTERISTICS FOR 74ALS623A/74ALS623A-1

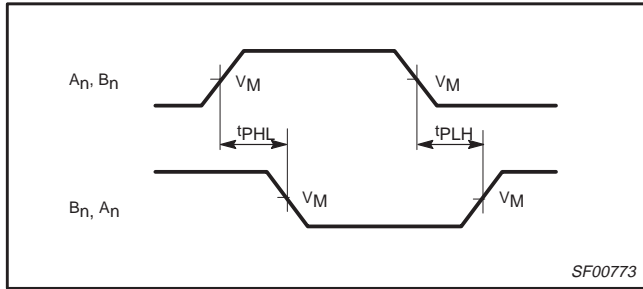
| SYMBOL | PARAMETER | TEST CONDITION | LIMITS | | UNIT |
|------------------------|---|--------------------------|---|--------------|------|
| | | | $T_{amb} = 0^{\circ}\text{C to } +70^{\circ}\text{C}$ $V_{CC} = +5.0\text{V} \pm 10\%$ $C_L = 50\text{pF}, R_L = 500\Omega$ | | |
| | | | MIN | MAX | |
| t_{PLH} t_{PHL} | Propagation delay An to Bn, Bn to An | Waveform 2 | 2.0 2.0 | 13.0 11.0 | ns |
| t_{PZH} t_{PZL} | Output enable time $\overline{\text{OEBA}}$ to An | Waveform 3 Waveform 4 | 2.0 3.0 | 22.0 22.0 | ns |
| t_{PHZ} t_{PLZ} | Output disable time $\overline{\text{OEBA}}$ to An | Waveform 3 Waveform 4 | 2.0 2.0 | 16.0 19.0 | ns |
| t_{PZH} t_{PZL} | Output enable time OEAB to Bn | Waveform 3 Waveform 4 | 2.0 3.0 | 22.0 22.0 | ns |
| t_{PHZ} t_{PLZ} | Output disable time OEAB to Bn | Waveform 3 Waveform 4 | 2.0 2.0 | 16.0 19.0 | ns |

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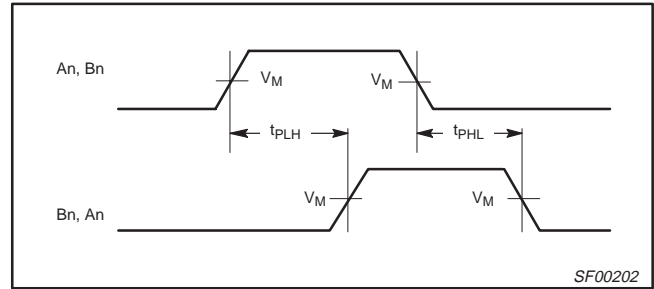
74ALS620A/74ALS620A-1 74ALS623A/74ALS623A-1

AC WAVEFORMS

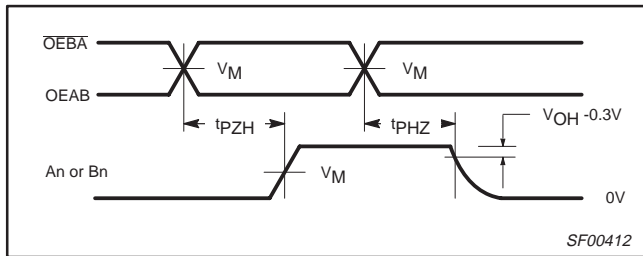
For all waveforms, $V_M = 1.3V$.



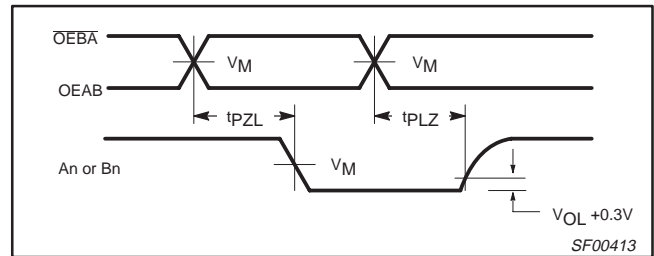
Waveform 1. Propagation Delay for Inverting Outputs



Waveform 2. Propagation Delay for Non-inverting Outputs



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



Waveform 4. 3-State Output Enable Time to Low Level and Disable Time from Low Level

TEST CIRCUIT AND WAVEFORMS

Test Circuit for 3-State Outputs

| SWITCH POSITION | |
|--------------------|--------|
| TEST | SWITCH |
| t_{PLZ}, 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 |

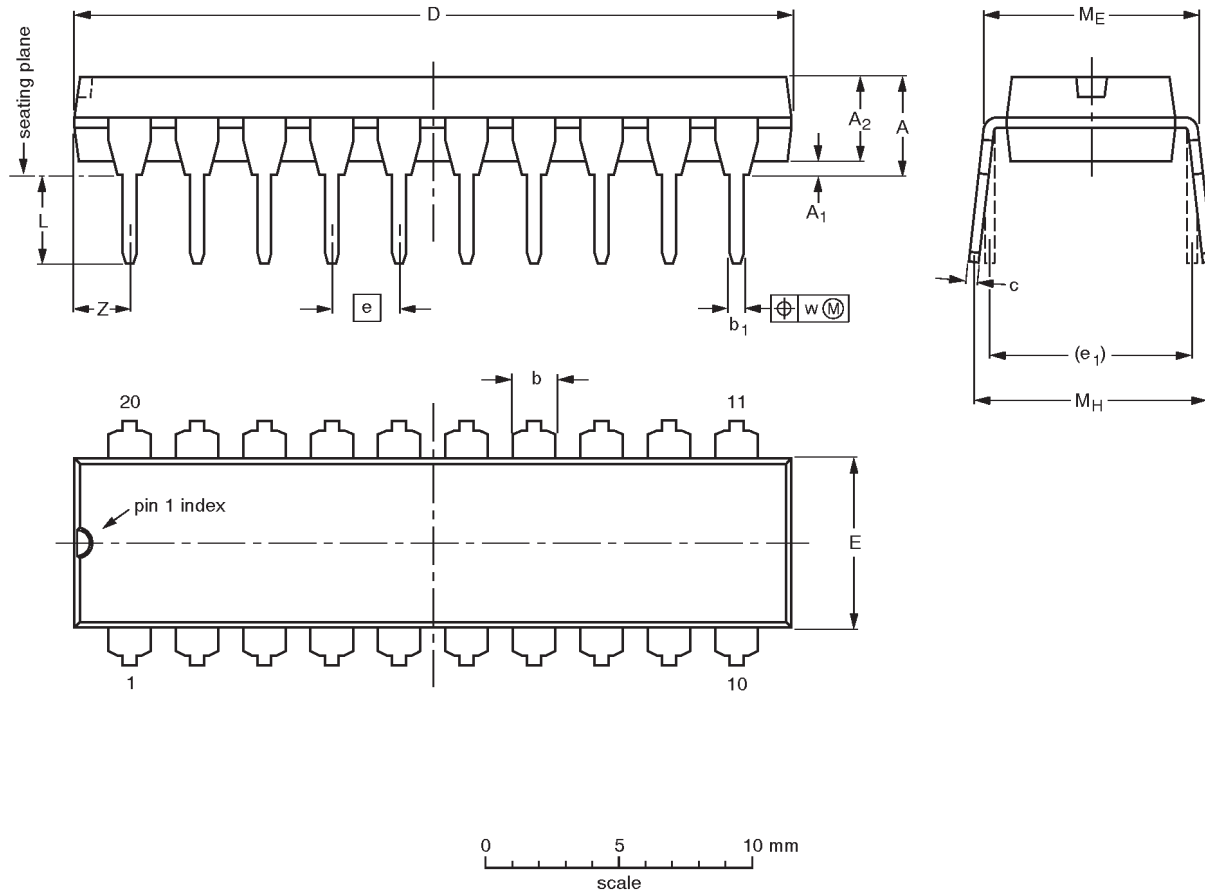
SC00072

Transceivers

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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.

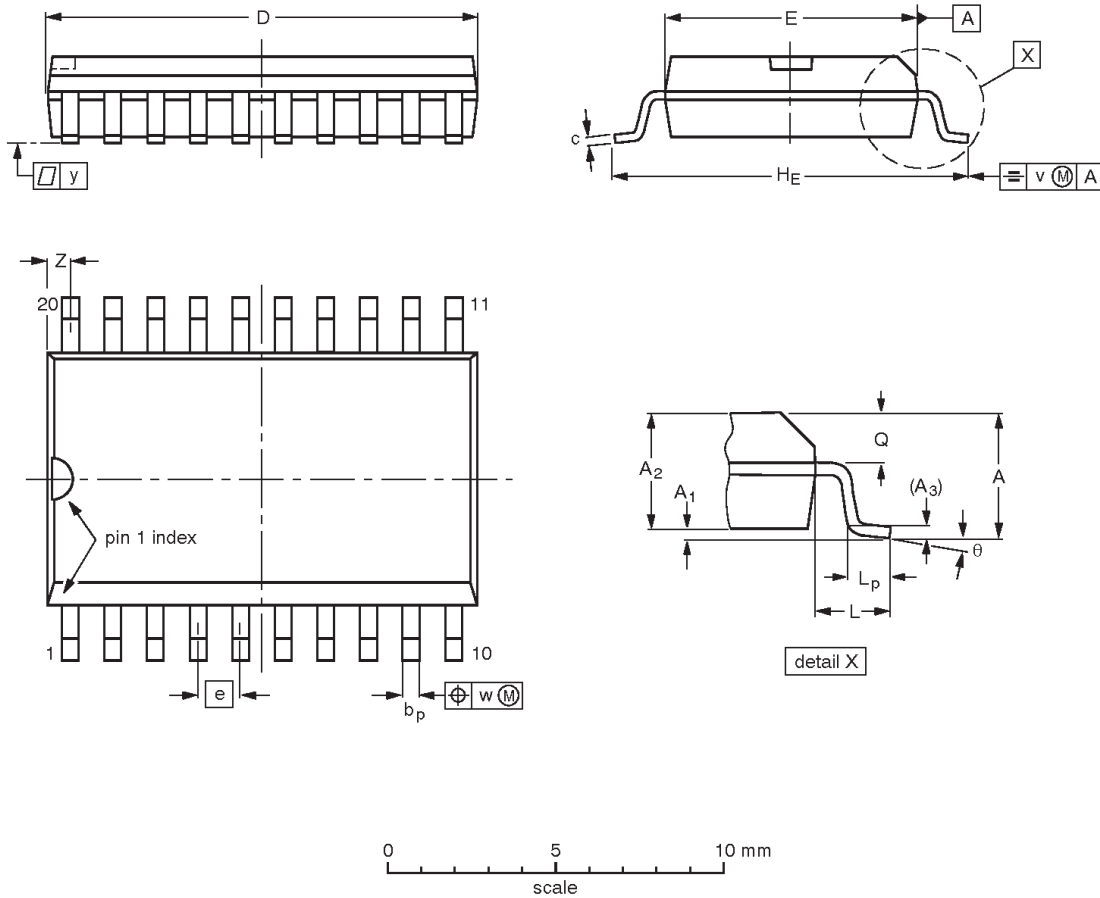
| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|--|---------------------|----------------------|
| | IEC | JEDEC | EIAJ | | | |
| SOT146-1 | | | SC603 | | | 92-11-17 95-05-24 |

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74ALS623A/74ALS623A-1

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 |

Transceivers

74ALS620A/74ALS620A-1
74ALS623A/74ALS623A-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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