TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC74HC07AP,TC74HC07AF

Hex Buffer (open drain)

The TC74HC07A is a high speed CMOS BUFFER fabricated with silicon gate C^2MOS technology.

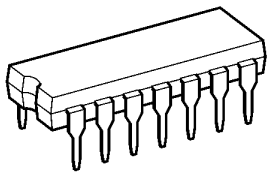
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

Pin configuration and function are the same as the TC74HCT7007A. But the TC74HC07A has high performance MOS N-channel transistor (open-drain) outputs.

This device can, therfore, with a suitable pull-up resistors, be used in wired-AND, LED driver and other applications.

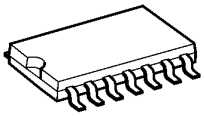
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

TC74HC07AP

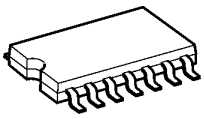


DIP14-P-300-2.54

TC74HC07AF



SOP14-P-300-1.27A



SOP14-P-300-1.27

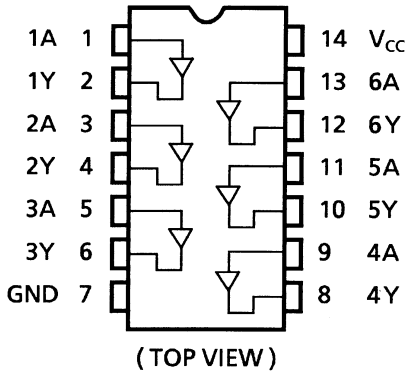
Weight

DIP14-P-300-2.54	: 0.96 g (typ.)
SOP14-P-300-1.27A	: 0.18 g (typ.)
SOP14-P-300-1.27	: 0.18 g (typ.)

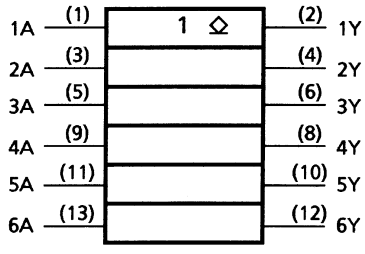
Features

- High speed: t_{pz} = 5 ns (typ.) at V_{CC} = 5 V
- Low power dissipation: I_{CC} = 1 μA (max) at Ta = 25°C
- High noise immunity: $V_{NIH} = V_{NIL}$ = 28% V_{CC} (min)
- Output drive capability: 10 LSTTL loads
- Wide operating voltage range: V_{CC} (opr) = 2 to 6 V
- Open drain structure.
- Pin and function compatible with 74LS07

Pin Assignment



IEC Logic Symbol

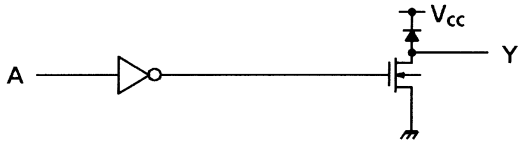


Truth Table

A	Y
L	L
H	Z

Z: High impedance

System Diagram (per gate)



Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	−0.5 to 7	V
DC input voltage	V_{IN}	−0.5 to V_{CC} + 0.5	V
DC 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
DC output current	I_{OUT}	+25	mA
DC V_{CC}/ground current	I_{CC}	±50	mA
Power dissipation	P_D	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T_{stg}	−65 to 150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Note 2: 500 mW in the range of Ta = −40 to 65°C. From Ta = 65 to 85°C a derating factor of −10 mW/°C shall be applied until 300 mW.

Recommended Operating Conditions (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2 to 6	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 85	°C
Input rise and fall time	t_r, t_f	0 to 1000 (V_{CC} = 2.0 V) 0 to 500 (V_{CC} = 4.5 V) 0 to 400 (V_{CC} = 6.0 V)	ns

Note: The recommended operating conditions are required to ensure the normal operation of the device. Unused inputs must be tied to either VCC or GND.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition		V_{CC} (V)	Ta = 25°C Min	Ta = 25°C Typ.	Ta = 25°C Max	Ta = –40 to 85°C Min	Ta = –40 to 85°C Max	Unit
High-level input voltage	V_{IH}	—		2.0	1.50	—	—	1.50	—	V
				4.5	3.15	—	—	3.15	—	
				6.0	4.20	—	—	4.20	—	
Low-level input voltage	V_{IL}	—		2.0	—	—	0.50	—	0.50	V
				4.5	—	—	1.35	—	1.35	
				6.0	—	—	1.80	—	1.80	
Low-level output voltage	V_{OL}	V_{IN} = V_{IL}	I_{OL} = 20 μA	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
				6.0	—	0.0	0.1	—	0.1	
			I_{OL} = 4 mA	4.5	—	0.17	0.26	—	0.33	
			I_{OL} = 5.2 mA	6.0	—	0.18	0.26	—	0.33	
Output off-state current	I_{OZ}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC}		6.0	—	—	±0.5	—	±5.0	μA
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	—	1.0	—	10.0	μA

AC Characteristics (C_L = 15 pF, V_{CC} = 5 V, Ta = 25°C, input: t_r = t_f = 6 ns)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output transition time	t_{THL}	—	—	4	8	ns
Propagation delay time	t_{pLZ}	R_L = 1 kΩ	—	5	15	ns
Propagation delay time	t_{pZL}	R_L = 1 kΩ	—	5	15	ns

AC Characteristics (C_L = 50 pF, input: $t_r = t_f$ = 6 ns)

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = −40 to 85°C		Unit
			V_{CC} (V)	Min	Typ.	Max	Min	Max	
Output transition time	t_{THL}	—	2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation delay time	t_{pLZ}	R_L = 1 kΩ	2.0	—	10	90	—	115	ns
			4.5	—	7	18	—	23	
			6.0	—	6	15	—	20	
Propagation delay time	t_{pZL}	R_L = 1 kΩ	2.0	—	17	90	—	115	ns
			4.5	—	7	18	—	23	
			6.0	—	5	15	—	20	
Input capacitance	C_{IN}	—		—	5	10	—	10	pF
Output capacitance	C_{OUT}	—		—	3	—	—	—	pF
Power dissipation capacitance	C_{PD} (Note)	—		—	4	—	—	—	pF

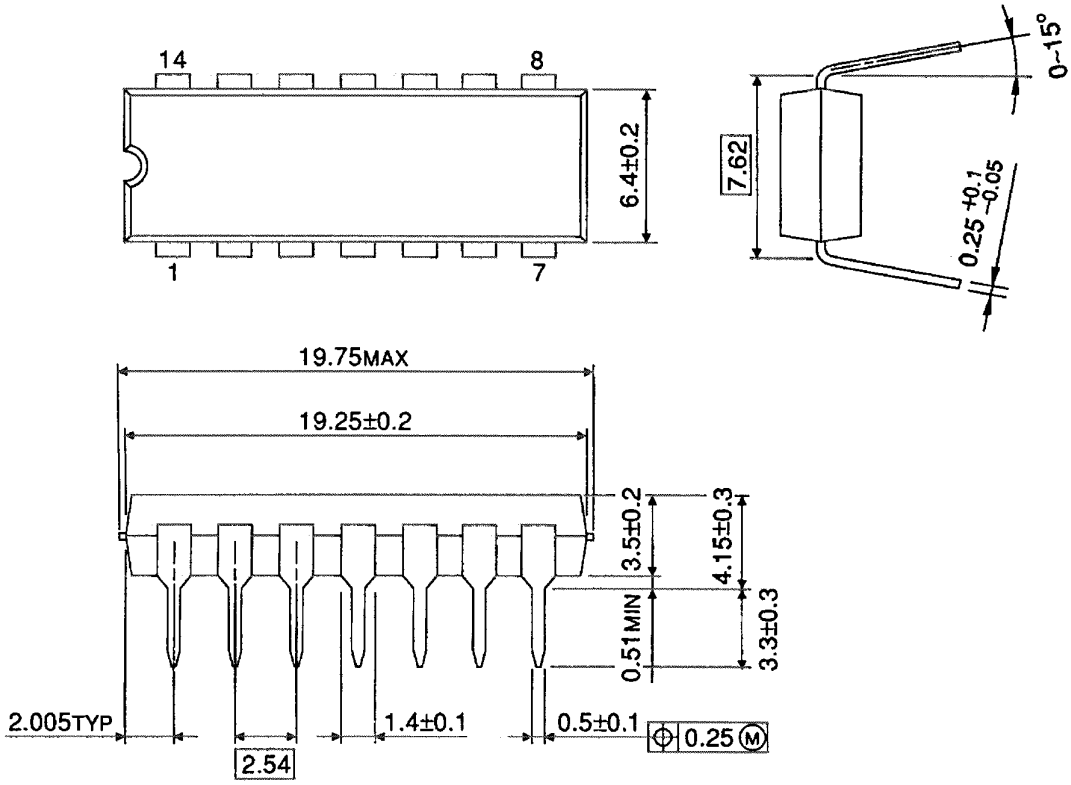
Note: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

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

Package Dimensions

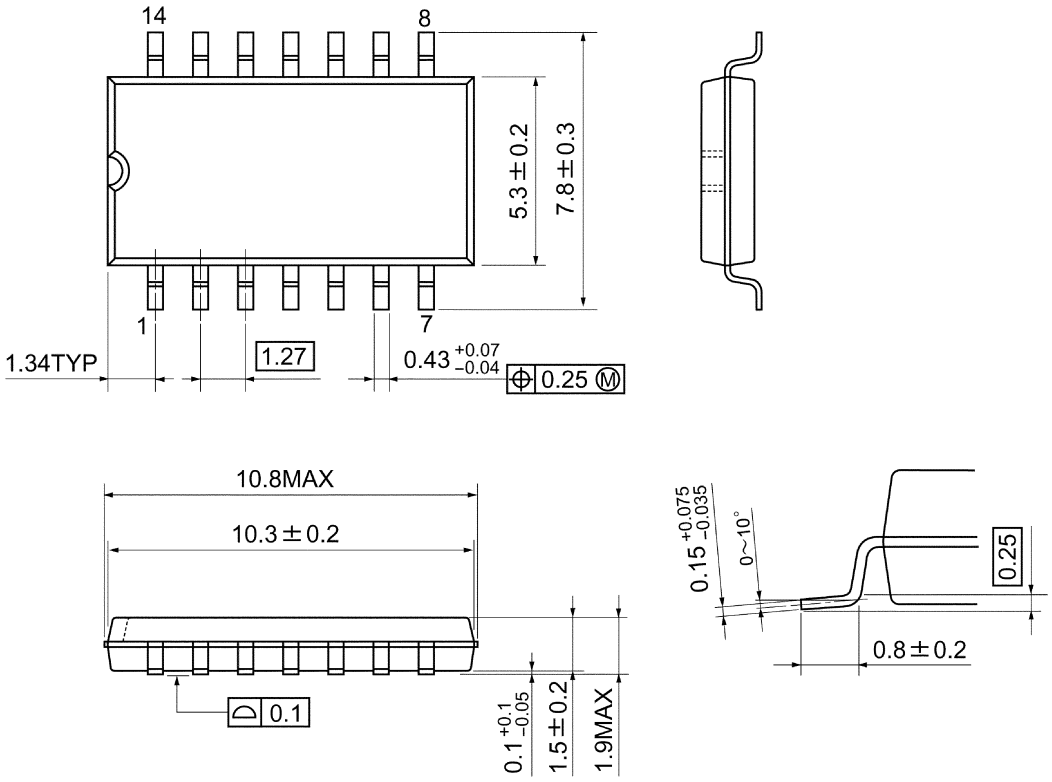
DIP14-P-300-2.54 Unit : mm



Weight: 0.96 g (typ.)

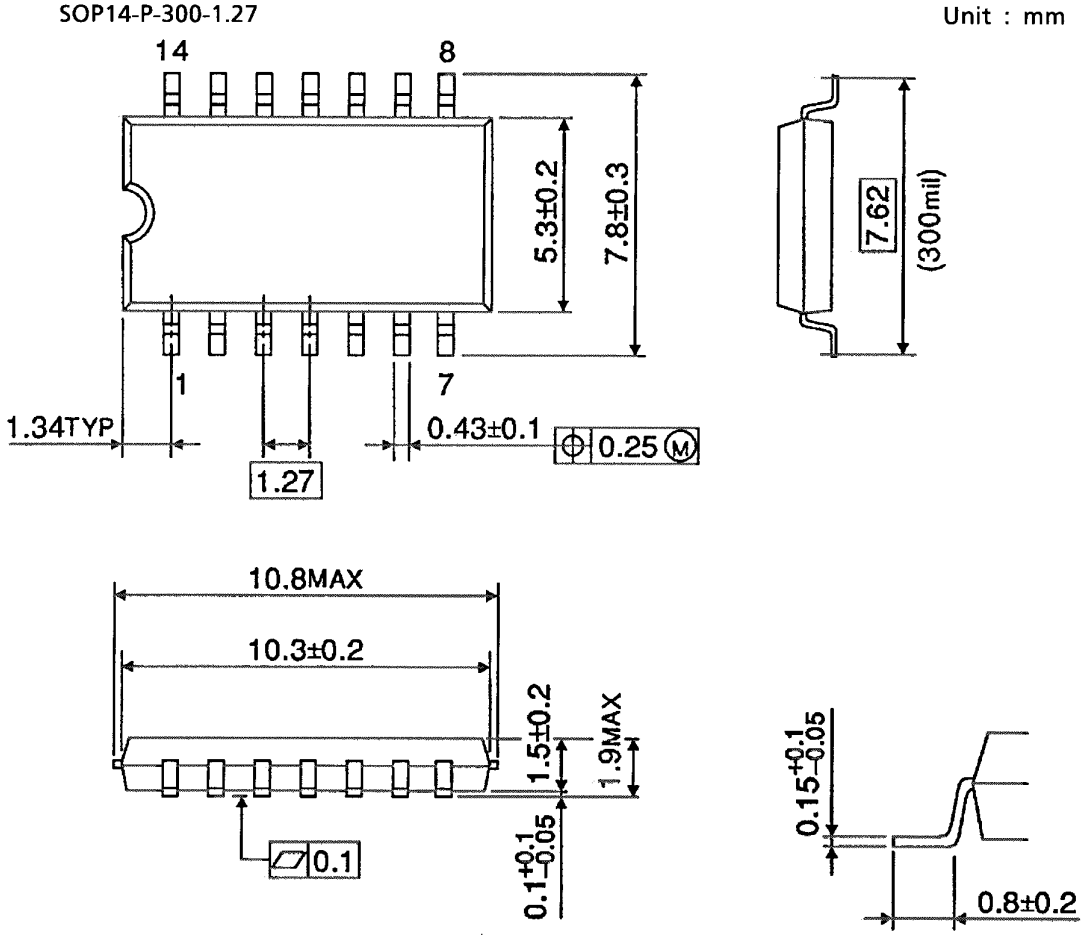
Package Dimensions

SOP14-P-300-1.27A Unit: mm



Weight: 0.18 g (typ.)

Package Dimensions



Weight: 0.18 g (typ.)

Note: Lead (Pb)-Free Packages

DIP14-P-300-2.54 SOP14-P-300-1.27A

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