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

DIP-14

SOP-14

TSSOP-14

Ordering Information

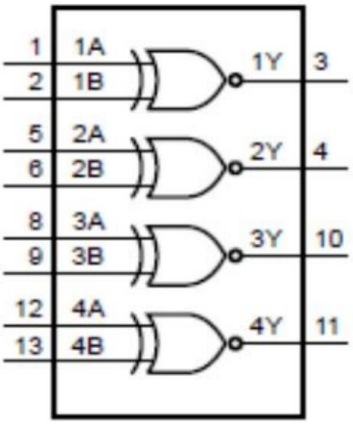
DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4077BE/ CD4077BN	DIP-14	CD4077B	TUBE	1000pcs/box
CD4077BM/TR	SOP-14	CD4077B	REEL	2500pcs/reel
CD4077BMT/TR	TSSOP-14	CD4077B	REEL	2500pcs/reel

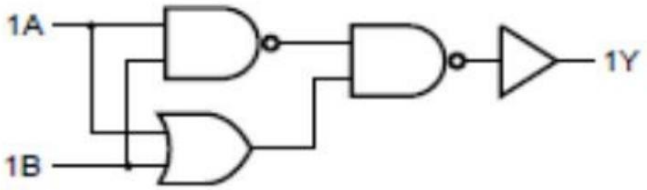
General Description

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



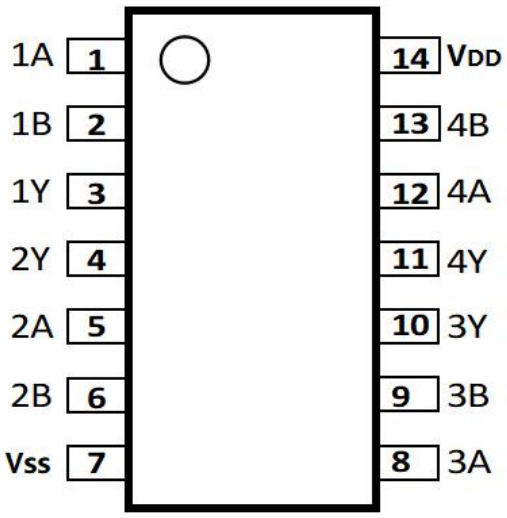


Function Table

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

Pin Description

Pin No.	Pin Name	Description
1	1A	data input
2	1B	data input
3	1Y	data output
4	2Y	data output
5	2A	data input
6	2B	data input
7	VSS	ground (0V)
8	3A	data input
9	3B	data input
10	3Y	data output
11	4Y	data output
12	4A	data input
13	4B	data input
14	VDD	supply voltage

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		245	℃
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

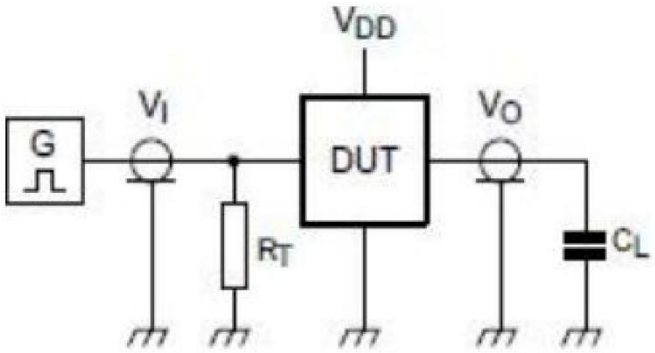


Figure 3. Test circuit for switching times

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

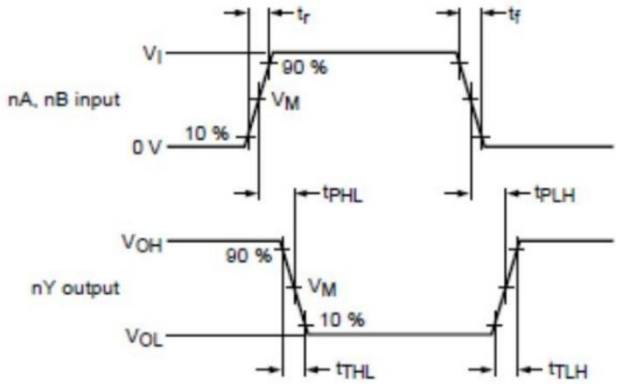


Figure 4. Input to output propagation delays and output transition times

Measurement Points

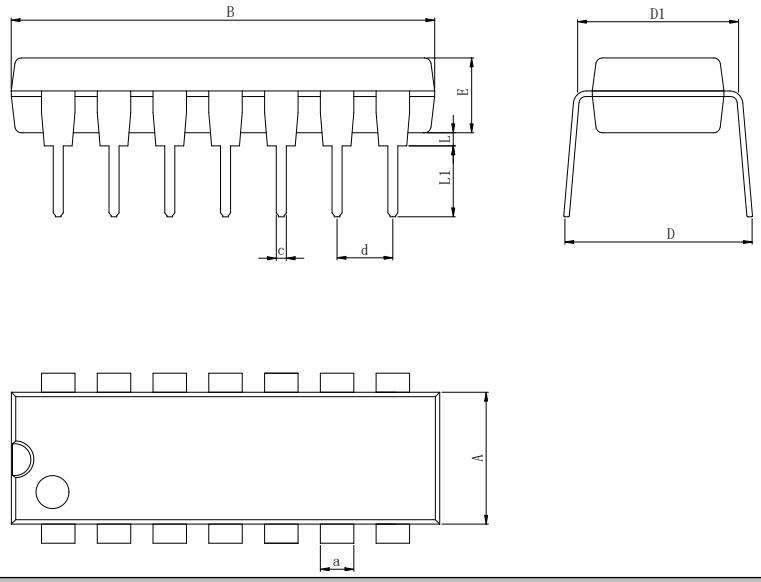
Supply voltage	Input	Output
V_{DD}	V_M	V_M
5V to 15V	0.5×V_{DD}	0.5×V_{DD}

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

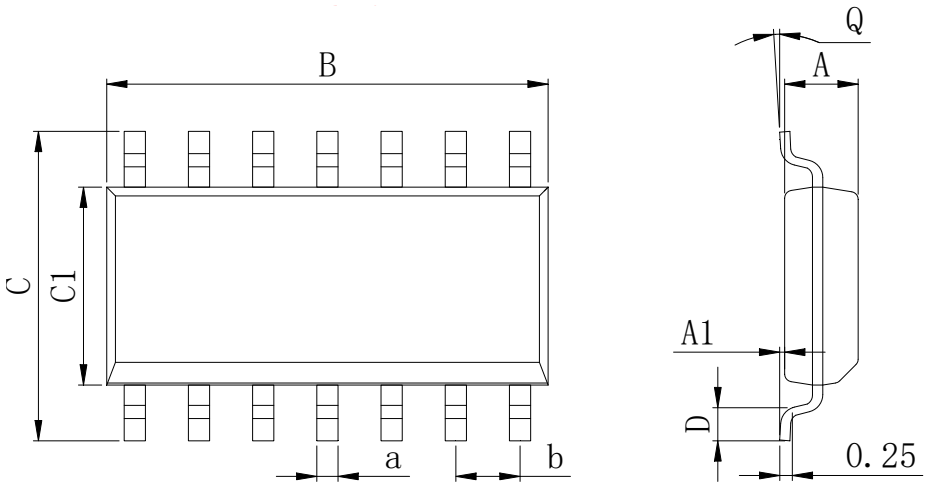
Physical Dimensions

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	

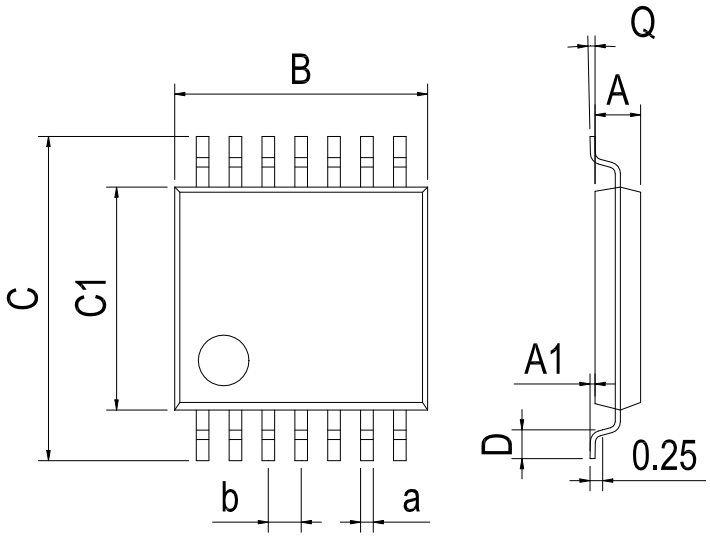
SOP-14



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	

Revision History

DATE	REVISION	PAGE
2019-7-10	New	1-11
2024-3-12	Document Reformatting	1-11

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