Quad 2-Input EXCLUSIVE-NOR Gate

Features

- Wide supply voltage range from 3V to 15V
- Fully static operation
- 5V, 10V, and 15V parametric ratings
- Standardized symmetrical output characteristics
- Specified from -40℃ to +85℃
- Packaging information: DIP-14/SOP-14/TSSOP-14/QFN-16


DIP-14


SOP-14


TSSOP-14


QFN-16 3*3

Ordering Information

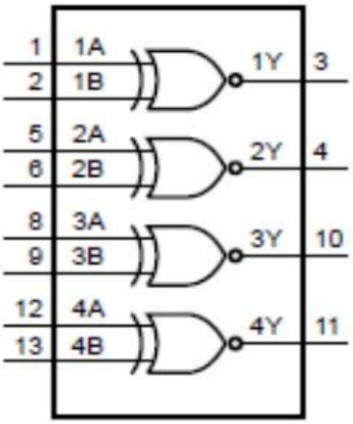
DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4077BE/ CD4077BN	DIP-14	CD4077B	TUBE	1000pcs/box
CD4077BM/TR	SOP-14	CD4077B	REEL	2500pcs/reel
CD4077BMT/TR	TSSOP-14	CD4077B	REEL	2500pcs/reel
CD4077BLQ/TR	QFN-16 3*3	CD4077B	REEL	5000pcs/reel

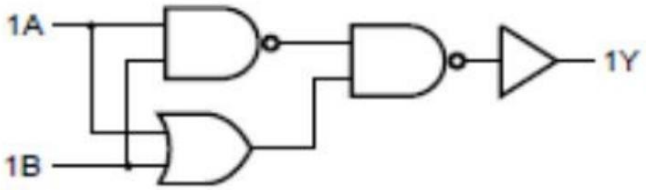
General Description

The CD4077B is a quad 2-input EXCLUSIVE-NOR gate. The outputs are fully buffered for the highest noise immunity and pattern insensitivity to output impedance.

The CD4077B operates over a recommended V_{DD} power supply range of 3V to 15V referenced to V_{SS} (usually ground). Unused inputs must be connected to V_{DD}, V_{SS}, or another input.

Block Diagram



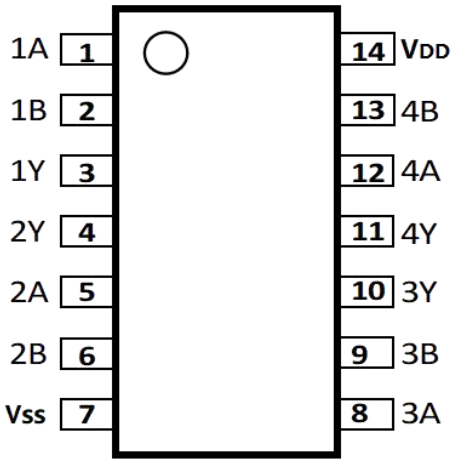


Function Table

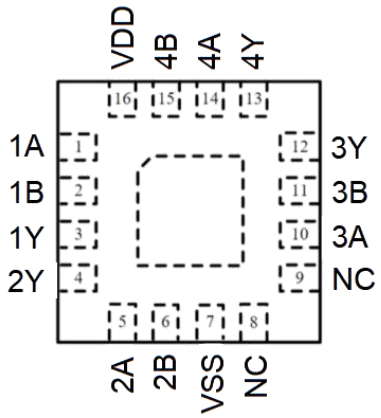
Input		Output
nA	nB	nY
L	L	H
L	H	L
H	L	L
H	H	H

Note: H=HIGH voltage level; L=LOW voltage level

Pin Configurations



DIP-14/SOP-14/TSSOP-14



QFN-16 3*3

Pin Description

Pin No.		Pin Name	Description
DIP/SOP/TSSOP	QFN		
1	1	1A	data input
2	2	1B	data input
3	3	1Y	data output
4	4	2Y	data output
5	5	2A	data input
6	6	2B	data input
7	7	VSS	ground (0V)
8	10	3A	data input
9	11	3B	data input
10	12	3Y	data output
11	13	4Y	data output
12	14	4A	data input
13	15	4B	data input
14	16	VDD	supply voltage
-	8	NC	No connection
-	9	NC	No connection

Absolute Maximum Ratings

(Voltages are referenced to VSS (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V_{DD}	-	-0.5	+18	V
DC input current	I_{IK}	any one input	-	±10	mA
input voltage	V_I	all inputs	-0.5	V_{DD} +0.5	V
storage temperature	T_{stg}	-	-65	+150	℃
Soldering temperature	T_L	10s		260	℃
total power dissipation	P_{tot}	-	-	500	mW
device dissipation	P	per output transistor	-	100	mW

Note: Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

For DIP14 packages: above 70℃ the value of P_{tot} derates linearly with 12mW/K.

For SOP14 packages: above 70℃ the value of P_{tot} derates linearly with 8mW/K.

For (T)SSOP14 packages: above 60℃ the value of P_{tot} derates linearly with 5.5mW/K

Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{DD}	-	3	-	15	V
ambient temperature	T_{amb}	in free air	-40	-	+85	℃

Electrical Characteristics

DC Characteristics 1

(Tamb=25℃, voltages are referenced to VSS (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions(V)			T_{amb}=25℃			Unit
		V_O	V_{IN}	V_{DD}	Min.	Typ.	Max.	
supply current	I_{DD}	-	0, 5	5	-	0.01	0.25	μA
		-	0, 10	10	-	0.01	0.5	μA
		-	0, 15	15	-	0.01	1	μA
LOW-level output current	I_{OL}	0.4	0, 5	5	0.51	1	-	mA
		0.5	0, 10	10	1.3	2.6	-	mA
		1.5	0, 15	15	3.4	6.8	-	mA
HIGH-level output current	I_{OH}	4.6	0, 5	5	-0.51	-1	-	mA
		2.5	0, 5	5	-1.6	-3.2	-	mA
		9.5	0, 10	10	-1.3	-2.6	-	mA
		13.5	0, 15	15	-3.4	-6.8	-	mA
LOW-level output voltage	V_{OL}	-	0, 5	5	-	0	0.05	V
		-	0, 10	10	-	0	0.05	V
		-	0, 15	15	-	0	0.05	V
HIGH-level output voltage	V_{OH}	-	0, 5	5	4.95	5	-	V
		-	0, 10	10	9.95	10	-	V
		-	0, 15	15	14.95	15	-	V
LOW-level input voltage	V_{IL}	0.5, 4.5	-	5	-	-	1.5	V
		1, 9	-	10	-	-	3	V
		1.5, 13.5	-	15	-	-	4	V
HIGH-level input voltage	V_{IH}	0.5, 4.5	-	5	3.5	-	-	V
		1, 9	-	10	7	-	-	V
		1.5, 13.5	-	15	11	-	-	V
input leakage current	I_I	-	0, 15	15	-	$\pm10^{-5}$	±0.1	μA

DC Characteristics 2

(Tamb=-40℃ to +105℃, voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions(V)			T_{amb}=-40℃		T_{amb}=+85℃		T_{amb}=+105℃		Unit
		V_O	V_{IN}	V_{DD}	Min.	Max.	Min.	Max.	Min.	Max.	
supply current	I_{DD}	-	0, 5	5	-	0.25	-	7.5	-	7.5	μA
		-	0, 10	10	-	0.5	-	15	-	15	μA
		-	0, 15	15	-	1	-	30	-	30	μA
LOW-level output current	I_{OL}	0.4	0, 5	5	0.61	-	0.42	-	0.36	-	mA
		0.5	0, 10	10	1.5	-	1.1	-	0.9	-	mA
		1.5	0, 15	15	4	-	2.8	-	2.4	-	mA
HIGH-level output current	I_{OH}	4.6	0, 5	5	-0.61	-	-0.42	-	-0.36	-	mA
		2.5	0, 5	5	-1.8	-	-1.3	-	-1.15	-	mA
		9.5	0, 10	10	-1.5	-	-1.1	-	-0.9	-	mA
		13.5	0, 15	15	-4	-	-2.8	-	-2.4	-	mA
LOW-level output voltage	V_{OL}	-	0, 5	5	-	0.05	-	0.05	-	0.05	V
		-	0, 10	10	-	0.05	-	0.05	-	0.05	V
		-	0, 15	15	-	0.05	-	0.05	-	0.05	V
HIGH-level output voltage	V_{OH}	-	0, 5	5	4.95	-	4.95	-	4.95	-	V
		-	0, 10	10	9.95	-	9.95	-	9.95	-	V
		-	0, 15	15	14.95	-	14.95	-	14.95	-	V
LOW-level input voltage	V_{IL}	0.5, 4.5	-	5	-	1.5	-	1.5	-	1.5	V
		1, 9	-	10	-	3	-	3	-	3	V
		1.5, 13.5	-	15	-	4	-	4	-	4	V
HIGH-level input voltage	V_{IH}	0.5, 4.5	-	5	3.5	-	3.5	-	3.5	-	V
		1, 9	-	10	7	-	7	-	7	-	V
		1.5, 13.5	-	15	11	-	11	-	11	-	V
input leakage current	I_I	-	0, 15	15	-	±0.1	-	±1.0	-	±1.0	μA

AC Characteristics

(Tamb=25℃, VSS=0V, tr, tf=20ns, CL=50pF, RL=200KΩ, unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
propagation delay time	t_{PHL}, t_{PLH}	see Figure 4	V_{DD}=5V	-	140	280	ns
			V_{DD}=10V	-	65	130	ns
			V_{DD}=15V	-	50	100	ns
transition time	t_{THL}, t_{TLH}	see Figure 4	V_{DD}=5V	-	100	200	ns
			V_{DD}=10V	-	50	100	ns
			V_{DD}=15V	-	40	80	ns
input capacitance	C_I	any input		-	5	7.5	pF

Testing Circuit

AC Testing Circuit

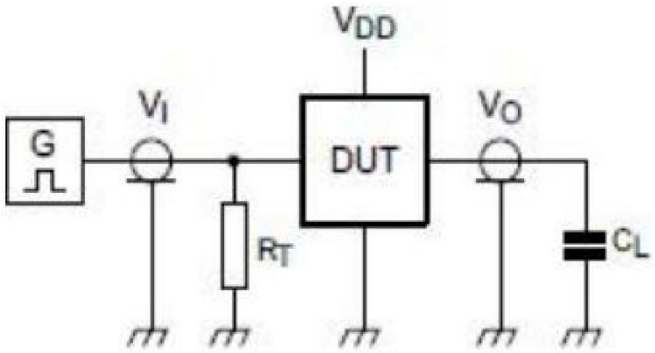


Figure 3. Test circuit for switching times

Definitions for test circuit:

DUT=Device Under Test

C_L=Load capacitance including jig and probe capacitance.

R_T=Termination resistance should be equal to the output impedance Z_o of the pulse generator.

AC Testing Waveforms

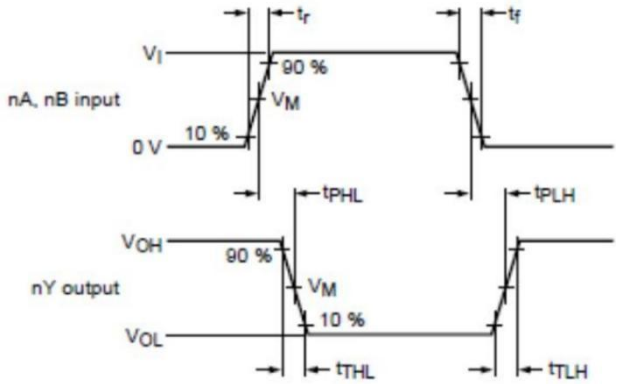


Figure 4. Input to output propagation delays and output transition times

Measurement Points

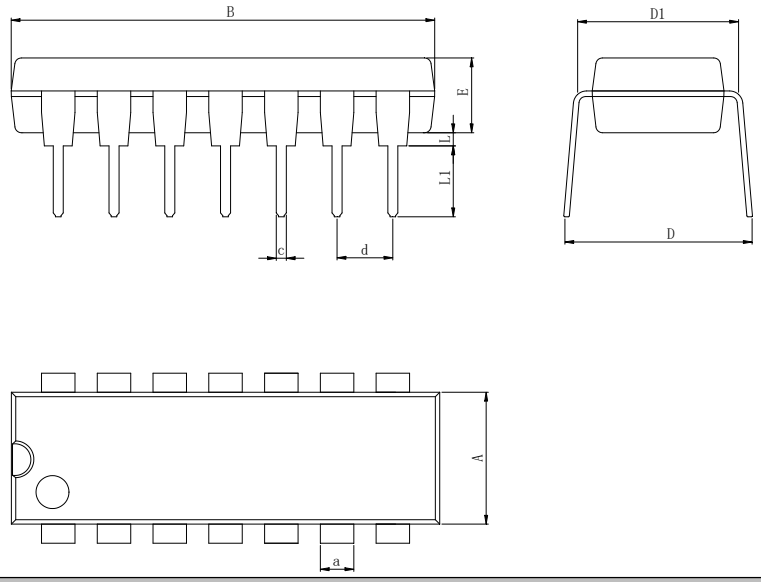
Supply voltage	Input	Output
V_{DD}	V_M	V_M
5V to 15V	0.5×V_{DD}	0.5×V_{DD}

Test Data

Supply voltage	Input		Load
V_{DD}	V_I	t_r, t_f	C_L
5V to 15V	V_{SS} or V_{DD}	≤20ns	50pF

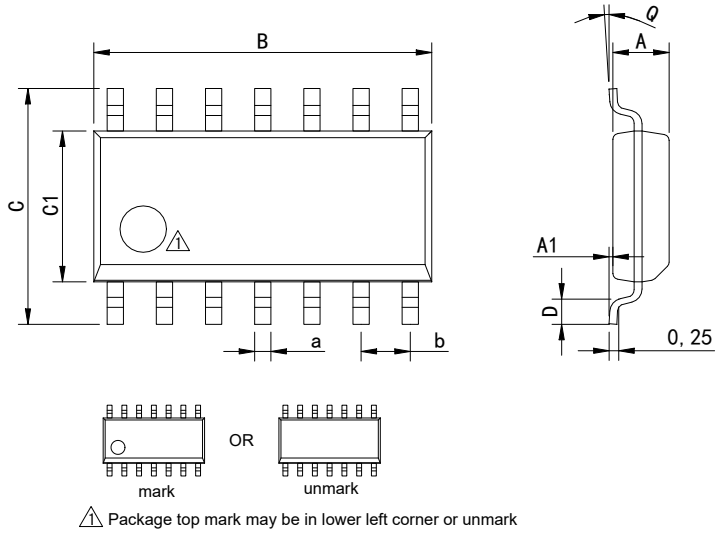
Physical Dimensions

DIP-14



Dimensions In Millimeters(DIP-14)										
Symbol:	A	B	D	D1	E	L	L1	a	c	d
Min:	6.10	18.94	8.10	7.42	3.10	0.50	3.00	1.50	0.40	2.54 BSC
Max:	6.68	19.56	10.9	7.82	3.55	0.70	3.60	1.55	0.50	

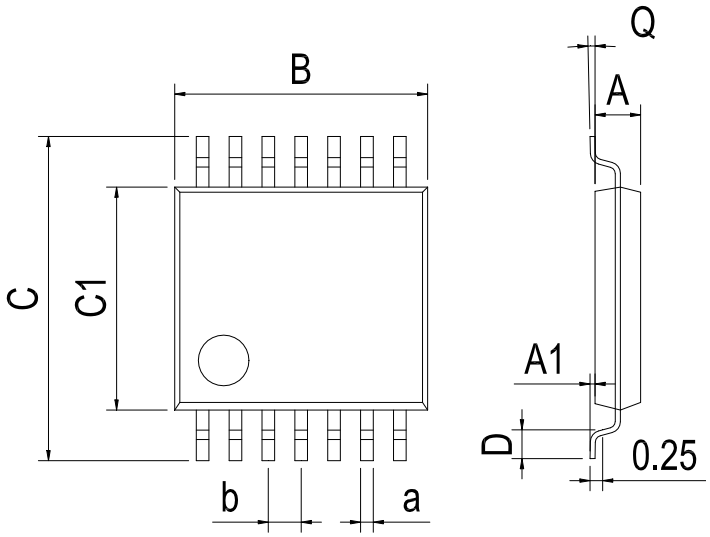
SOP-14



Dimensions In Millimeters(SOP-14)									
Symbol:	**A**	**A1**	**B**	**C**	**C1**	**D**	**Q**	**a**	**b**
Min:	1.35	0.05	8.55	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	8.75	6.20	4.00	0.80	8°	0.45	

Physical Dimensions

TSSOP-14



Dimensions In Millimeters(TSSOP-14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

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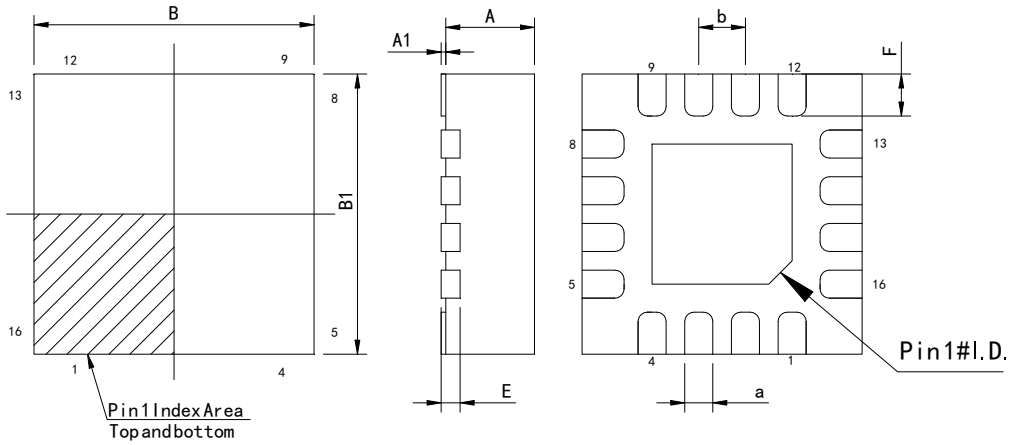

Dimensions In Millimeters(QFN-16 3*3)								
Symbol:	**A**	**A1**	**B**	**B1**	**E**	**F**	**a**	**b**
Min:	0.85	0	2.90	2.90	0.15	0.25	0.18	0.50TYP
Max:	0.95	0.05	3.10	3.10	0.25	0.45	0.30	

Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2019-7	New	1-11
V1.1	2024-3	Document Reformatting	1-11
V1.2	2024-10	Update Lead Temperature	4
V1.3	2025-11	Update important statements、Update SOP-14 Dimension drawing	8、11
V1.4	2026-4	Add QFN-16 package model	1

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