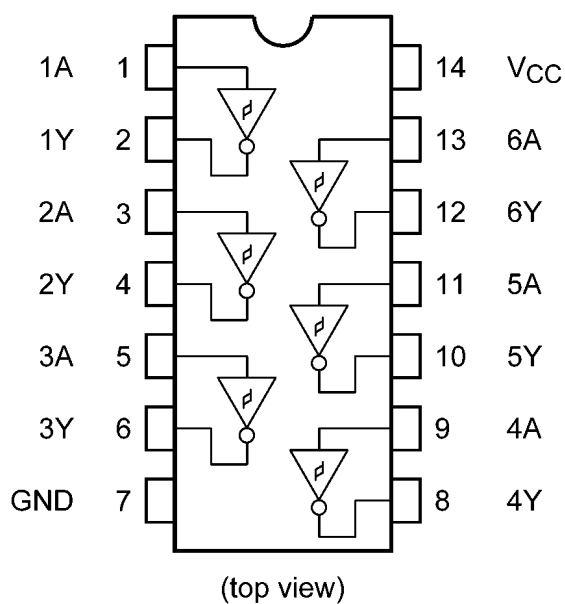
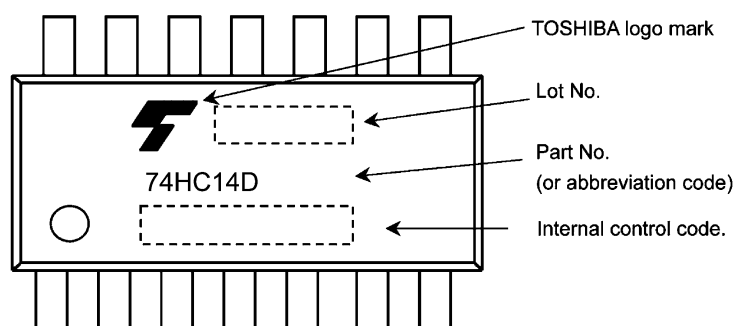


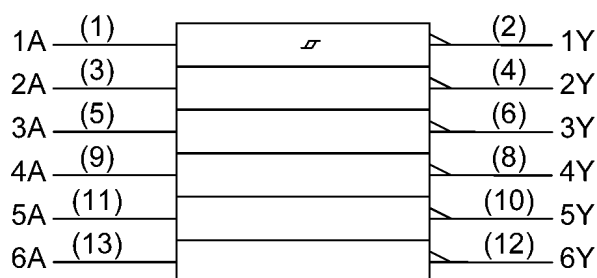
5. Pin Assignment



6. Marking



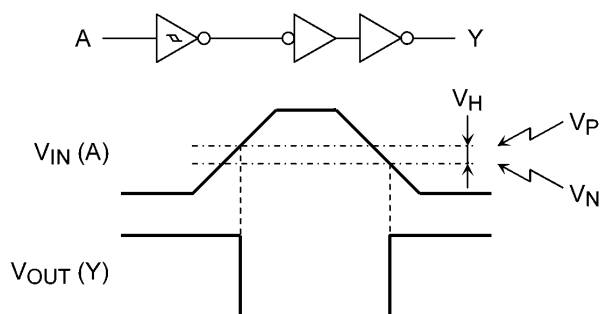
7. IEC Logic Symbol



8. Truth Table

A	Y
L	H
H	L

9. System Diagram, Waveform



10. Absolute Maximum Ratings (Note)

Characteristics	Symbol	Note	Rating	Unit
Supply voltage	V_{CC}		-0.5 to 7.0	V
Input voltage	V_{IN}		-0.5 to $V_{CC} + 0.5$	V
Output voltage	V_{OUT}		-0.5 to $V_{CC} + 0.5$	V
Input diode current	I_{IK}		± 20	mA
Output diode current	I_{OK}		± 20	mA
Output current	I_{OUT}		± 25	mA
V_{CC} /ground current	I_{CC}		± 50	mA
Power dissipation	P_D	(Note 1)	500	mW
Storage temperature	T_{stg}		-65 to 150	°C

Note: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: P_D derates linearly with -8 mW/°C above 85 °C

11. Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.0 to 6.0	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	-40 to 125	°C

Note: The operating ranges are required to ensure the normal operation of the device. Unused inputs must be tied to either V_{CC} or GND.

12. Electrical Characteristics

12.1. DC Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Typ.	Max	Unit
Positive threshold voltage	V_P	—		2.0	0.7	1.18	1.50	V
				4.5	1.7	2.38	3.15	
				6.0	2.1	3.14	4.20	
Negative threshold voltage	V_N	—		2.0	0.3	0.52	0.9	V
				4.5	0.9	1.40	2.0	
				6.0	1.5	1.89	2.6	
Hysteresis voltage	V_H	—		2.0	0.3	0.6	1.0	V
				4.5	0.6	1.1	1.4	
				6.0	0.8	1.2	1.7	
High-level output voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -20\text{ }\mu\text{A}$	2.0	1.9	2.0	—	V
				4.5	4.4	4.5	—	
				6.0	5.9	6.0	—	
			$I_{OH} = -4\text{ mA}$	4.5	4.18	4.31	—	
			$I_{OH} = -5.2\text{ mA}$	6.0	5.68	5.80	—	
Low-level output voltage	V_{OL}	$V_{IN} = V_{IH}$	$I_{OL} = 20\text{ }\mu\text{A}$	2.0	—	0.0	0.1	V
				4.5	—	0.0	0.1	
				6.0	—	0.0	0.1	
			$I_{OL} = 4\text{ mA}$	4.5	—	0.17	0.26	
			$I_{OL} = 5.2\text{ mA}$	6.0	—	0.18	0.26	
Input leakage current	I_{IN}	$V_{IN} = V_{CC}$ or GND		6.0	—	—	± 0.1	μA
Quiescent supply current	I_{CC}	$V_{IN} = V_{CC}$ or GND		6.0	—	—	1.0	μA

12.2. DC Characteristics (Unless otherwise specified, $T_a = -40\text{ to }85\text{ }^\circ\text{C}$)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Max	Unit
Positive threshold voltage	V_P	—		2.0	0.7	1.50	V
				4.5	1.7	3.15	
				6.0	2.1	4.20	
Negative threshold voltage	V_N	—		2.0	0.3	0.9	V
				4.5	0.9	2.0	
				6.0	1.2	2.6	
Hysteresis voltage	V_H	—		2.0	0.3	1.0	V
				4.5	0.6	1.4	
				6.0	0.8	1.7	
High-level output voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -20\text{ }\mu\text{A}$	2.0	1.9	—	V
				4.5	4.4	—	
				6.0	5.9	—	
			$I_{OH} = -4\text{ mA}$	4.5	4.13	—	
			$I_{OH} = -5.2\text{ mA}$	6.0	5.63	—	
Low-level output voltage	V_{OL}	$V_{IN} = V_{IH}$	$I_{OL} = 20\text{ }\mu\text{A}$	2.0	—	0.1	V
				4.5	—	0.1	
				6.0	—	0.1	
			$I_{OL} = 4\text{ mA}$	4.5	—	0.33	
			$I_{OL} = 5.2\text{ mA}$	6.0	—	0.33	
Input leakage current	I_{IN}	$V_{IN} = V_{CC}$ or GND		6.0	—	± 1.0	μA
Quiescent supply current	I_{CC}	$V_{IN} = V_{CC}$ or GND		6.0	—	10.0	μA

12.3. DC Characteristics (Unless otherwise specified, $T_a = -40$ to $125\text{ }^\circ\text{C}$)

Characteristics	Symbol	Test Condition		V_{CC} (V)	Min	Max	Unit
Positive threshold voltage	V_P	—		2.0	0.7	1.50	V
				4.5	1.7	3.15	
				6.0	2.1	4.20	
Negative threshold voltage	V_N	—		2.0	0.3	0.9	V
				4.5	0.9	2.0	
				6.0	1.2	2.6	
Hysteresis voltage	V_H	—		2.0	0.3	1.0	V
				4.5	0.6	1.4	
				6.0	0.8	1.7	
High-level output voltage	V_{OH}	$V_{IN} = V_{IL}$	$I_{OH} = -20\text{ }\mu\text{A}$	2.0	1.9	—	V
				4.5	4.4	—	
				6.0	5.9	—	
			$I_{OH} = -4\text{ mA}$	4.5	4.13	—	
			$I_{OH} = -5.2\text{ mA}$	6.0	5.63	—	
Low-level output voltage	V_{OL}	$V_{IN} = V_{IH}$	$I_{OL} = 20\text{ }\mu\text{A}$	2.0	—	0.1	V
				4.5	—	0.1	
				6.0	—	0.1	
			$I_{OL} = 4\text{ mA}$	4.5	—	0.4	
			$I_{OL} = 5.2\text{ mA}$	6.0	—	0.4	
Input leakage current	I_{IN}	$V_{IN} = V_{CC}$ or GND		6.0	—	± 1.0	μA
Quiescent supply current	I_{CC}	$V_{IN} = V_{CC}$ or GND		6.0	—	40.0	μA

12.4. AC Characteristics

(Unless otherwise specified, $C_L = 15\text{ pF}$, $V_{CC} = 5\text{ V}$, $T_a = 25\text{ }^\circ\text{C}$, Input: $t_r = t_f = 6\text{ ns}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output transition time	t_{TLH}, t_{THL}	—	—	4	8	ns
Propagation delay time	t_{PLH}, t_{PHL}	—	—	11	21	ns

12.5. AC Characteristics

(Unless otherwise specified, $C_L = 50\text{ pF}$, $T_a = 25\text{ }^\circ\text{C}$, Input: $t_r = t_f = 6\text{ ns}$)

Characteristics	Symbol	Note	V_{CC} (V)	Min	Typ.	Max	Unit
Output transition time	t_{TLH}, t_{THL}		2.0	—	30	75	ns
			4.5	—	8	15	
			6.0	—	7	13	
Propagation delay time	t_{PLH}, t_{PHL}		2.0	—	42	125	ns
			4.5	—	14	25	
			6.0	—	12	21	
Input capacitance	C_{IN}		—	—	3	—	pF
Power dissipation capacitance	C_{PD}	(Note 1)	—	—	8	—	pF

Note 1: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation.

$$I_{CC(\text{opr})} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/6 \text{ (per gate)}$$

12.6. AC Characteristics(Unless otherwise specified, $C_L = 50 \text{ pF}$, $T_a = -40 \text{ to } 85 \text{ }^\circ\text{C}$, Input: $t_r = t_f = 6 \text{ ns}$)

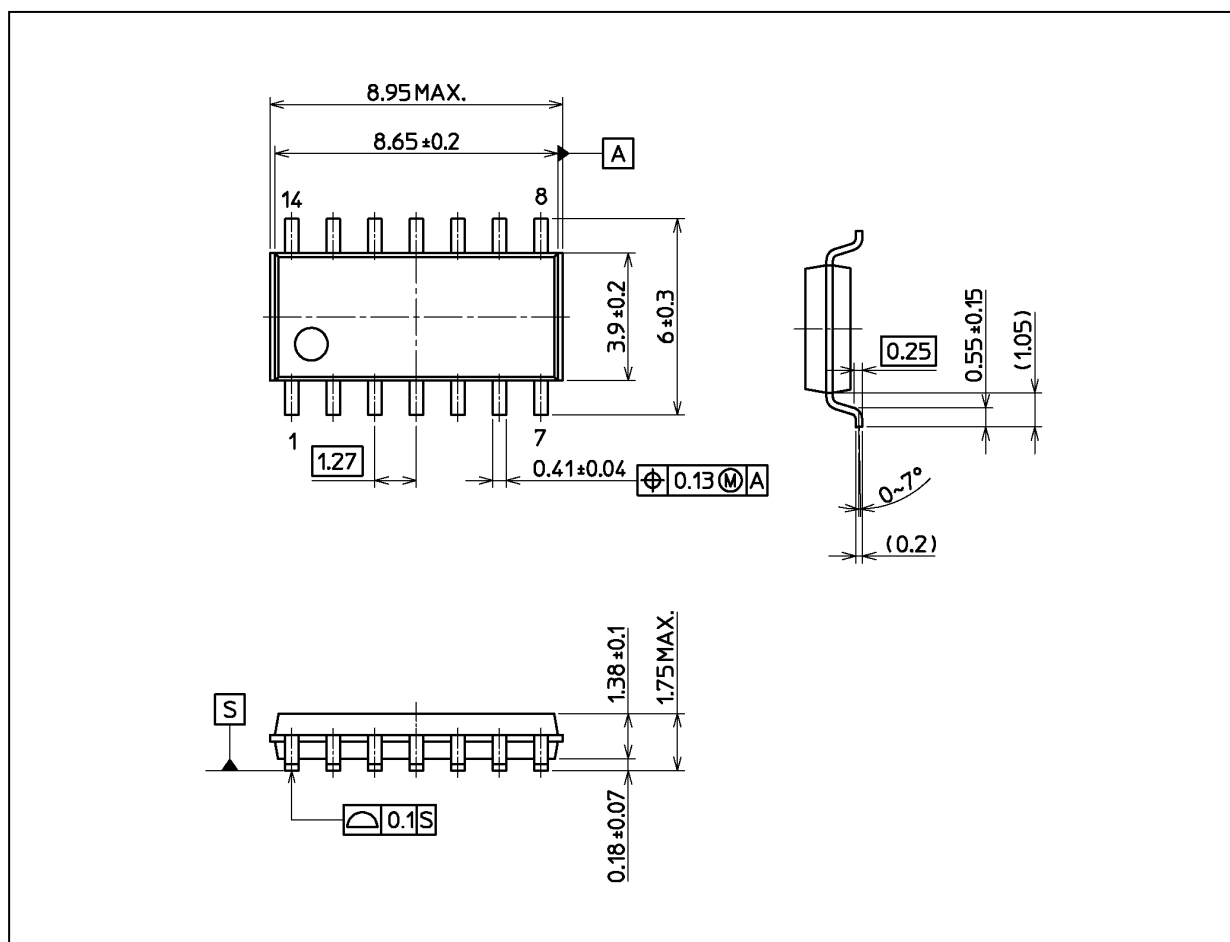
Characteristics	Symbol	$V_{CC} \text{ (V)}$	Min	Max	Unit
Output transition time	t_{TLH}, t_{THL}	2.0	—	95	ns
		4.5	—	19	
		6.0	—	16	
Propagation delay time	t_{PLH}, t_{PHL}	2.0	—	155	ns
		4.5	—	31	
		6.0	—	26	

12.7. AC Characteristics(Unless otherwise specified, $C_L = 50 \text{ pF}$, $T_a = -40 \text{ to } 125 \text{ }^\circ\text{C}$, Input: $t_r = t_f = 6 \text{ ns}$)

Characteristics	Symbol	$V_{CC} \text{ (V)}$	Min	Max	Unit
Output transition time	t_{TLH}, t_{THL}	2.0	—	110	ns
		4.5	—	22	
		6.0	—	19	
Propagation delay time	t_{PLH}, t_{PHL}	2.0	—	190	ns
		4.5	—	38	
		6.0	—	32	

Package Dimensions

Unit: mm



Weight: 0.13 g (typ.)

Package Name(s)
Nickname: SOIC14

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