

HD74AC153

Dual 4-Input Multiplexer

HITACHI

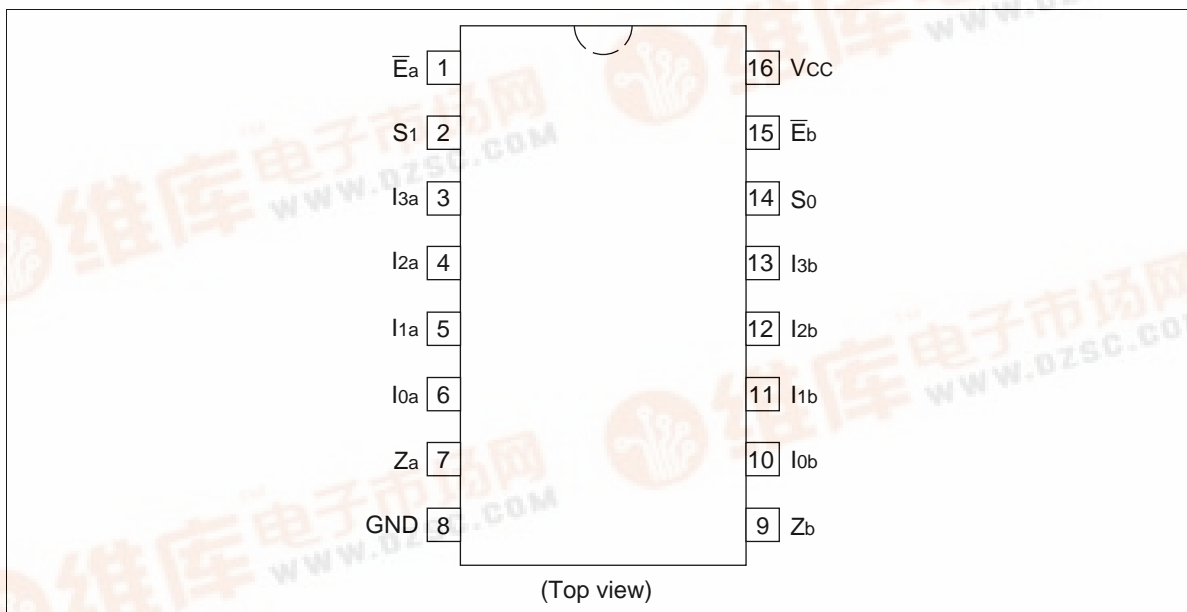
Description

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

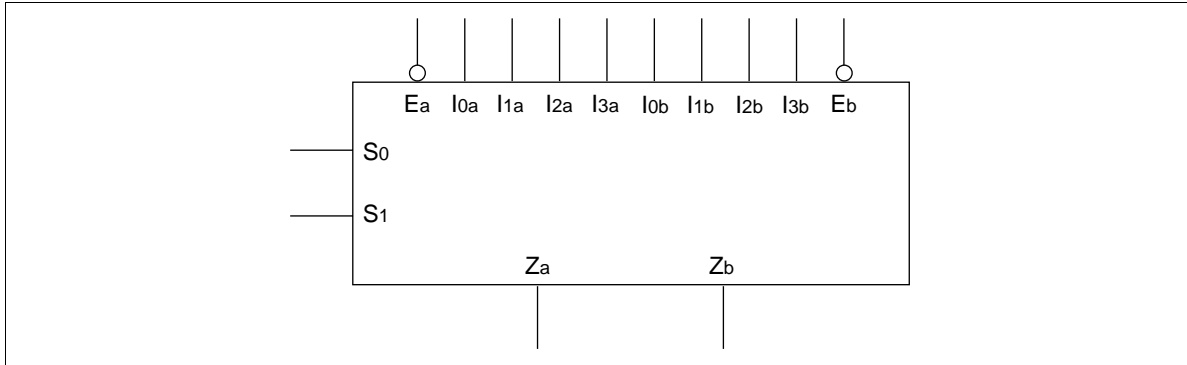
- Outputs Source/Sink 24 mA

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.

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

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

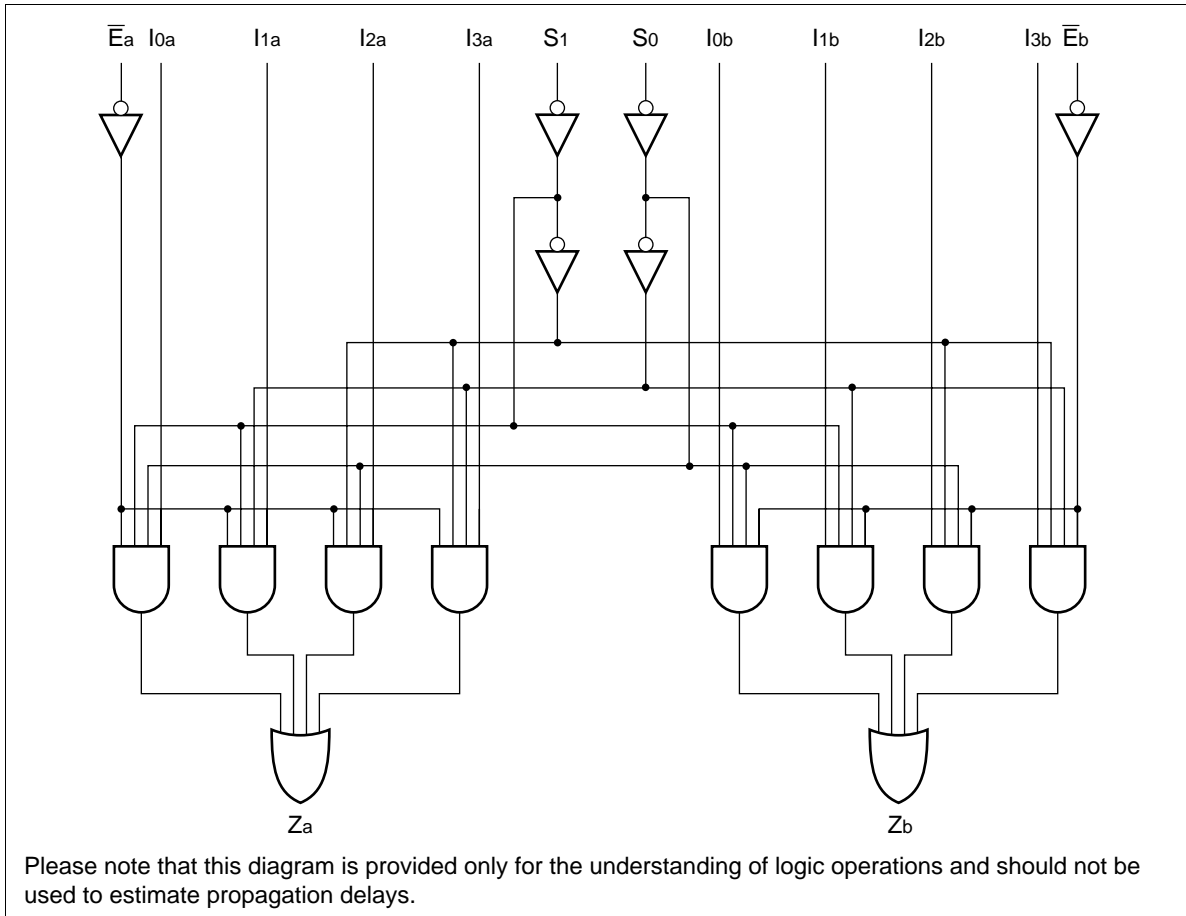
H : High Voltage Level

L : Low Voltage Level

X : Immaterial

HD74AC153

Logic Diagram



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, $V_{CC} = 5.5 V$, $T_a = 25^\circ C$

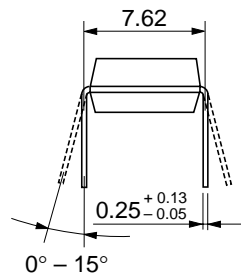
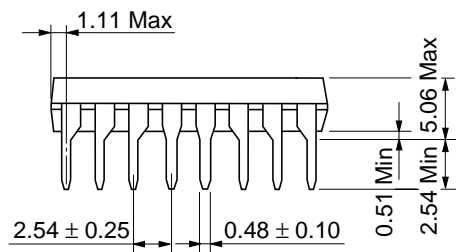
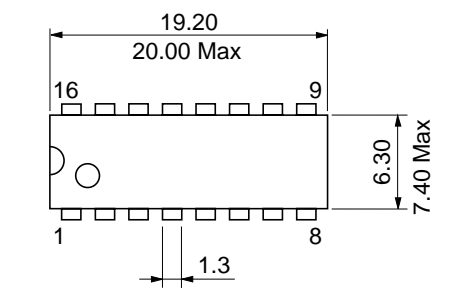
AC Characteristics: HD74AC153

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	

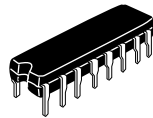
Note: 1. Voltage Range 3.3 is 3.3 V ± 0.3 V
Voltage Range 5.0 is 5.0 V ± 0.5 V

Capacitance

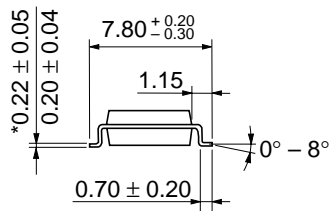
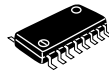
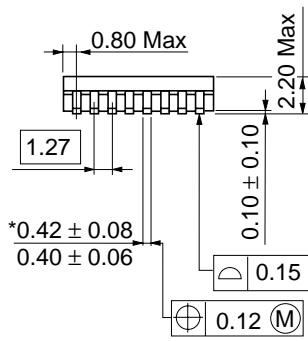
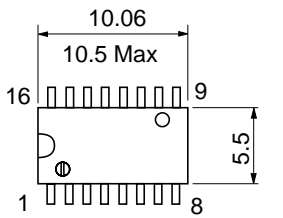
Item	Symbol	Typ	Unit	Condition
Input capacitance	C _{IN}	4.5	pF	V _{CC} = 5.5 V
Power dissipation capacitance	C _{PD}	65.0	pF	V _{CC} = 5.0 V



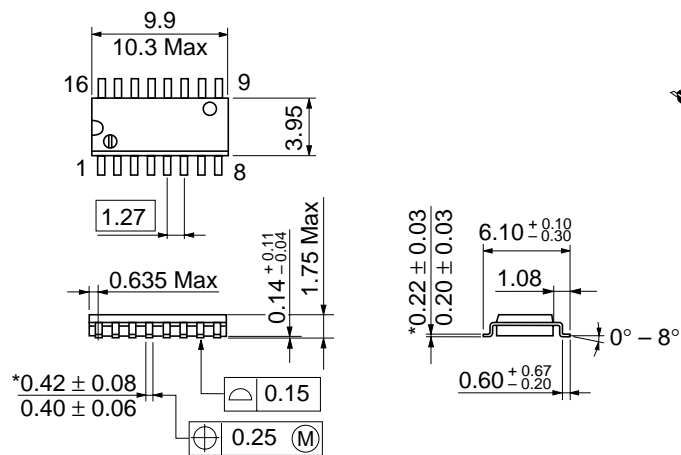
Unit: mm



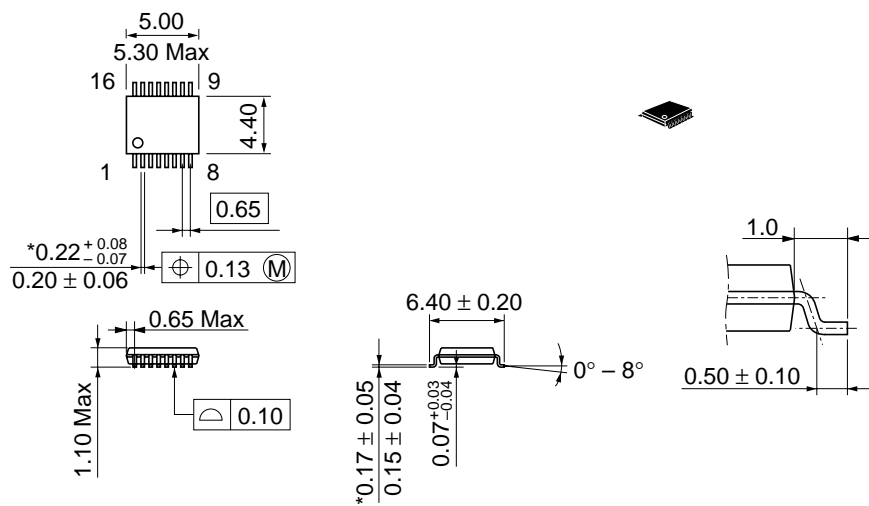
Unit: mm



Unit: mm



Unit: mm



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