

# LC4077B



3003A

CMOS Standard Logic LC4000B Series

## Quad 2-Input Exclusive NOR Gate

©1504

The LC4077B is a quad 2-input Exclusive-NOR Gate IC (equivalent to B series) having such features as wide operating voltage range, high noise margin, low power dissipation.

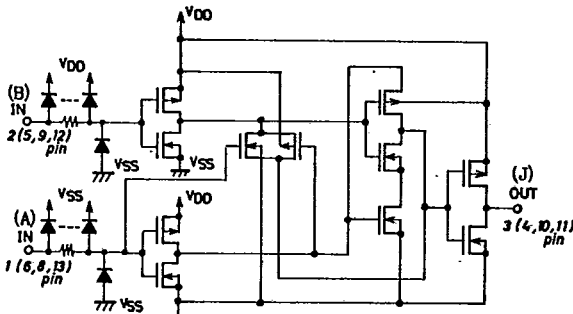
### Absolute Maximum Ratings at $T_a=25^{\circ}\text{C}, V_{SS}=0\text{V}$

Parameter	Symbol	Value	Unit
Maximum Supply Voltage	$V_{DD}$ max	$V_{SS}-0.5$ to $V_{SS}+20$	V
Input Voltage	$V_{IN}$ max	$V_{SS}-0.5$ to $V_{DD}+0.5$	V
Output Voltage	$V_{OUT}$ max	$V_{SS}-0.5$ to $V_{DD}+0.5$	V
Input Current	$I_{IN}$	$\pm 10$	mA
Allowable Power Dissipation	$P_{dmax}$	$T_a \leq 85^{\circ}\text{C}$	300 mW
Lead Temperature and Time	$T_{sol}$	$t=10\text{sec}$	260 $^{\circ}\text{C}$
Operating Temperature	$T_{opg}$	-40 to +85	$^{\circ}\text{C}$
Storage Temperature	$T_{stg}$	-65 to +150	$^{\circ}\text{C}$

### Allowable Operating Conditions at $T_a=-40$ to $+85^{\circ}\text{C}$

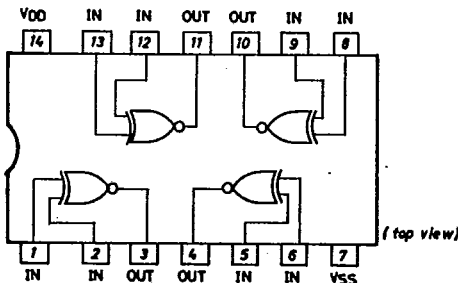
Parameter	Symbol	Value	Unit
Supply Voltage	$V_{DD}$	3 to 18	V
Input Voltage	$V_{IN}$	0 to $V_{DD}$	V

### Equivalent Circuit(1/4 LC4077B)



Input protection circuit

### Pin Assignment



### Truth Table

1 of 4 Gates

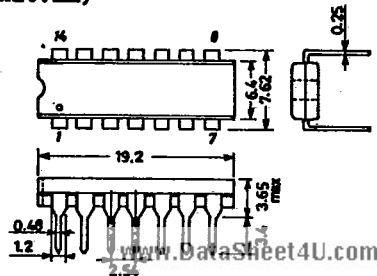
A	B	J
0	0	1
1	0	0
0	1	0
1	1	1

1 : HIGH LEVEL

0 : LOW LEVEL

J :  $A \oplus B$

### Case Outline 3003A-D14IC (unit:mm)



SANYO: DIP14

Electrical Characteristics at Ta=25°C, V <sub>SS</sub> =0V			min	typ	max	unit
"H" Level Output Voltage	V <sub>OH</sub>	V <sub>DD</sub> =5V, I <sub>OUT</sub> <1uA, Vin=V <sub>SS</sub> , V <sub>DD</sub>	4.95	5.00		V
		V <sub>DD</sub> =10V, " " "	9.95	10.00		V
		V <sub>DD</sub> =15V, " " "	14.95	15.00		V
"L" Level Output Voltage	V <sub>OL</sub>	V <sub>DD</sub> =5V, I <sub>OUT</sub> <1uA, Vin=V <sub>SS</sub> , V <sub>DD</sub>		0.00	0.05	V
		V <sub>DD</sub> =10V, " " "		0.00	0.05	V
		V <sub>DD</sub> =15V, " " "		0.00	0.05	V
"H" Level Output Current	I <sub>OH</sub>	V <sub>DD</sub> =5V, Vo=4.6V, Vin=V <sub>SS</sub> , V <sub>DD</sub>	-0.44	-0.88		mA
		V <sub>DD</sub> =10V, Vo=9.5V, " "	-1.1	-2.25		mA
		V <sub>DD</sub> =15V, Vo=13.5V, " "	-3.0	-8.8		mA
"L" Level Output Current	I <sub>OL</sub>	V <sub>DD</sub> =5V, Vo=0.4V, Vin=V <sub>SS</sub> , V <sub>DD</sub>	0.44	0.88		mA
		V <sub>DD</sub> =10V, Vo=1.0V, " "	1.1	2.25		mA
		V <sub>DD</sub> =15V, Vo=1.5V, " "	3.0	8.8		mA
"H" Level Input Voltage	V <sub>IH</sub>	V <sub>DD</sub> =5V, Vo=0.5V or 4.5V, I <sub>OUT</sub> <1uA	3.5	2.75		V
		V <sub>DD</sub> =10V, Vo=1.0V or 9.0V, " "	7.0	5.5		V
		V <sub>DD</sub> =15V, Vo=1.5V or 13.5V, " "	11.0	8.25		V
"L" Level Input Voltage	V <sub>IL</sub>	V <sub>DD</sub> =5V, Vo=0.5V or 4.5V, I <sub>OUT</sub> <1uA		2.25	1.5	V
		V <sub>DD</sub> =10V, Vo=1.0V or 9.0V, " "		4.5	3.0	V
		V <sub>DD</sub> =15V, Vo=1.5V or 13.5V, " "		6.75	4.0	V
"H" Level Input Current	I <sub>IH</sub>	V <sub>DD</sub> =18V, Vin=18V		10	0.3	uA
"L" Level Input Current	I <sub>IL</sub>	V <sub>DD</sub> =18V, Vin=0V		-10	-0.3	uA
Quiescent Device Current	I <sub>DD</sub>	V <sub>DD</sub> =5V, Vin=V <sub>SS</sub> , V <sub>DD</sub>		0.001	1.0	uA
		V <sub>DD</sub> =10V, " "		0.001	2.0	uA
		V <sub>DD</sub> =15V, " "		0.001	4.0	uA
Input Capacitance	C <sub>IN</sub>			5	7.5	pF

Electrical Characteristics at Ta=-40°C, V <sub>SS</sub> =0V			min	typ	max	unit
"H" Level Output Voltage	V <sub>OH</sub>	V <sub>DD</sub> =5V, I <sub>OUT</sub> <1uA, Vin=V <sub>SS</sub> , V <sub>DD</sub>	4.95			V
		V <sub>DD</sub> =10V, " " "	9.95			V
		V <sub>DD</sub> =15V, " " "	14.95			V
"L" Level Output Voltage	V <sub>OL</sub>	V <sub>DD</sub> =5V, I <sub>OUT</sub> <1uA, Vin=V <sub>SS</sub> , V <sub>DD</sub>			0.05	V
		V <sub>DD</sub> =10V, " " "			0.05	V
		V <sub>DD</sub> =15V, " " "			0.05	V
"H" Level Output Current	I <sub>OH</sub>	V <sub>DD</sub> =5V, Vo=4.6V, Vin=V <sub>SS</sub> , V <sub>DD</sub>	-0.52			mA
		V <sub>DD</sub> =10V, Vo=9.5V, " "	-1.3			mA
		V <sub>DD</sub> =15V, Vo=13.5V, " "	-3.6			mA
"L" Level Output Current	I <sub>OL</sub>	V <sub>DD</sub> =5V, Vo=0.4V, Vin=V <sub>SS</sub> , V <sub>DD</sub>	0.52			mA
		V <sub>DD</sub> =10V, Vo=1.0V, " "	1.3			mA
		V <sub>DD</sub> =15V, Vo=1.5V, " "	3.6			mA
"H" Level Input Voltage	V <sub>IH</sub>	V <sub>DD</sub> =5V, Vo=0.5V or 4.5V, I <sub>OUT</sub> <1uA	3.5			V
		V <sub>DD</sub> =10V, Vo=1.0V or 9.0V, " "	7.0			V
		V <sub>DD</sub> =15V, Vo=1.5V or 13.5V, " "	11.0			V
"L" Level Input Voltage	V <sub>IL</sub>	V <sub>DD</sub> =5V, Vo=0.5V or 4.5V, I <sub>OUT</sub> <1uA			1.5	V
		V <sub>DD</sub> =10V, Vo=1.0V or 9.0V, " "			3.0	V
		V <sub>DD</sub> =15V, Vo=1.5V or 13.5V, " "			4.0	V
"H" Level Input Current	I <sub>IH</sub>	V <sub>DD</sub> =18V, Vin=18V			0.3	uA
"L" Level Input Current	I <sub>IL</sub>	V <sub>DD</sub> =18V, Vin=0V			-0.3	uA
Quiescent Device Current	I <sub>DD</sub>	V <sub>DD</sub> =5V, Vin=V <sub>SS</sub> , V <sub>DD</sub>			1.0	uA
		V <sub>DD</sub> =10V, " "				uA
		V <sub>DD</sub> =15V, " "				uA

**Electrical Characteristics at Ta=85°C**

			min	typ	max	unit
"H" Level Output Voltage	$V_{OH}$	$V_{DD}=5V,  I_{OUT}  < 1\mu A, V_{in}=V_{SS}, V_{DD}$	4.95			V
		$V_{DD}=10V,$				V
		$V_{DD}=15V,$				V
"L" Level Output Voltage	$V_{OL}$	$V_{DD}=5V,  I_{OUT}  < 1\mu A, V_{in}=V_{SS}, V_{DD}$			0.05	V
		$V_{DD}=10V,$			0.05	V
		$V_{DD}=15V,$			0.05	V
"H" Level Output Current	$I_{OH}$	$V_{DD}=5V, V_o=4.6V, V_{in}=V_{SS}, V_{DD}$	-0.36			mA
		$V_{DD}=10V, V_o=9.5V,$	-0.9			mA
		$V_{DD}=15V, V_o=13.5V,$	-2.4			mA
"L" Level Output Current	$I_{OL}$	$V_{DD}=5V, V_o=0.4V, V_{in}=V_{SS}, V_{DD}$	0.36			mA
		$V_{DD}=10V, V_o=1.0V,$	0.9			mA
		$V_{DD}=15V, V_o=1.5V,$	2.4			mA
"H" Level Input Voltage	$V_{IH}$	$V_{DD}=5V, V_o=0.5V \text{ or } 4.5V,  I_{OUT}  < 1\mu A$	3.5			V
		$V_{DD}=10V, V_o=1.0V \text{ or } 9.0V,$	7.0			V
		$V_{DD}=15V, V_o=1.5V \text{ or } 13.5V,$	11.0			V
"L" Level Input Voltage	$V_{IL}$	$V_{DD}=5V, V_o=0.5V \text{ or } 4.5V,  I_{OUT}  < 1\mu A$			1.5	V
		$V_{DD}=10V, V_o=1.0V \text{ or } 9.0V,$			3.0	V
		$V_{DD}=15V, V_o=1.5V \text{ or } 13.5V,$			4.0	V
"H" Level Input Current	$I_{IH}$	$V_{DD}=18V, V_{in}=18V$			1.0	uA
"L" Level Input Current	$I_{IL}$	$V_{DD}=18V, V_{in}=0V$			-1.0	uA
Quiescent Device Current	$I_{DD}$	$V_{DD}=5V, V_{in}=V_{SS}, V_{DD}$			7.5	uA
		$V_{DD}=10V,$			15.0	uA
		$V_{DD}=15V,$			30.0	uA

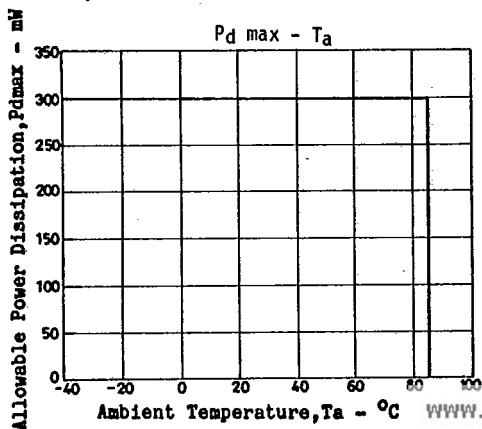
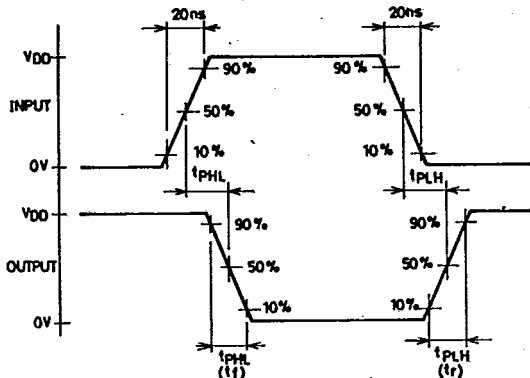
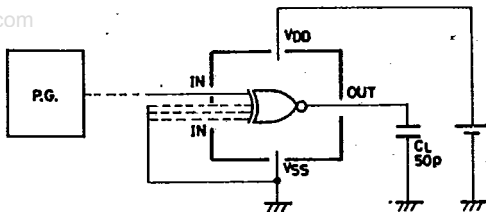
Note) Current direction: +, no sign : Flowing into device  
 - : Flowing out of device.

**Switching Characteristics at Ta=25±2°C, V<sub>SS</sub>=0V, C<sub>L</sub>=50pF**

			min	typ	max	unit
Output Rise Time	$t_r$ ( $t_{TLH}$ )	$V_{DD}=5V$	100	200		ns
		$V_{DD}=10V$	50	100		ns
		$V_{DD}=15V$	40	80		ns
Output Fall Time	$t_f$ ( $t_{THL}$ )	$V_{DD}=5V$	100	200		ns
		$V_{DD}=10V$	50	100		ns
		$V_{DD}=15V$	40	80		ns
"H" Level Propagation Delay Time	$t_{PLH}$	$V_{DD}=5V$	175	350		ns
		$V_{DD}=10V$	75	150		ns
		$V_{DD}=15V$	50	100		ns
"L" Level Propagation Delay Time	$t_{PHL}$	$V_{DD}=5V$	175	350		ns
		$V_{DD}=10V$	75	150		ns
		$V_{DD}=15V$	50	100		ns

# Switching Time Test Circuit and Waveforms

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