

# TC74HC4075AP, TC74HC4075AF

## Triple 3-Input OR Gate

The TC74HC4075A is a high speed CMOS 3-INPUT OR GATE fabricated with silicon gate C<sup>2</sup>MOS technology.

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

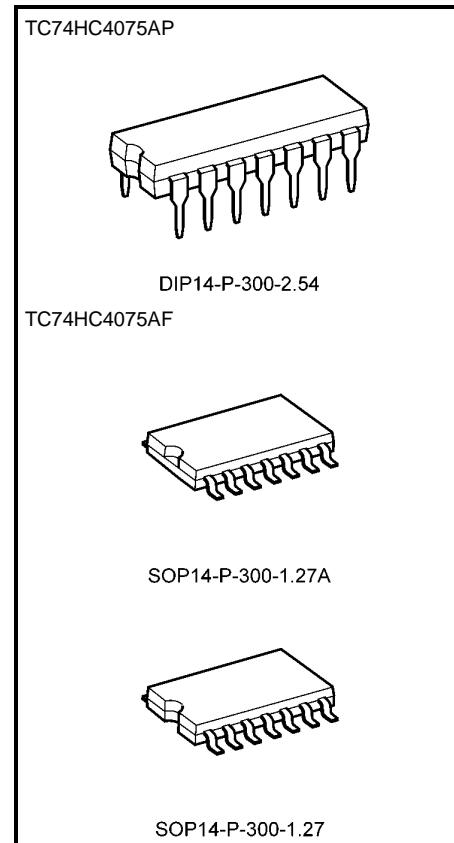
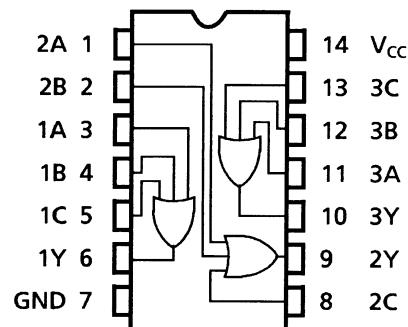
The internal circuit is composed of 4 stages including a buffered outputs, which provide high noise immunity and stable output.

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

## Features

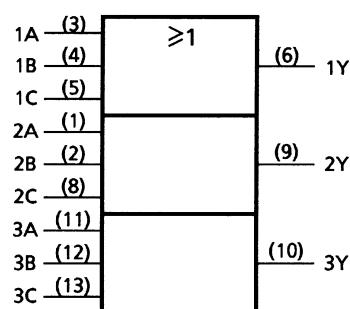
- High speed:  $t_{pd} = 8$  ns (typ.) at  $V_{CC} = 5$  V
- Low power dissipation:  $I_{CC} = 2$   $\mu$ A (max) at  $T_a = 25^\circ\text{C}$
- High noise immunity:  $V_{NIH} = V_{NIL} = 28\%$   $V_{CC}$  (min)
- Output drive capability: 10 LSTTL loads
- Symmetrical output impedance:  $|I_{OH}| = I_{OL} = 4$  mA (min)
- Balanced propagation delays:  $t_{PLH} \approx t_{PHL}$
- Wide operating voltage range:  $V_{CC}$  (opr) = 2 to 6 V
- Pin and function compatible with 4075B

## Pin Assignment



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.)

## IEC Logic Symbol



**Truth Table**

A	B	C	Y
H	X	X	H
X	H	X	H
X	X	H	H
L	L	L	L

X: Don't care

**Absolute Maximum Ratings (Note 1)**

Characteristics	Symbol	Rating	Unit
Supply voltage range	V <sub>CC</sub>	-0.5 to 7	V
DC input voltage	V <sub>IN</sub>	-0.5 to V <sub>CC</sub> + 0.5	V
DC output voltage	V <sub>OUT</sub>	-0.5 to V <sub>CC</sub> + 0.5	V
Input diode current	I <sub>IK</sub>	±20	mA
Output diode current	I <sub>OK</sub>	±20	mA
DC output current	I <sub>OUT</sub>	±25	mA
DC V <sub>CC</sub> /ground current	I <sub>CC</sub>	±50	mA
Power dissipation	P <sub>D</sub>	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T <sub>stg</sub>	-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 <sub>CC</sub>	2 to 6	V
Input voltage	V <sub>IN</sub>	0 to V <sub>CC</sub>	V
Output voltage	V <sub>OUT</sub>	0 to V <sub>CC</sub>	V
Operating temperature	T <sub>opr</sub>	-40 to 85	°C
Input rise and fall time	t <sub>r</sub> , t <sub>f</sub>	0 to 1000 (V <sub>CC</sub> = 2.0 V) 0 to 500 (V <sub>CC</sub> = 4.5 V) 0 to 400 (V <sub>CC</sub> = 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 V<sub>CC</sub> or GND.

## Electrical Characteristics

## DC Characteristics

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit		
				V <sub>CC</sub> (V)	Min	Typ.	Max	Min			
High-level input voltage	V <sub>IH</sub>	—		2.0	1.50	—	—	1.50	—	V	
				4.5	3.15	—	—	3.15	—		
				6.0	4.20	—	—	4.20	—		
Low-level input voltage	V <sub>IL</sub>	—		2.0	—	—	0.50	—	0.50	V	
				4.5	—	—	1.35	—	1.35		
				6.0	—	—	1.80	—	1.80		
High-level output voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -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	—		
			I <sub>OH</sub> = -4 mA	4.5	4.18	4.31	—	4.13	—		
				6.0	5.68	5.80	—	5.63	—		
				2.0	—	0.0	0.1	—	0.1		
Low-level output voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 µA	4.5	—	0.0	0.1	—	0.1	V	
				6.0	—	0.0	0.1	—	0.1		
				2.0	—	0.17	0.26	—	0.33		
			I <sub>OL</sub> = 4 mA	4.5	—	0.17	0.26	—	0.33		
				6.0	—	0.18	0.26	—	0.33		
Input leakage current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		6.0	—	—	±0.1	—	±1.0	µA	
Quiescent supply current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		6.0	—	—	1.0	—	10.0	µA	

AC Characteristics (C<sub>L</sub> = 15 pF, V<sub>CC</sub> = 5 V, Ta = 25°C, input: t<sub>r</sub> = t<sub>f</sub> = 6 ns)

Characteristics	Symbol	Test Condition			Min	Typ.	Max	Unit
Output transition time	t <sub>TLH</sub> t <sub>THL</sub>	—	—	—	—	4	8	ns
Propagation delay time	t <sub>pLH</sub> t <sub>pHL</sub>	—	—	—	—	8	15	ns

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

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit
			V <sub>CC</sub> (V)	Min	Typ.	Max	Min	
Output transition time	$t_{TLH}$	—	2.0	—	30	75	—	95
	$t_{THL}$		4.5	—	8	15	—	19
			6.0	—	7	13	—	16
Propagation delay time	$t_{pLH}$	—	2.0	—	35	90	—	115
	$t_{pHL}$		4.5	—	11	18	—	23
			6.0	—	9	15	—	20
Input capacitance	C <sub>IN</sub>	—	—	—	5	10	—	10
Power dissipation capacitance	C <sub>PD</sub> (Note)	—	—	—	27	—	—	—
								pF

Note: C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

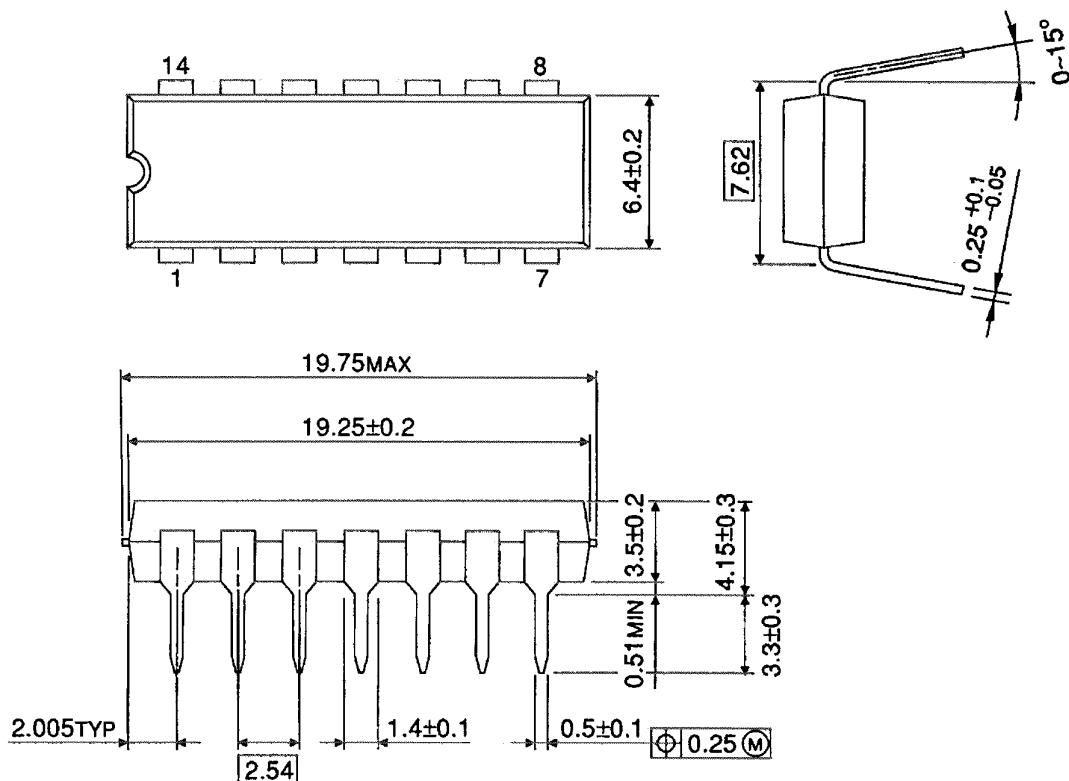
Average operating current can be obtained by the equation:

$$I_{CC} (\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/3 \text{ (per gate)}$$

**Package Dimensions**

DIP14-P-300-2.54

Unit : mm

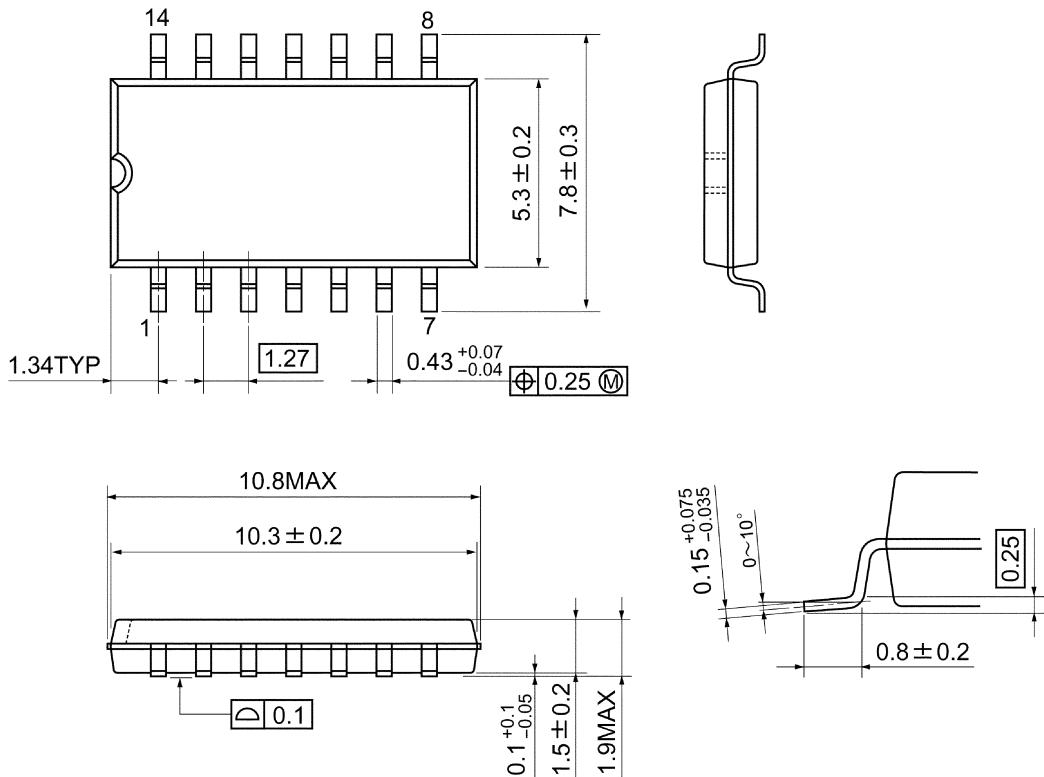


Weight: 0.96 g (typ.)

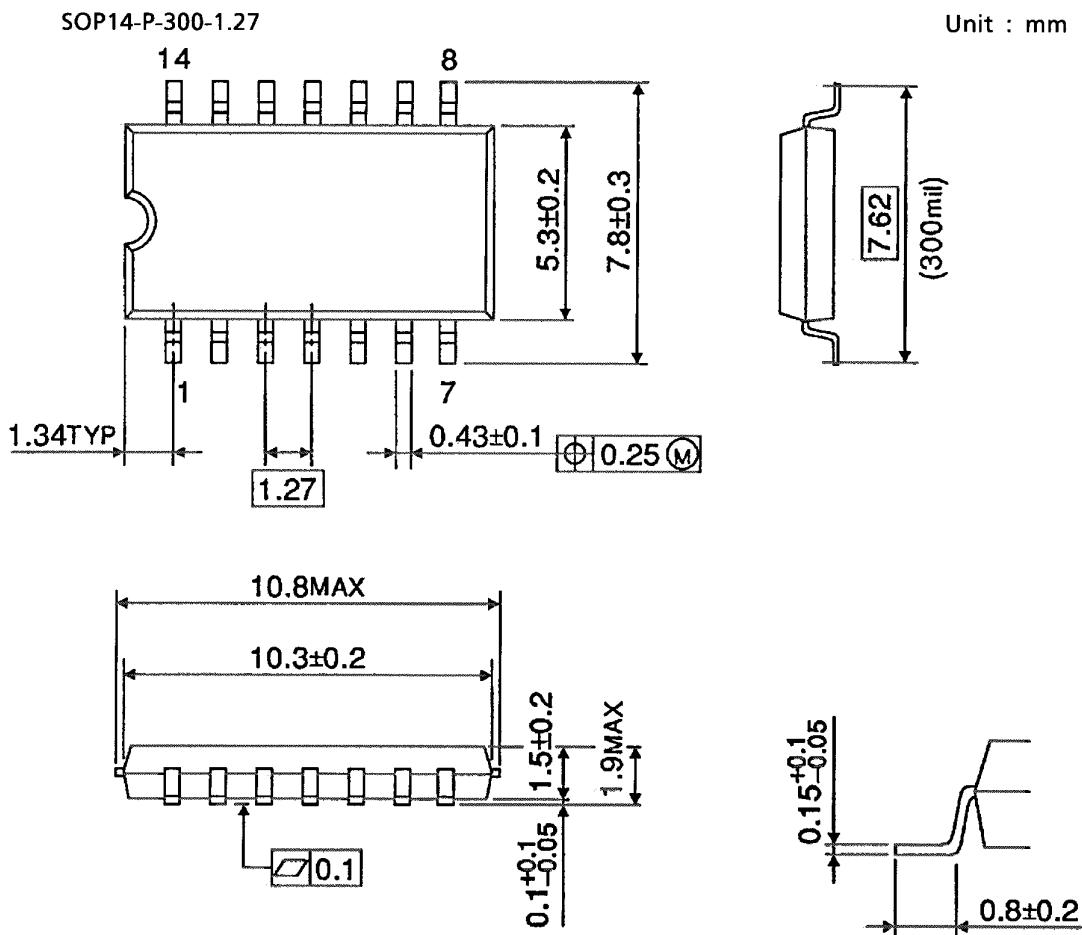
**Package Dimensions**

SOP14-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

**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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