General Description

The CD4011 is a quad 2 -input NAND gate.The outputs are fully buffered for the highest noise immunity and pattern insensitivity to output impedance.

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

Features

- Wide supply voltage range from 3V to 15 V
- Fully static operation
- 5V,10V,and 15V parametric ratings
- Standardized symmetrical output characteristics
- nputs and outputs are protected against electrostatic effects
- Specified from -40C to+105C
- Packaging information:DIP14/SOP14/TSSOP1

Order Information

Product Model	Package Type	Marking	Packing	Packing Qty

2.Block Diagram And Pin Description

2.1 、Block Diagram

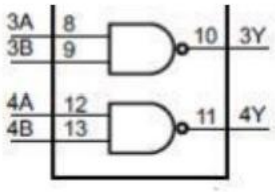
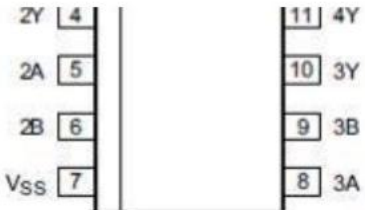


Figure 1.Functional diagram

Figure 2.Logic diagram(one gate)

2.2 、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	1A	data input
2	1B	data input
3	1Y	data outpul
4	2Y	data output
5	2A	data input
6	2B	data input
7	Vss	ground (0 V
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

2.4 Function Table

Input		Output
nA	nB	nY
L	L	H
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 Vss(ground=0V),unless otherwise specified.)

Paramet e r	Symbol	Conditions		Min	Max	Unit
supply voltage	VDD			-0.5	+18	V
DC input current	Iik	any one input			±10	mA
input voltage	Vi	all inputs		-0.5	Vdd+0 .5	V
storage temperature	Tstg			-65	+150	C
total power dissipation	Ptot				500	mW
device dissipation	P	per output transistor			100	mW
Solderi ng t emperat ur e	TL	10s	DIP	245		C
			SOP	250		

Note:

[1]For DIP14 packages:above 70C the value of Pwt derates linearly with 12mW/K.

[2]For SOP14 packages:above 70C the value of Pat derates linearly with 8mW/K.

[3]For(T)SSOP14 packages:above 60C the value of Pwt derates linearly with 5.5mW/K

3.2、 Recommended Operating Conditions

Paramet e r	Symbol	Conditions	Min	Typ.	Max	Unit
supply voltage	VpD		3		15	V
ambient t emperat ur e	Tamb	in free air	-40		+105	C

3.3 Electrical 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)			Tamh=25C			Unit
		Vo	ViN	Vpp	Min.	Typ.	Max	
supply current	Ipp		0,5	5		0.01	0.25	uA
			0,10	10		0.01	0.5	uA
			0,15	15		0.01		uA
LOW-level output current	Iol	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	4.5		5			1.5	V
		9		10			3	V
		13.5		15			4	V
HIGH-level input voltage	ViH	0.5.45		5	3.5			V
		1,9		10	7			V
		1.5,13.5		15	11			V
input leakage current	I_{I}		0,15	15		±10-5	±0.1	uA

3.3.2、 DC Characteristics 2

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

Parameter	Symbol	Conditions(V)			Tamb=-4 C		Tamb=+85C		Tamh=+10 C		Unit
		Vo	ViN	VpD	Min	Max	Min	Max.	Min	Max.	
supply current	IpD		0,5	5		0.25		7.5		7.5	uA
			0,10	10		0.5		15		15	uA
			0,15	15				30		30	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	4.5		5		1.5		1.5		1.5	V
		9		10		3		3		3	V
		13.5		15		4		4		4	V
HIGH-level input voltage	ViH	0.545		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		0,15	15		±0.1		±1		±1	uA

3.3.3 AC Craracteristies

(Tmb=25C,Vss=0 V,ti,t=20 ns,Ct=50 pF,R_1=200kQ,unless otherwise specified.)

Paramet e r	Svmbo	Conditions		Min	Typ.	Max	Unit
propagatior delay time	tpHL,tpLH	see Figure 4	Vpp=5V		125	250	ns
			Vdp=10V		60	120	ns
			Vdp=15V		45	90	ns
transition time	trhL,trlh	see Figure 4	Vpp=5 V		100	200	ns
			VDp=10V		50	100	ns
			Vdp=15V		40	80	ns
input capacitance	1	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.

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

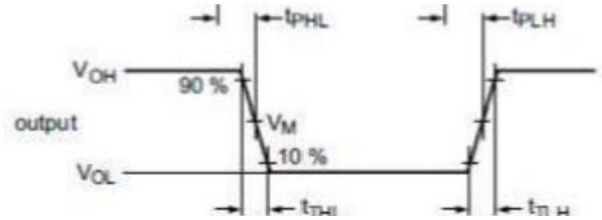


Figure 4 .Propagation delay, output transition time

4 .3、Measurement Points

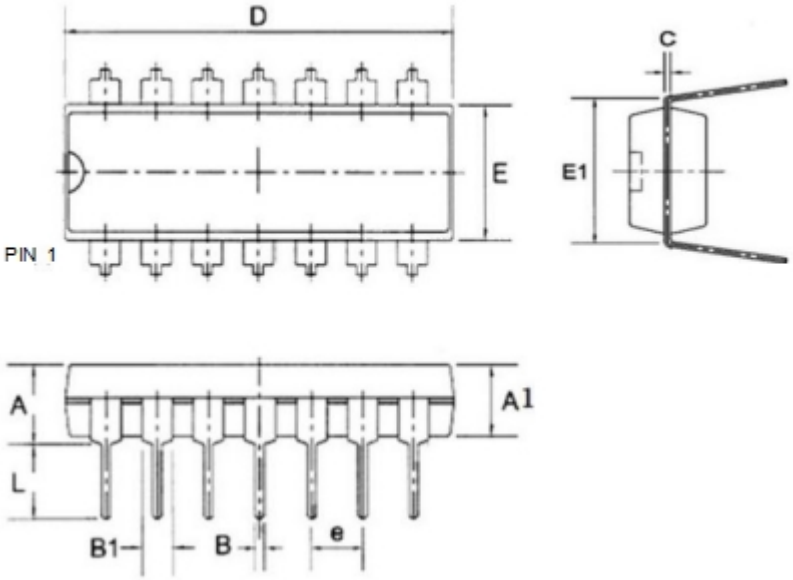
Supply voltage	Input	Output
VDD	VM	VM
5V to 15V	05×Vpp	05×VpD

4.4、Test Data

Supply voltage	Input		Load
VDD	v,	tr, tr	CL
5V to 15V	Vss or Vpp	≤20ns	50pF

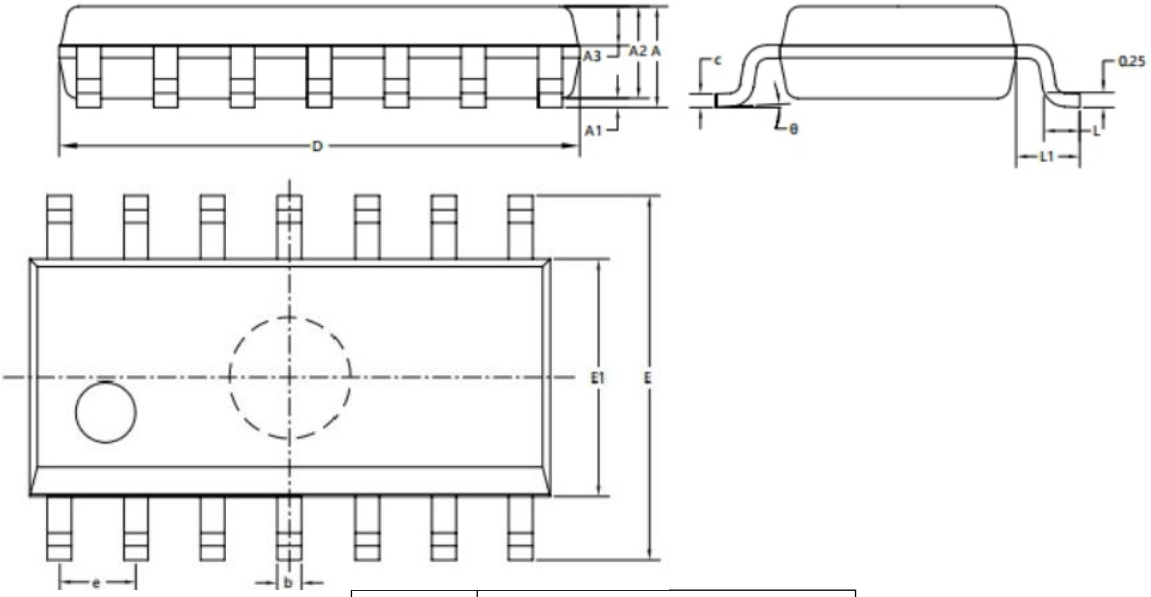
5、Package Information

5.1、DIP14



Symbol	Dimensions in Millimeters		
	Min	Nom	Max
A			4.31
A1	3.15	3.30	3.65
B		0.46	
B1		1.60	
C	—	0.25	
D	19.00	19.30	19.60
E	6.20	6.40	6.60
E1		7.60	
e	—	2.54	
L	3.00	3.35	3.60

5.2～ SOP14



SYMBOL	MIL LMETER		
	MIN	NOM	MAX
A	1.50	1.60	1.70
A1	010	0.15	0.25
A2	1.40	1.45	1.50
A3	Q60	0.65	0.70
b	035	0.40	0.45
c	015	0.20	0.25
D	850	8.60	8.70
E	5.80	6.00	620
E1	3.85	3.90	395
e	1.27BSC		
L	a50	0.60	0.70
L1	1.05REF		
θ	0	4	8 ”