

CD4012 CMOS Dual 4-Input NAND Gate

1. General Description

1.1 Description

CD4012 NAND gate provides the system designer with direct implementation of the NAND function and supplement the existing family of CMOS gates. All inputs and outputs are buffered.

1.2 Features

- Buffered inputs and outputs
- Standardized symmetrical output characteristics

- 100% tested for quiescent current at 18V
- Maximum input current of 1μA at 18V and 25°C
- 5V,10V, and 15V parametric ratings

1.3 Device Information

PART NUMBER	PACKAGE
CD4012	DIP
	SOP
	TSSOP

2. Pin Description and Functional Diagram

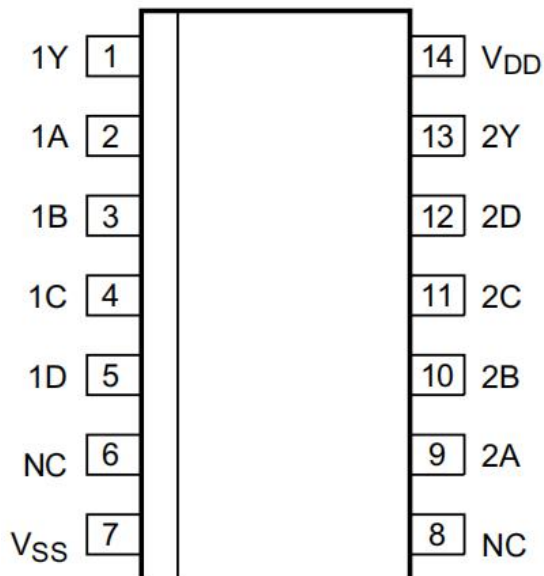


Figure 2.1 Top View

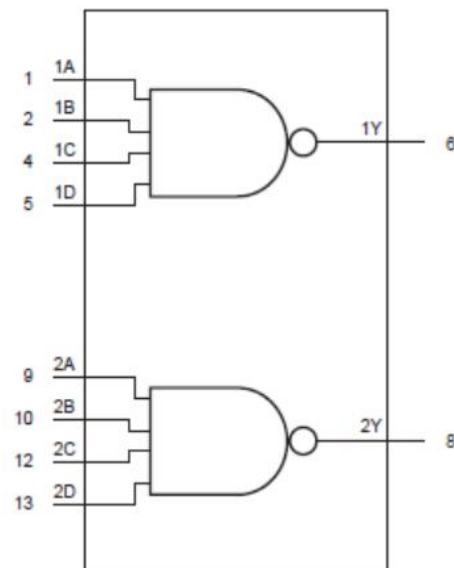


Figure 2.2 Functional Diagram

PIN No.	NAME	I/O	FUNCTION
1	1Y	O	Data Output
2	1A	I	Data Input
3	1B	I	Data Input
4	1C	I	Data Input
5	1D	I	Data Input
6	NC		Not Connected
7	VSS		Ground
8	NC		Not Connected
9	2A	I	Data Input
10	2B	I	Data Input
11	2C	I	Data Input
12	2D	I	Data Input
13	2Y	O	Data Output
14	VDD		Supply Voltage

3. System Diagram

3.1 Logic Diagram

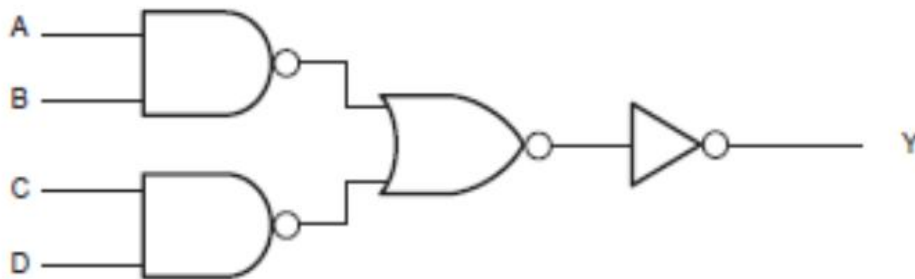


Figure 3.1: CD4012 Logic Diagram

3.2 Truth Table

Input				Output
A	B	C	D	Y
0	X	X	X	1
X	0	X	X	1
X	X	0	X	1
X	X	X	0	1
1	1	1	1	0

X = Don't Care, 1 ≡ High State, 0 ≡ Low State



4. Specifications

4.1 Absolute Maximum Ratings

Symbol	Parameter	MIN	MAX	Unit
V_{DD}	DC Supply Voltage Range (Voltage Referenced to VSS Terminals)	-0.5	20	V
V_I	Input Voltage Range, All Inputs	0.5	$V_{DD}+0.5$	V
P_D	Power Dissipation		500	mW
T_J	Junction Temperature		125	°C
T_{OP}	Operating Temperature	-40	85	°C

Absolute maximum ratings are those values beyond which the device could be permanently damaged, These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions.

4.2 Electrical Characteristics

4.2.1 DC Specifications

($T_a=25^\circ\text{C}$, voltages are referenced to VSS (ground=0V), unless otherwise specified)

Symbol	Parameter	Test Condition			MIN	TYP	MAX	Unit
		VO	VIN	VDD				
I_{DD}	Supply Current	--	0,5	5	--	0	1	uA
		--	0,10	10	--	0	1	uA
		--	0,18	18	--	0	1	uA
I_{OL}	Low Level Output Current	0.4	0,5	5	1.5	3	--	mA
		0.5	0,10	10	4	8	--	mA
		1.5	0,15	15	15	30	--	mA
I_{OH}	High Level Output Current	4.6	0,5	5	-0.5	-2	--	mA
		2.5	0,5	5	-4	-8	--	mA
		9.5	0,10	10	-2	-4	--	mA
		13.5	0,15	15	-7	-14	--	mA
V_{OL}	Low Level Output Voltage	--	0,5	5	--	0	0.05	V
		--	0,10	10	--	0	0.05	V
		--	0,15	15	--	0	0.05	V
V_{OH}	High Level Output Voltage	--	0,5	5	4.95	5	--	V
		--	0,10	10	9.95	10	--	V
		--	0,15	15	14.95	15	--	V
V_{IL}	Low Level Input Voltage	0.5,4.5	--	5	--	--	1.5	V
		1,9	--	10	--	--	3	V
		1.5,13.5	--	15	--	--	4	V
V_{IH}	High Level Input Voltage	0.5,4.5	--	5	3.5	--	--	V
		1,9	--	10	7	--	--	V
		1.5,13.5	--	15	11	--	--	V
I_{IN}	Input Leakage Current	--	0,18	18	--	0	±1	uA

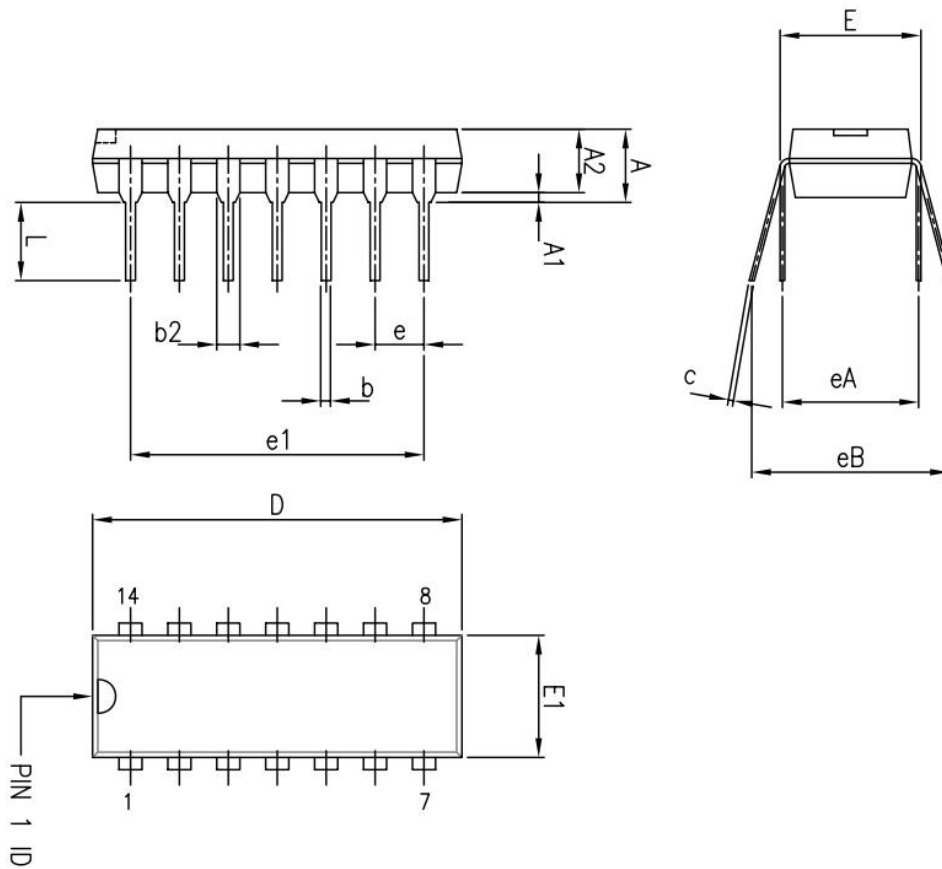


5. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
CD4012ND14ATBE	DIP	14	Tube	25
CD4012NS14ARDQ	SOP	14	Tape & Reel	4000
CD4012TS14ARBQ	TSSOP	14	Tape & Reel	2000

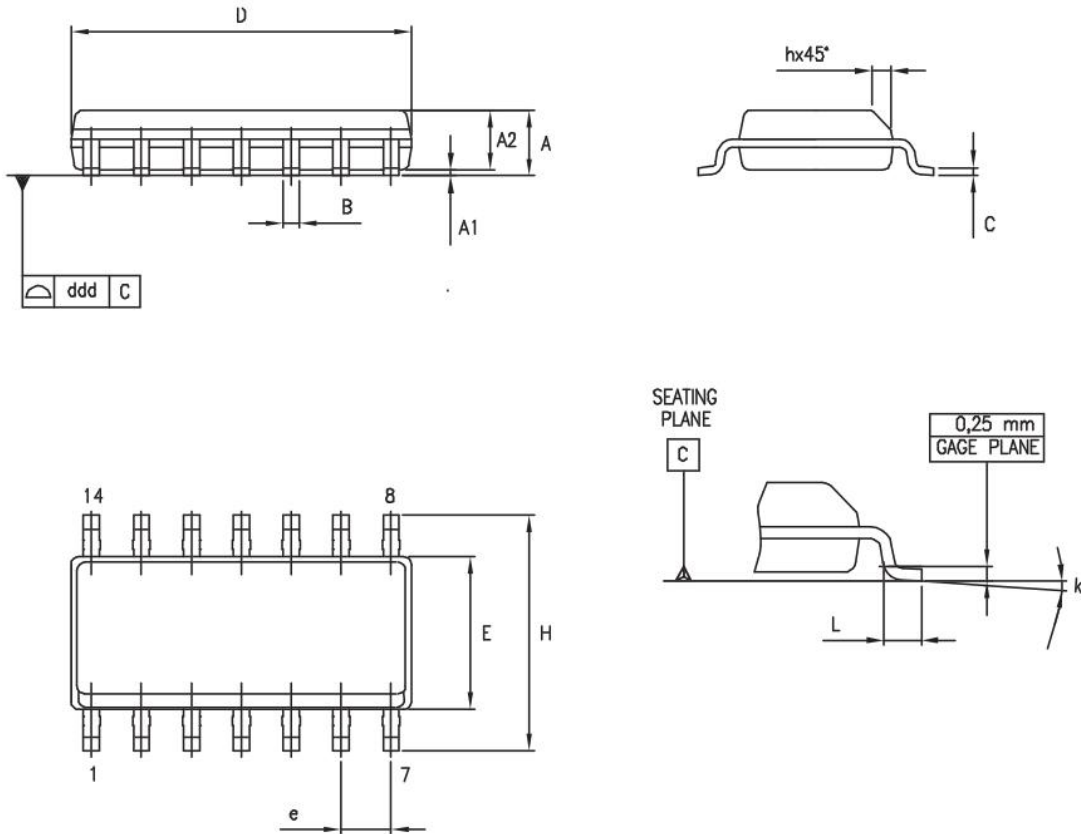
6. Package Information

6.1 DIP14



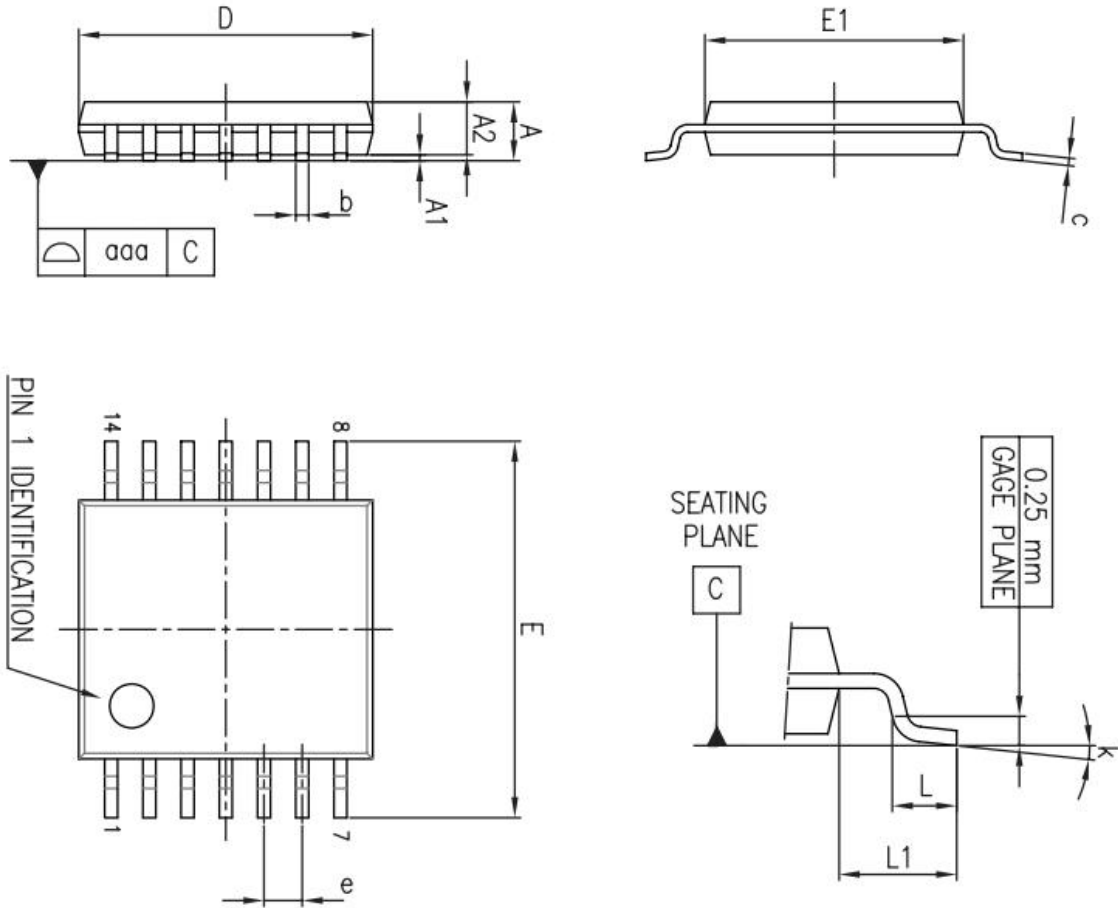
Dimensions						
Ref.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.33			0.21
A1	0.38			0.015		
A2	2.92	3.30	4.95	0.11	0.13	0.19
b	0.36	0.46	0.56	0.014	0.018	0.022
b2	1.14	1.52	1.78	0.04	0.06	0.07
c	0.20	0.25	0.36	0.007	0.009	0.01
D	18.67	19.05	19.69	0.73	0.75	0.77
E	7.62	7.87	8.26	0.30	0.31	0.32
E1	6.10	6.35	7.11	0.24	0.25	0.28
e		2.54			0.10	
e1		15.24			0.60	
eA		7.62			0.30	
eB			10.92			0.43
L	2.92	3.30	3.81	0.11	0.13	0.15

6.2 SOP14



Dimensions						
Ref.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.05		0.068
A1	0.10		0.25	0.004		0.009
A2	1.10		1.65	0.04		0.06
B	0.33		0.51	0.01		0.02
C	0.19		0.25	0.007		0.009
D	8.55		8.75	0.33		0.34
E	3.80		4.0	0.15		0.15
e		1.27			0.05	
H	5.80		6.20	0.22		0.24
h	0.25		0.50	0.009		0.02
L	0.40		1.27	0.015		0.05
k	8° (max.)					
ddd			0.10			0.004

6.3 TSSOP14



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	4.90	5.00	5.10	0.193	0.197	0.201
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.176
e		0.65			0.0256	
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1.00			0.039	
k	0°		8°	0°		8°
aaa			0.10			0.004