

TC74HC32AP,TC74HC32AF

Quad 2-Input OR Gate

The TC74HC32A is a high speed CMOS 2-INPUT OR GATE fabricated with silicon gate C²MOS technology.

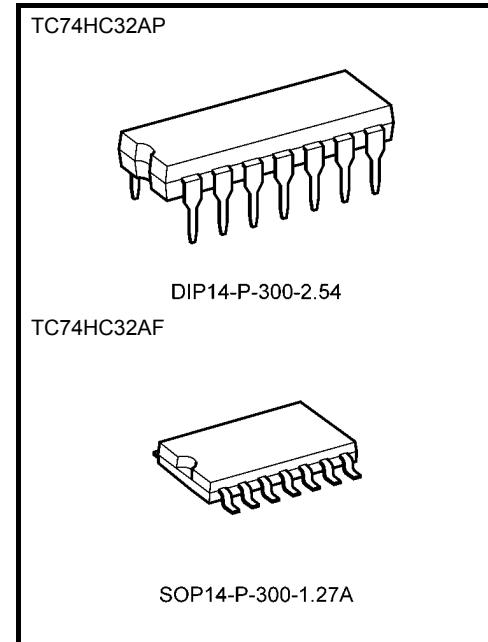
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

The internal circuit is composed of 2 stages including buffer output, which provide high noise immunity and stable output.

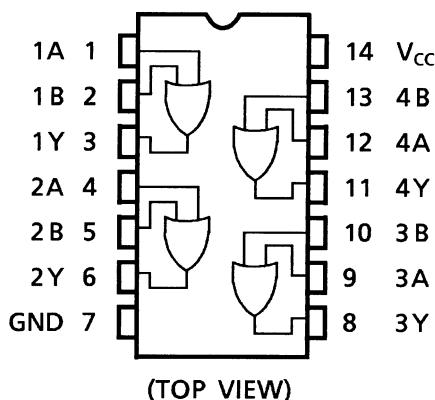
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Features

- High speed: $t_{pd} = 6$ ns (typ.) at $V_{CC} = 5$ V
- Low power dissipation: $I_{CC} = 1 \mu A$ (max) at $T_a = 25^\circ C$
- High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min)
- Output drive capability: 10 LSTTL loads
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 4$ mA (min)
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Wide operating voltage range: V_{CC} (opr) = 2~6 V
- Pin and function compatible with 74LS32

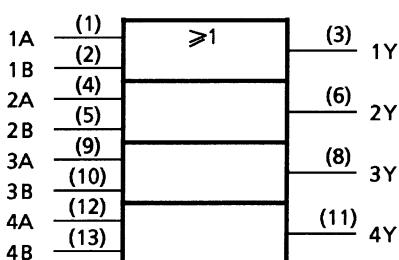


Pin Assignment



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

IEC Logic Symbol



Truth Table

A	B	Y
H	H	H
L	H	H
H	L	H
L	L	L

Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5~7	V
DC input voltage	V_{IN}	-0.5~ V_{CC} + 0.5	V
DC output voltage	V_{OUT}	-0.5~ 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}	-65~150	°C

Note 1: 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 2: 500 mW in the range of $T_a = -40^{\circ}\text{C}$ ~ 65°C . From $T_a = 65^{\circ}\text{C}$ to 85°C a derating factor of $-10 \text{ mW/}^{\circ}\text{C}$ shall be applied until 300 mW.

Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2~6	V
Input voltage	V_{IN}	0~ V_{CC}	V
Output voltage	V_{OUT}	0~ V_{CC}	V
Operating temperature	T_{opr}	-40~85	°C
Input rise and fall time	t_r, t_f	0~1000 ($V_{CC} = 2.0 \text{ V}$) 0~500 ($V_{CC} = 4.5 \text{ V}$) 0~400 ($V_{CC} = 6.0 \text{ V}$)	ns

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

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40~85°C		Unit
				Min	Typ.	Max	Min	Max	
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	
High-level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -20 μA	2.0	1.9	2.0	—	1.9	V
				4.5	4.4	4.5	—	4.4	
				6.0	5.9	6.0	—	5.9	
Low-level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 20 μA	4.5	4.18	4.31	—	4.13	V
				6.0	5.68	5.80	—	5.63	
				2.0	—	0.0	0.1	—	
Input leakage current	I _{IN}	V _{IN} = V _{CC} or GND	I _{OL} = 4 mA	4.5	—	0.0	0.1	—	μA
				6.0	—	0.0	0.1	—	
				2.0	—	0.17	0.26	—	
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND	I _{OL} = 5.2 mA	4.5	—	0.18	0.26	—	μA
				6.0	—	0.18	0.26	—	
				2.0	—	0.1	—	—	

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 _{TLH} t _{THL}	—	—	4	8	ns
Propagation delay time	t _{pLH} t _{pHL}	—	—	6	12	ns

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

Characteristics	Symbol	Test Condition	V _{CC} (V)	Ta = 25°C			Ta = -40~85°C		Unit
				Min	Typ.	Max	Min	Max	
Output transition time	t_{TLH} t_{THL}	—	2.0	—	25	75	—	95	ns
			4.5	—	7	15	—	19	
			6.0	—	6	13	—	16	
Propagation delay time	t_{pLH} t_{pHL}	—	2.0	—	24	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Input capacitance	C_{IN}	—	—	—	5	10	—	10	pF
Power dissipation capacitance	C_{PD} (Note)	—	—	—	21	—	—	—	pF

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

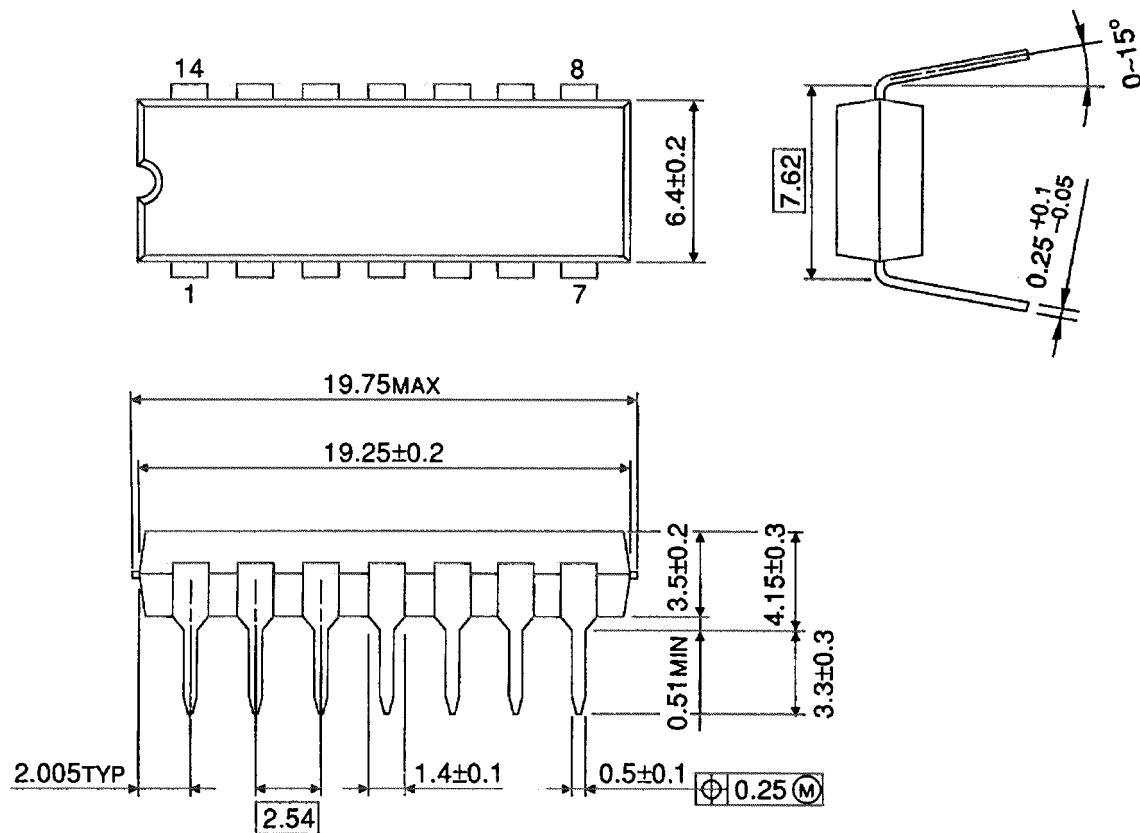
Average operating current can be obtained by the equation:

$$I_{CC} (\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4 \text{ (per gate)}$$

Package Dimensions

DIP14-P-300-2.54

Unit : mm

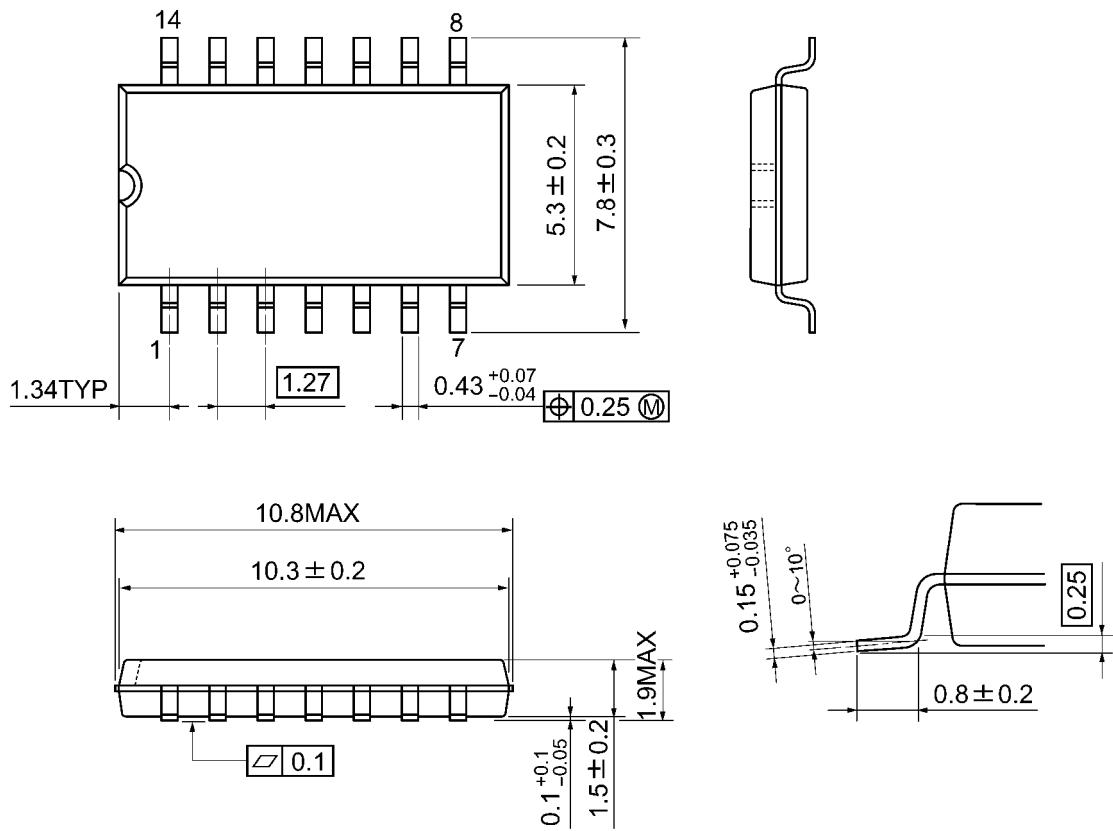


Weight: 0.96 g (typ.)

Package Dimensions

SOP14-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

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