



# CD4070

## Quad 2-input Exclusive-or Gate

### Product Specification

**Specification Revision History:**

Version	Date	Description
2019-05-A1	2019-05	New
2023-04-B1	2023-04	Update the template
2025-08-B2	2025-08	Modify the content of general description; modify IOH in the DC Characteristics 1/2; update the package information



## 1、General Description

The CD4070 is a quad 2-input EXCLUSIVE-OR gate. It 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.

### Features:

- Wide supply voltage range from 3V to 15V
- 5V, 10V, and 15V parametric ratings
- Specified from -40°C to +125°C
- Packaging information: DIP14/SOP14/TSSOP14

### Ordering Information:

#### Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
CD4070DA14.TB	DIP14	CD4070	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
CD4070SA14.TB	SOP14	CD4070	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
CD4070TA14.TB	TSSOP14	CD4070	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

#### Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
CD4070SA14.TR	SOP14	CD4070	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 8.7mm×3.9mm Pin spacing: 1.27mm
CD4070TA14.TR	TSSOP14	CD4070	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



## 2、Block Diagram And Pin Description

### 2.1、Block Diagram

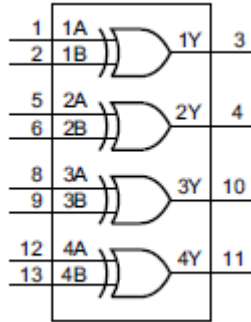


Figure 1. Functional diagram

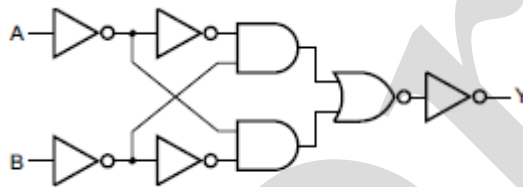
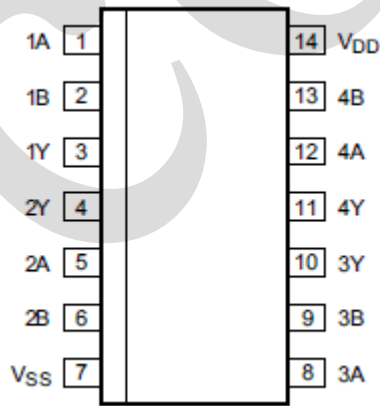


Figure 2. Logic diagram (one gate)

### 2.2、Pin Configurations





## 2.3、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	V <sub>SS</sub>	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	V <sub>DD</sub>	supply voltage

## 2.4、Function Table

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

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

## 3、Electrical Parameter

### 3.1、Absolute Maximum Ratings

(Voltages are referenced to V<sub>SS</sub> (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage	V <sub>DD</sub>	-	-0.5	+18	V
DC input current	I <sub>IK</sub>	any one input	-	±10	mA
input voltage	V <sub>I</sub>	all inputs	-0.5	V <sub>DD</sub> +0.5	V
storage temperature	T <sub>stg</sub>	-	-65	+150	°C
total power dissipation	P <sub>tot</sub>	-	-	500	mW
device dissipation	P	per output transistor	-	100	mW
Soldering temperature	T <sub>L</sub>	10s	DIP	245	°C
			SOP/TSSOP	260	



## 3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V <sub>DD</sub>	-	3	-	15	V
ambient temperature	T <sub>amb</sub>	in free air	-40	-	+125	°C

## 3.3、Electrical Characteristics

### 3.3.1、DC Characteristics 1

(T<sub>amb</sub>=25°C, voltages are referenced to V<sub>SS</sub> (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions (V)			T <sub>amb</sub> =25°C			Unit
		V <sub>O</sub>	V <sub>IN</sub>	V <sub>DD</sub>	Min.	Typ.	Max.	
supply current	I <sub>DD</sub>	-	0, 5	5	-	-	1	uA
		-	0, 10	10	-	-	1	uA
		-	0, 15	15	-	-	1	uA
LOW-level output current	I <sub>OL</sub>	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 <sub>OH</sub>	4.6	0, 5	5	-	-1	-0.51	mA
		2.5	0, 5	5	-	-3.2	-1.6	mA
		9.5	0, 10	10	-	-2.6	-1.3	mA
		13.5	0, 15	15	-	-6.8	-3.4	mA
LOW-level output voltage	V <sub>OL</sub>	-	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 <sub>OH</sub>	-	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 <sub>IL</sub>	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 <sub>IH</sub>	0.5, 4.5	-	5	3.5	-	-	V
		1, 9	-	10	7	-	-	V
		1.5, 13.5	-	15	11	-	-	V
input leakage current	I <sub>I</sub>	-	0, 15	15	-	-	±1	uA



### 3.3.2、DC Characteristics 2

( $T_{amb}=-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ , voltages are referenced to  $V_{SS}$  (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions (V)			$T_{amb}=-40^{\circ}\text{C}$		$T_{amb}=+85^{\circ}\text{C}$		$T_{amb}=+125^{\circ}\text{C}$		Unit
		$V_O$	$V_{IN}$	$V_{DD}$	Min.	Max.	Min.	Max.	Min.	Max.	
supply current	$I_{DD}$	-	0, 5	5	-	1	-	7.5	-	7.5	$\mu\text{A}$
		-	0, 10	10	-	1	-	15	-	15	$\mu\text{A}$
		-	0, 15	15	-	1	-	30	-	30	$\mu\text{A}$
LOW-level output current	$I_{OL}$	0.4	0, 5	5	0.61	-	0.42	-	0.36	-	$\text{mA}$
		0.5	0, 10	10	1.5	-	1.1	-	0.9	-	$\text{mA}$
		1.5	0, 15	15	4	-	2.8	-	2.4	-	$\text{mA}$
HIGH-level output current	$I_{OH}$	4.6	0, 5	5	-	-0.61	-	-0.42	-	-0.36	$\text{mA}$
		2.5	0, 5	5	-	-1.8	-	-1.3	-	-1.15	$\text{mA}$
		9.5	0, 10	10	-	-1.5	-	-1.1	-	-0.9	$\text{mA}$
		13.5	0, 15	15	-	-4	-	-2.8	-	-2.4	$\text{mA}$
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	-	$\pm 1$	-	$\pm 1$	-	$\pm 1$	$\mu\text{A}$

### 3.3.3、AC Characteristics

( $T_{amb}=25^{\circ}\text{C}$ ,  $V_{SS}=0\text{V}$ ,  $t_r, t_f=20\text{ns}$ ,  $C_L=50\text{pF}$ ,  $R_L=200\text{k}\Omega$ , unless otherwise specified.)

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



## 4、Testing Circuit

### 4.1、AC Testing Circuit

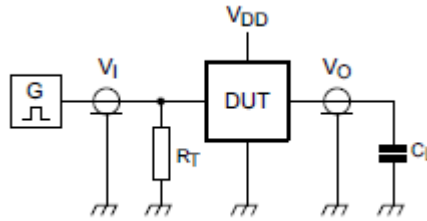


Figure 3. Test circuit for switching times

Definitions for test circuit:

DUT=Device Under Test.

CL=Load capacitance including jig and probe capacitance.

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

### 4.2、AC Testing Waveforms

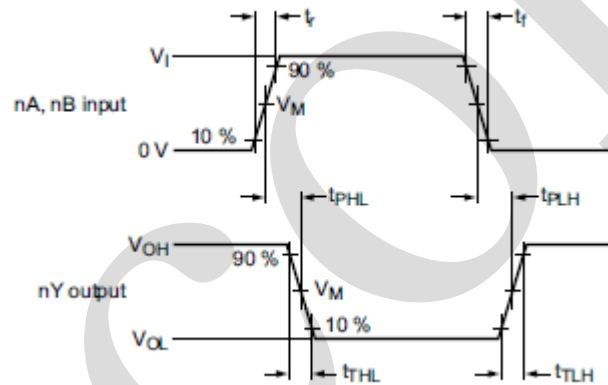


Figure 4. Input to output propagation delays and output transition times

### 4.3、Measurement Points

Supply voltage	Input	Output
$V_{DD}$	$V_M$	$V_M$
5V to 15V	$0.5 \times V_{DD}$	$0.5 \times V_{DD}$

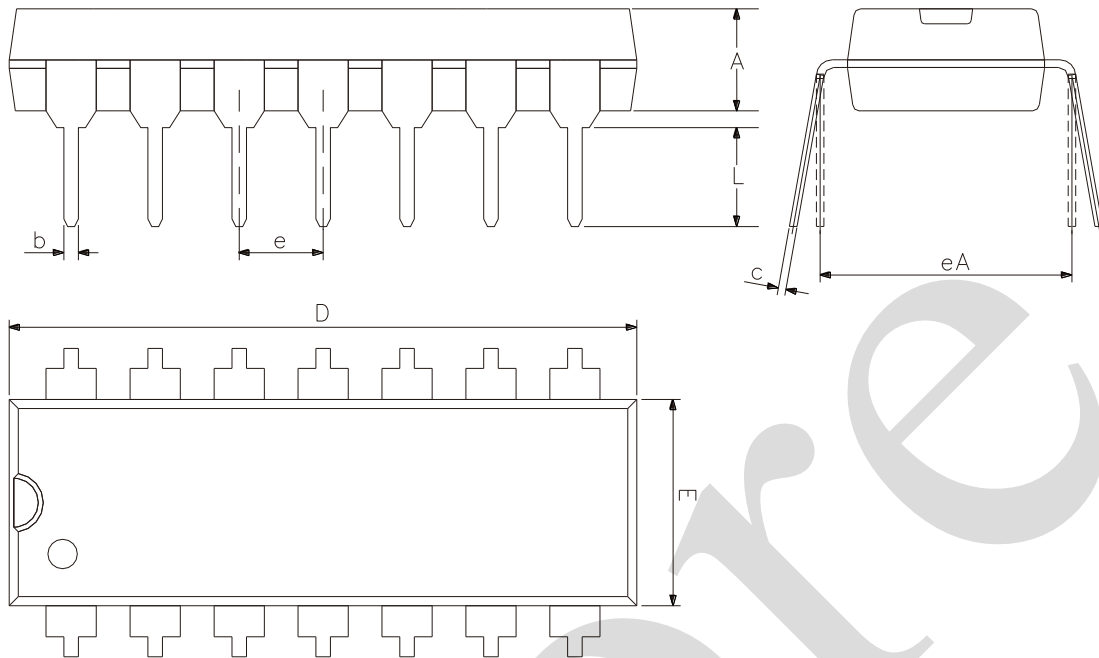
### 4.4、Test Data

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



## 5、Package Information

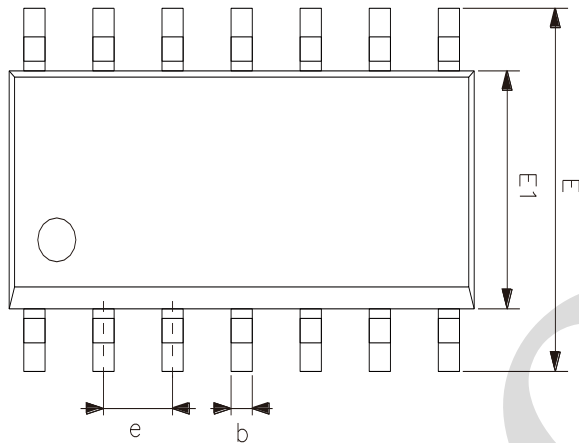
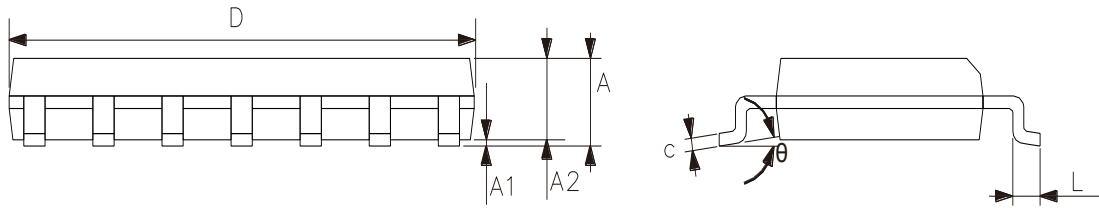
### 5.1、DIP14



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	3.05	3.60
b	0.33	0.56
c	0.20	0.36
D	18.80	19.40
E	6.20	6.60
e	2.54	
eA	7.62	10.90
L	2.92	—



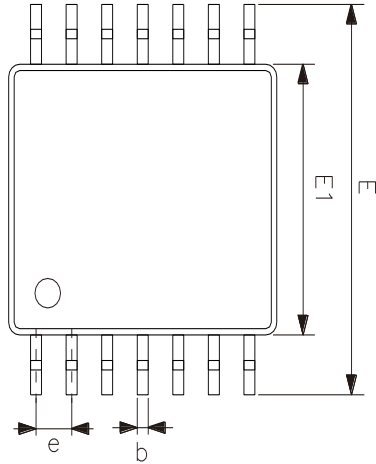
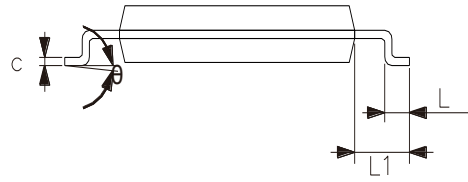
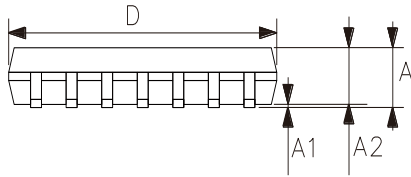
5.2、SOP14



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	1.50	1.75
A1	0.05	0.25
A2	1.30	—
b	0.33	0.50
c	0.19	0.25
D	8.43	8.76
E	5.80	6.25
E1	3.75	4.00
e	1.27	
L	0.40	0.89
$\theta$	0°	8°



## 5.3、TSSOP14



2023/12/A	Dimensions In Millimeters	
Symbol	Min	Max
A	—	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
L1	1.00	
$\theta$	0°	8°



## 6、 Statements And Notes

### 6.1、 The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

### 6.2、 Notes

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