General Description

The CD4027 is a edge-triggered dual JK flip-flop which features independent set-direct (SD),clear-direct (CD),clock (CP)inputs and outputs(Q,Q).Data is accepted when CP is LOW,and transferred to the output on the positive-going edge of the clock.The active HIGH asynchronous clear-direct (CD)and set-direct (SD)inputs are independent and override the J,K,and CP inputs.The outputs are buffered for best system performance.

It operates over a recommended VDD power supply range of 3V to 15V referenced to VSS (usually ground). Unused inputs must be connected to VDD,VSS,or another input.

Features

- Wide supply voltage range from 3V to 15V
- Fully static operation
- 5V,10V,and 15V parametric ratings
- Standardized symmetrical output characteristics
- Specified from-40C to+105C
- Packaging information:DIP16/SOP16/TSSOP16

Order Information

DEVICE	Package Type	MARKING	Packing	Packing QTY

2.Block Diagram And Pin Description

2.1、Block Diagram

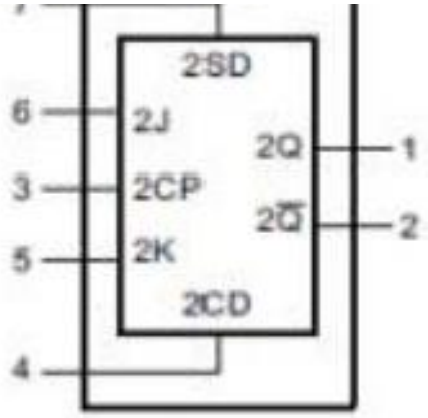


Figure 1.Functional diagram

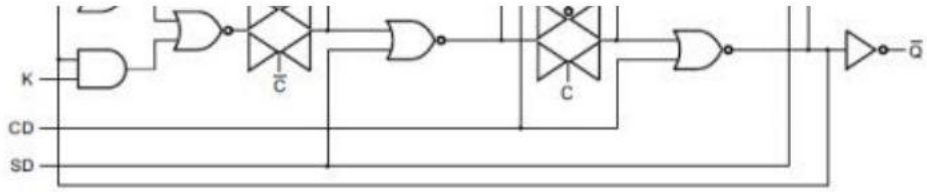
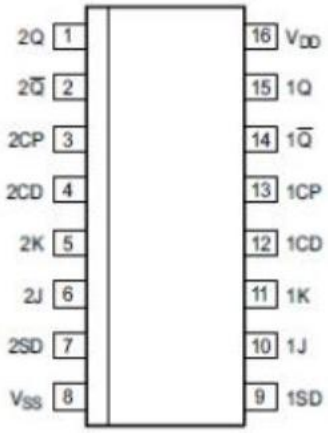


Figure 2.Logic diagram (one gate)

2.2、Pin Configurations



2.3、 Pin Description

Pin No.	Pin Name	Description
	2Q	true output
2	2Q	complement output
3	2CP	clock input(LOW-to-HIGH edge-triggered)
4	2CD	asynchronous clear-direct input (active HIGH)
5	2K	synchronous input
6	2J	synchronous input
7	2SD	asynchronous set-direct input (active HIGH)
8	Vss	ground(0 V
9	1SD	asynchronous set-direct input (active HIGH)
10	1J	synchronous input
11	1K	synchronous input
12	1CD	asynchronous clear-direct input(active HIGH)
13	1CP	clock input(LOW-to-HIGH edge-triggered)
14	1Q	complement output
15	1Q	true output
16	V DD	supply voltage

2.4、 Function Table

Input					Output	
nSD	nCD	nCP	nJ	nK	nQ	nQ
H	L	X	X	X	H	L
L	H	X	X	X	L	H
H	H	X	X	X	H	H
L	L	1	L	L	10 change	no change
L	L		H	L	H	L
L	L		L	H	L	H
L	L		H	H	nQ	nQ

Note:H=HIGH voltage level;L=LOW voltage level;X=don't care;↑=LOW-to-HIGH clock transition.

3 Electrical Parameter

3.1、Absolute Maximum Ratings

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

Paramet e I	Symbol	Conditions		Min	Max	Unit
supply voltage	VDD			-0.5	+18	V
DC input current	Ik	any one input			±10	mA
input voltage	V_1	all inputs		-0.5	VDd+0.5	V
storage temperature	Tsg			-65	+150	C
otal power dis sipation	Ptot				500	mW
device dissipation	P	per output transistor			100	mW
Solderi ng t emperat ur e	TL	10s	DIP	245		C
			SOP	250		C

Note:

[1]For DIP16 packages:above 70C the value of Pot derates linearly with 12mW/K.

[2]For SOP16 packages:above 70C the value of Pwt derates linearly with 8mW/K.

[3]For(T)SSOP16 packages:above 60C the value of Pa derates linearly with 5.5mW/K.

3.2、Recommended Operating Conditions

Paramet e r	Symbol	Conditions	Min	Typ.	Max	Unit
supply voltage	Vpp		3		15	V
ambient temperature	Tamb	in free air	-40		+105	C
clock pulse width	twcl	Vdp=5 V	140			ns
		Vdp=10V	60			ns
		Vpp=15V	40			ns
clock rise and fall time	tcl,ticl	VDp=5 V			45	uS
		Vdp=10V			5	us
		Vdp=15V			2	uS
clock inpu frequency	fcl	Vdp=5 V	DC		35	MHz
		Vdp=10V			8	MHz
		Vdp=15V			12	MHz
set-up time	ts	VDd=5 V	200			hS
		Vdp=10V	75			ns
		Vdp=15V	50			nS
set or reset pulse width	twsi R	Vpp=5 V	180			nS
		Vpp=10V	80			ns
		Vpp=15V	50			ns

3.3Electrical Characteristics

3.3.1、DC Characteristics 1

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

Parameter	Symbol	Conditions(V)			Tamb=25C			Unit
		Vo	ViN	VDD	Min.	Typ.	Max.	
supply current	Ibp		0, 5	5		0.02	1	uA
			0, 10	10		0.02	2	uA
			0, 15	15		0.02	4	uA
LOW-leve output curren	lol	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	Ioh	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	Vol		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	VoH		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	Vn	0.5, 4.5		5			1.5	V
		1, 9		10			3	V
		1.5, 13.5		15			4	V
HIGH-level input voltage	VH	0.5, 4.5		5	3.5			V
		1, 9		10	7			V
		1.5, 13.5		15	11			V
input leakage current	Ii		0, 15	15		$\pm 10^5$	± 0.1	uA

3.3.2、DC Characteristies 2

(Tamb=-40 C to+105 C,voltages are referenced to Vss(ground=0 V),unless otherwise specified.)

Parameter	Symbol	Conditions (V)			Tamb=-40C		Tamb=+85C		Tamb=+105C		Unit
		Vo	ViN	VpD	Min.	Max.	Min.	Max.	Min	Max	
supply current	IpD		0,5	5		1		30		30	uA
			0,10	10		2		60		60	uA
			0,15	15		4		120		120	uA
LOW-level output current	Ior	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	Ioh	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	Vol		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	VoH		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	Vn	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	VH	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_1		0,15	15		±0.1		±1		±1	uA

4、Testing Circuit

4.1、AC Testing Circuit

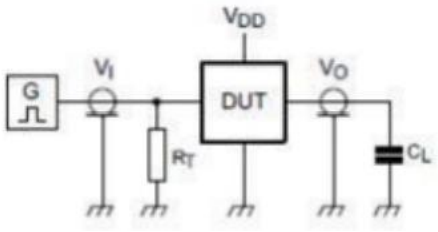


Figure 3. Test circuit for switching times

Definitions for test circuit:

DUT=Device Under Test.

C_1=Load capacitance including jig and probe capacitance.

R_1=Termination resistance should be equal to the output impedance Z。of the pulse generator.

4.2、AC Testing Waveforms

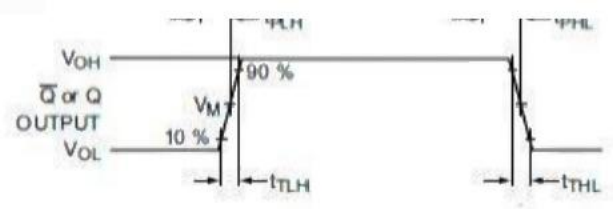


Figure 4.Waveforms showing rise,fall and transition times and propagation delays

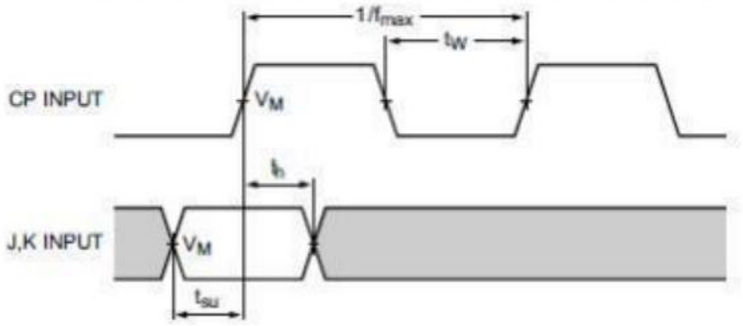


Figure 5. Waveforms showing set-up and hold times and minimum clock pulse width

Figure 6. Waveforms showing pulse widths

4 .3、Measurement points

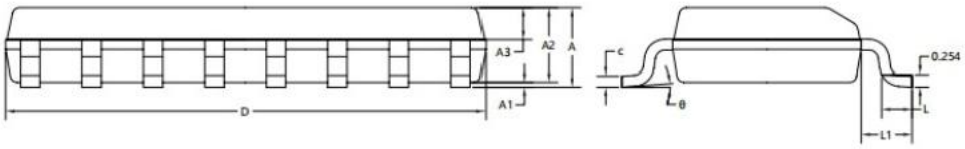
Supply voltage	Input	Output
Vdp	VM	VM
5V to 15V	0.5×Voo	0.5×VDD

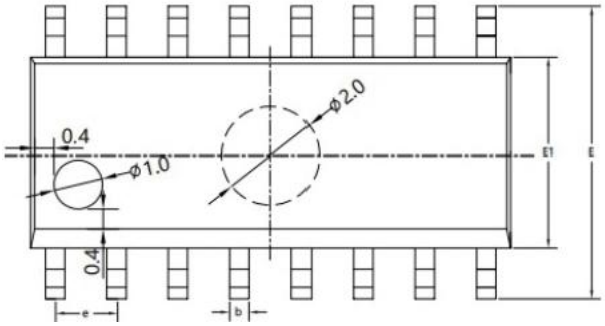
4.4、Test data

Supply voltage	Input		Load
VpD	Vi	tr,tr	CL
5V to 15V	Vss or VpD	⩽20ns	50pF

5、Package Information

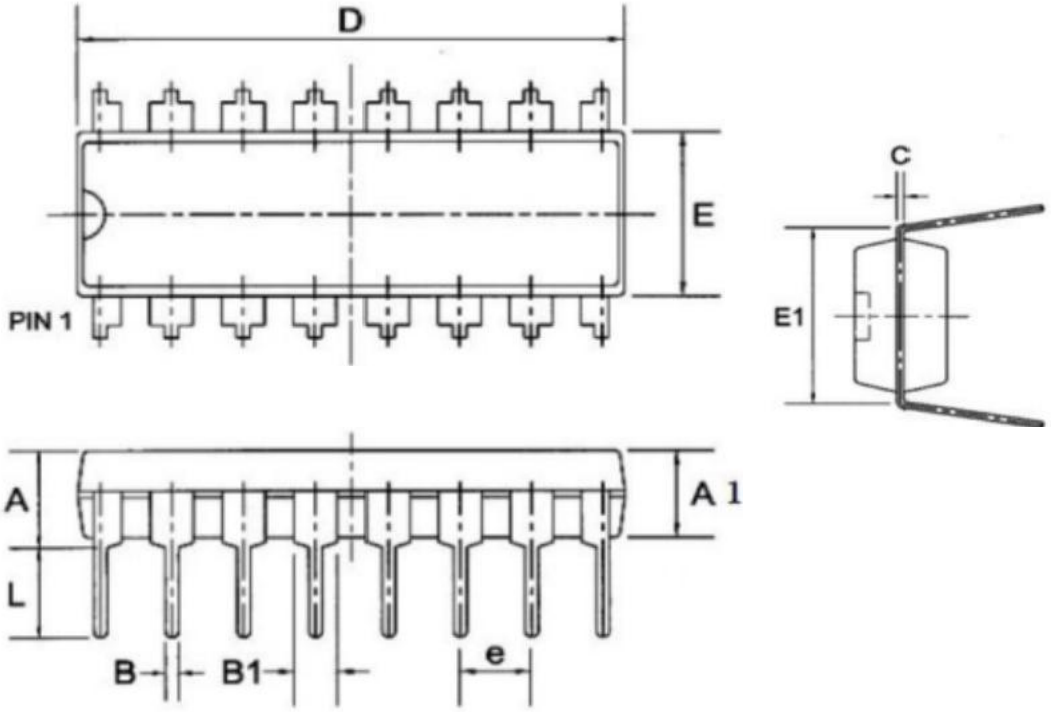
5.1、DIP16





SYMBOL	MILUMETER		
	MIN	NOM	MAX
A	1.50	1.60	1.70
A1	0.10	0.15	0.25
A2	1.40	1.45	1.50
A3	0.60	065	0.70
b	0.30	040	0.50
c	0.15	020	0.25
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.85	3.90	3.95
e	1.27BSC		
L	0.50	060	0.70
L1	1.0585C		
θ	σ	4*	8*

5.2～SOP16



Symbol	Dimensions in Millimeters		
	Min	Nom	Max
A	--	-	4.31
A1	3.15	3.30	3.65
B	-	0.50	-
B1	--	1.6	--
C	-	0.27	
D	19.00	19.20	19.60
E	6.20	6.50	6.60
E1		8.0	
e	--	2.3	--
L	3.00	3.20	3.60