

HD74AC153

Dual 4-Input Multiplexer

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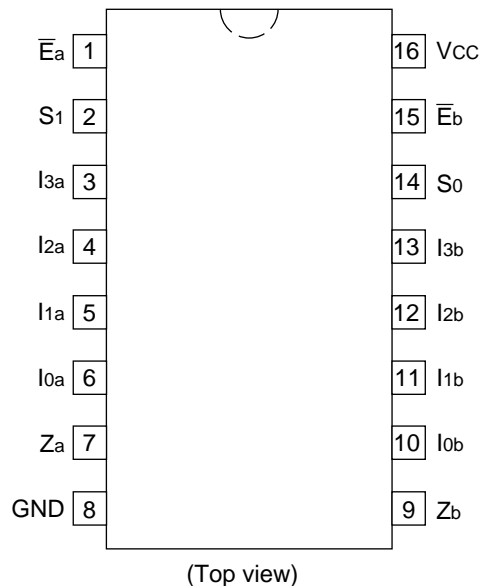
Description

The HD74AC153 is a high-speed dual 4-input multiplexer with common select inputs and individual enable inputs for each section. It can select two lines of data from four sources. The two buffered outputs present data in the true (noninverted) form. In addition to multiplexer operation, the HD74AC153 can act as a function generator and generate any two functions of three variables.

Feature

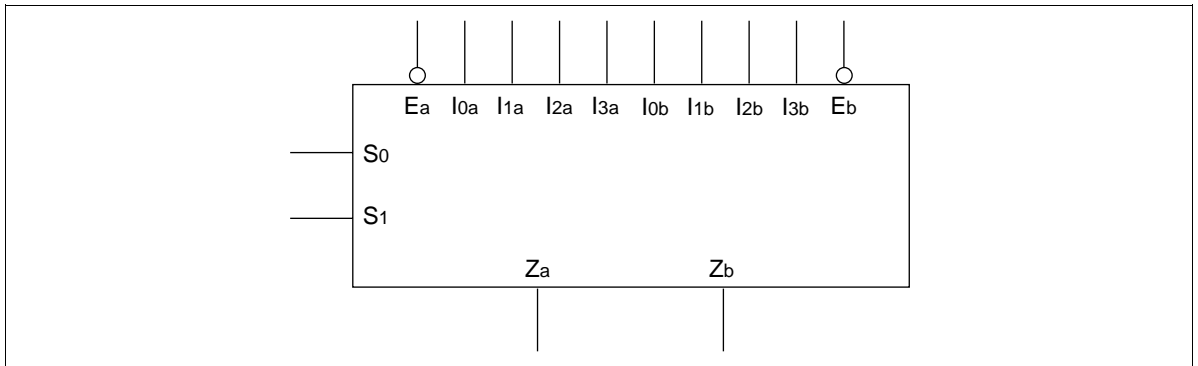
- Outputs Source/Sink 24 mA

Pin Arrangement



HD74AC153

Logic Symbol



Pin Names

I_{0a} to I_{3a} Side A Data Inputs

I_{0b} to I_{3b} Side B Data Inputs

S_0, S_1 Common Select Inputs

\bar{E}_a Side A Enable Input

\bar{E}_b Side B Enable Input

Z_a Side A Output

Z_b Side B Output

Functional Description

The HD74AC153 is a dual 4-input multiplexer. It can select two bits of data from up to four sources under the control of the common Select inputs (S_0, S_1). The two 4-input multiplexer circuits have individual active-Low Enables (\bar{E}_a, \bar{E}_b) which can be used to strobe the outputs independently. When the Enables (\bar{E}_a, \bar{E}_b) are High, the corresponding outputs (Z_a, Z_b) are forced Low. The HD74AC153 is the logic implementation of a 2-pole, 4-position switch, where the position of the switch is determined by the logic levels supplied to the two Select inputs. The logic equations for the outputs are shown below.

$$Z_a = \bar{E}_a \cdot (I_{0a} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1a} \cdot \bar{S}_1 \cdot S_0 + I_{2a} \cdot S_1 \cdot \bar{S}_0 + I_{3a} \cdot S_1 \cdot S_0)$$

$$Z_b = \bar{E}_b \cdot (I_{0b} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1b} \cdot \bar{S}_1 \cdot S_0 + I_{2b} \cdot S_1 \cdot \bar{S}_0 + I_{3b} \cdot S_1 \cdot S_0)$$

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Truth Table

| Select Inputs | | Input (a or b) | | | | | Output |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------|
| S ₀ | S ₁ | \bar{E} | I ₀ | I ₁ | I ₂ | I ₃ | Z |
| X | X | H | X | X | X | X | L |
| L | L | L | L | X | X | X | L |
| L | L | L | H | X | X | X | H |
| H | L | L | X | L | X | X | L |
| H | L | L | X | H | X | X | H |
| L | H | L | X | X | L | X | L |
| L | H | L | X | X | H | X | H |
| H | H | L | X | X | X | L | L |
| H | H | L | X | X | X | H | H |

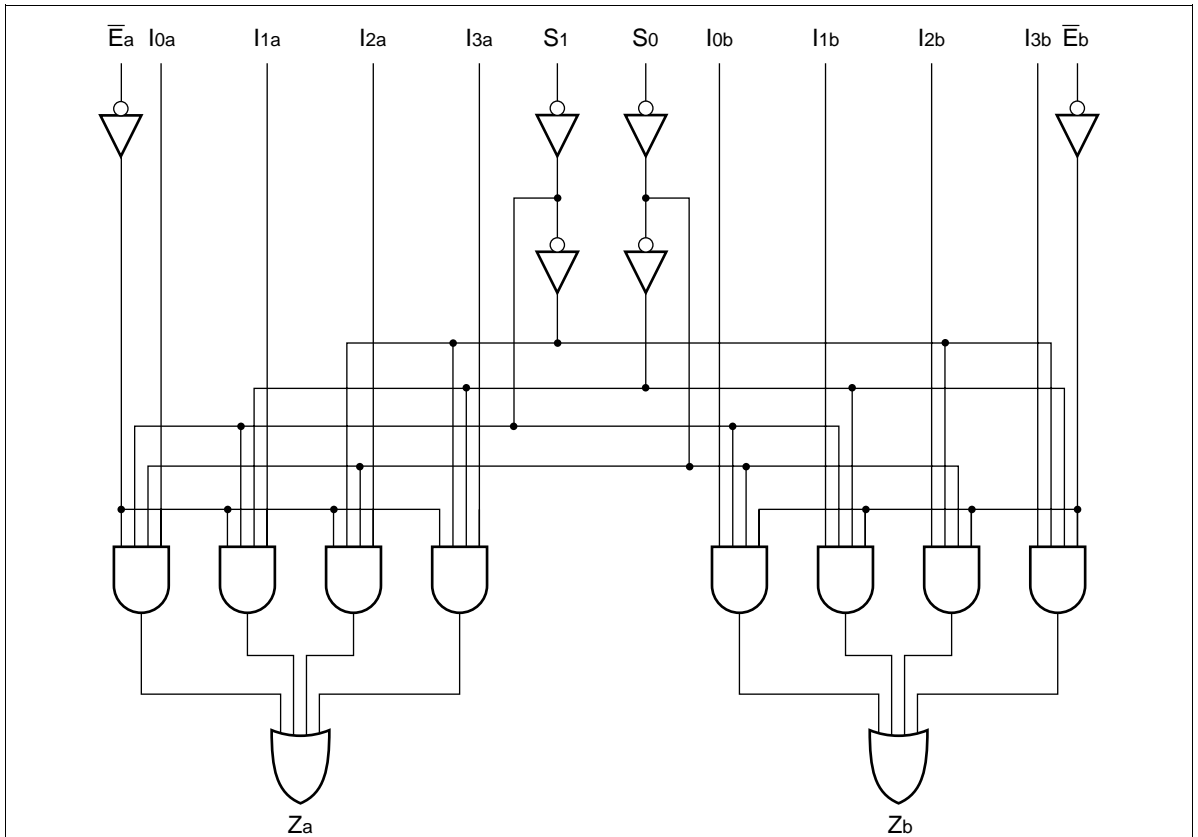
H : High Voltage Level

L : Low Voltage Level

X : Immaterial

HD74AC153

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

DC Characteristics (unless otherwise specified)

| Item | Symbol | Max | Unit | Condition |
|----------------------------------|----------|-----|---------|--|
| Maximum quiescent supply current | I_{CC} | 80 | μA | $V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5 V$, $T_a = \text{Worst case}$ |
| Maximum quiescent supply current | I_{CC} | 8.0 | μA | $V_{IN} = V_{CC}$ or ground, $V_{CC} = 5.5 V$, $T_a = 25^\circ C$ |

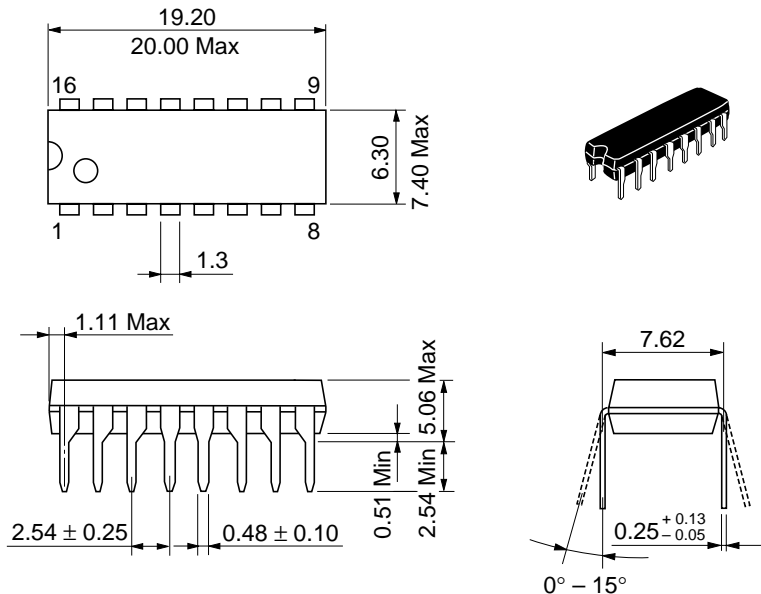
AC Characteristics: HD74AC153

| Item | Symbol | V _{CC} (V)*1 | Ta = +25°C C _L = 50 pF | | | Ta = -40°C to +85°C C _L = 50 pF | | Unit |
|---|------------------|-----------------------|--------------------------------------|-----|------|---|------|------|
| | | | Min | Typ | Max | Min | Max | |
| Propagation delay S _n to Z _n | t _{PLH} | 3.3 | 1.0 | 9.5 | 15.0 | 1.0 | 17.5 | ns |
| | | 5.0 | 1.0 | 6.5 | 11.0 | 1.0 | 12.5 | |
| Propagation delay S _n to Z _n | t _{PHL} | 3.3 | 1.0 | 8.5 | 14.5 | 1.0 | 16.5 | ns |
| | | 5.0 | 1.0 | 6.5 | 11.0 | 1.0 | 12.0 | |
| Propagation delay E _n to Z _n | t _{PLH} | 3.3 | 1.0 | 8.0 | 13.5 | 1.0 | 16.0 | ns |
| | | 5.0 | 1.0 | 5.5 | 9.5 | 1.0 | 11.0 | |
| Propagation delay E _n to Z _n | t _{PHL} | 3.3 | 1.0 | 7.0 | 11.0 | 1.0 | 12.5 | ns |
| | | 5.0 | 1.0 | 5.0 | 8.0 | 1.0 | 9.0 | |
| Propagation delay I _n to Z _n | t _{PLH} | 3.3 | 1.0 | 7.5 | 12.5 | 1.0 | 14.5 | ns |
| | | 5.0 | 1.0 | 5.5 | 9.0 | 1.0 | 10.5 | |
| Propagation delay I _n to Z _n | t _{PHL} | 3.3 | 1.0 | 7.0 | 11.5 | 1.0 | 13.0 | ns |
| | | 5.0 | 1.0 | 5.0 | 8.5 | 1.0 | 10.0 | |

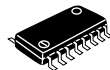
Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

| Item | Symbol | Typ | Unit | Condition |
|-------------------------------|-----------------|------|------|-------------------------|
| Input capacitance | C _{IN} | 4.5 | pF | V _{CC} = 5.5 V |
| Power dissipation capacitance | C _{PD} | 65.0 | pF | V _{CC} = 5.0 V |

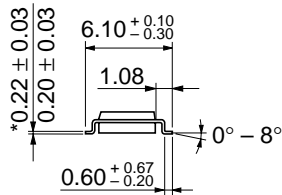


| | |
|--------------------------|----------|
| Hitachi Code | DP-16 |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 1.07 g |



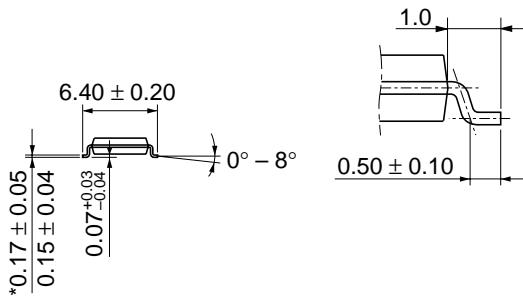
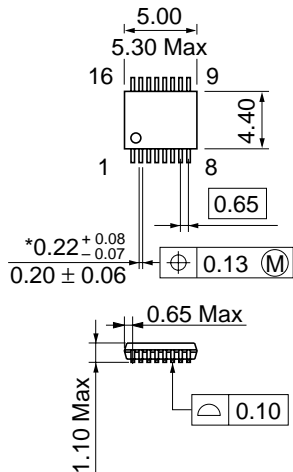
*Dimension including the plating thickness
Base material dimension

| | |
|--------------------------|----------|
| Hitachi Code | FP-16DA |
| JEDEC | — |
| EIAJ | Conforms |
| Weight (reference value) | 0.24 g |



*Dimension including the plating thickness
Base material dimension

| | |
|--------------------------|----------|
| Hitachi Code | FP-16DN |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Weight (reference value) | 0.15 g |



*Dimension including the plating thickness
 Base material dimension

| | |
|--------------------------|----------|
| Hitachi Code | TTP-16DA |
| JEDEC | — |
| EIAJ | — |
| Weight (reference value) | 0.05 g |

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