

74HC20 Dual 4-Input Nand Gates

1. General Description

1.1 Description

This device contains two independent 4-input NAND gates. Each gate performs the Boolean function $Y = \overline{A \cdot B \cdot C \cdot D}$ in positive logic.

1.2 Features

- Buffered inputs
- Wide operating voltage range: 2 V to 6 V
- Wide operating temperature range:
-40°C to +85°C

- Supports fanout up to 10 LSTTL loads
- Significant power reduction compared to LSTTL logic ICs

1.3 Device Information

PART NUMBER	PACKAGE
74HC20	DIP
	SOP
	TSSOP

2. Connection Diagrams and Pin Description

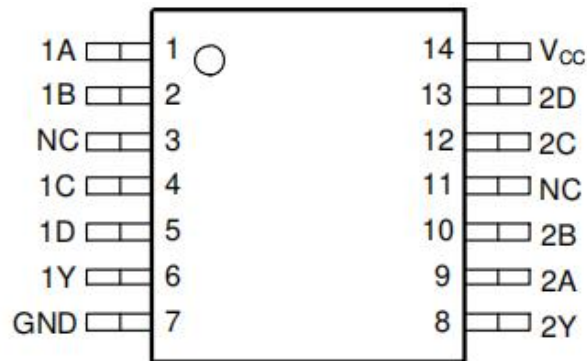


Figure 2.1 Top View



PIN No.	NAME	I/O	FUNCTION
1	1A	I	Data Input
2	1B	I	Data Input
3	NC		No Connected
4	1C	I	Data Input
5	1D	I	Data Input
6	1Y	O	Data Output
7	GND		Ground
8	2Y	O	Data Output
9	2A	I	Data Input
10	2B	I	Data Input
11	NC		No Connected
12	2C	I	Data Input
13	2D	I	Data Input
14	VCC		Supply Voltage

3. System Diagram

3.1 Logic Diagram

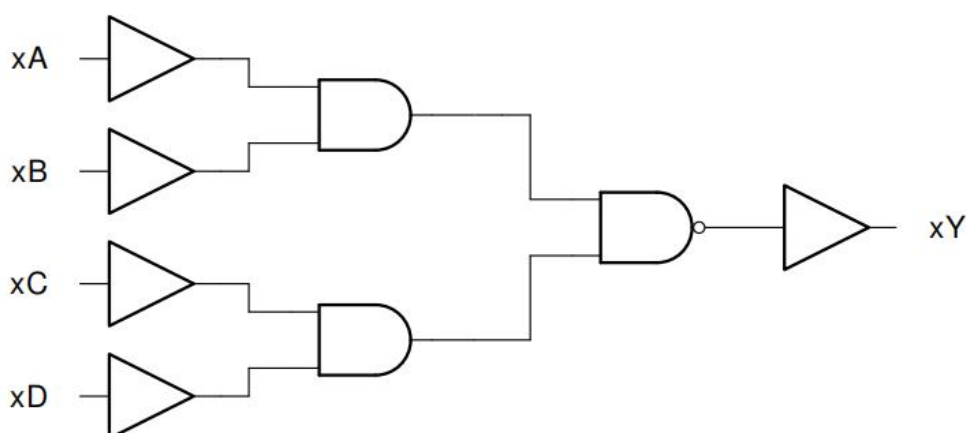


Figure 3.1: 74HC20 Logic Diagram

3.2 Function Table

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

Z=High Impedance, 1≡High State, 0≡Low State.

4. Specifications

4.1 Absolute Maximum Ratings

Symbol	Parameter	MIN	MAX	Unit
V _{CC}	Supply Voltage	-0.5	7	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 normal operating conditions.



4.2 Recommended Operating Conditions

Symbol	Parameter	Test Condition	MIN	NOM	MAX	Unit
V_{CC}	Supply Voltage		2	5	6	V
V_{IH}	High Level Input Voltage	$V_{CC}=2V$	1.5			V
		$V_{CC}=4.5V$	3.15			V
		$V_{CC}=6V$	4.2			V
V_{IL}	Low Level Input Voltage	$V_{CC}=2V$			0.5	V
		$V_{CC}=4.5V$			1.35	V
		$V_{CC}=6V$			1.8	V
V_I	Input voltage		0		V_{CC}	V

4.3 Electrical Characteristics

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

Symbol	Parameter	Test Condition	MIN	TYP	MAX	Unit
V_{OH}	High Level Output Voltage	$V_{CC}=2V, I_O=-20\mu A$	1.9	--	--	V
		$V_{CC}=4.5V, I_O=-20\mu A$	4.4	--	--	V
		$V_{CC}=6V, I_O=-20\mu A$	5.9	--	--	V
		$V_{CC}=4.5V, I_O=-4mA$	4.0	--	--	V
		$V_{CC}=6V, I_O=-5.2mA$	5.5	--	--	V
V_{OL}	Low Level Output Voltage	$V_{CC}=2V, I_O=20\mu A$	--	--	0.1	V
		$V_{CC}=4.5V, I_O=20\mu A$	--	--	0.1	V
		$V_{CC}=6V, I_O=20\mu A$	--	--	0.1	V
		$V_{CC}=4.5V, I_O=4mA$	--	--	0.26	V
		$V_{CC}=6V, I_O=5.2mA$	--	--	0.26	V
I_I	Input Leakage Current	$V_{CC}=6V, V_I=V_{CC}$ or GND	--	0	± 1	μA
I_{CC}	Quiescent Supply Current	$V_{CC}=6V, V_I=V_{CC}/GND$	--	0	10	μA

5. Application Information

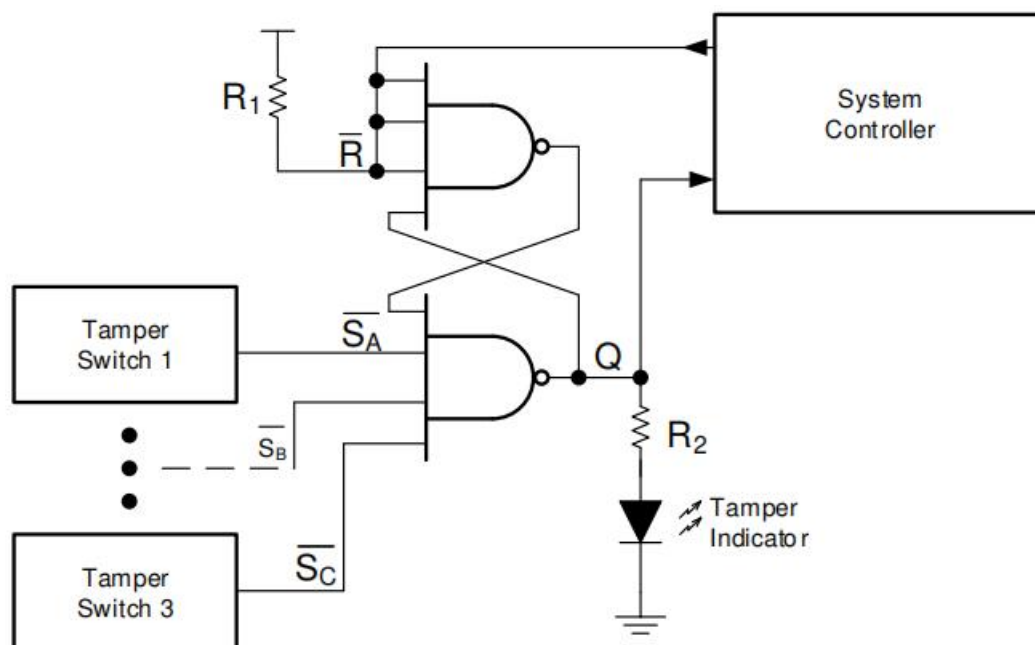


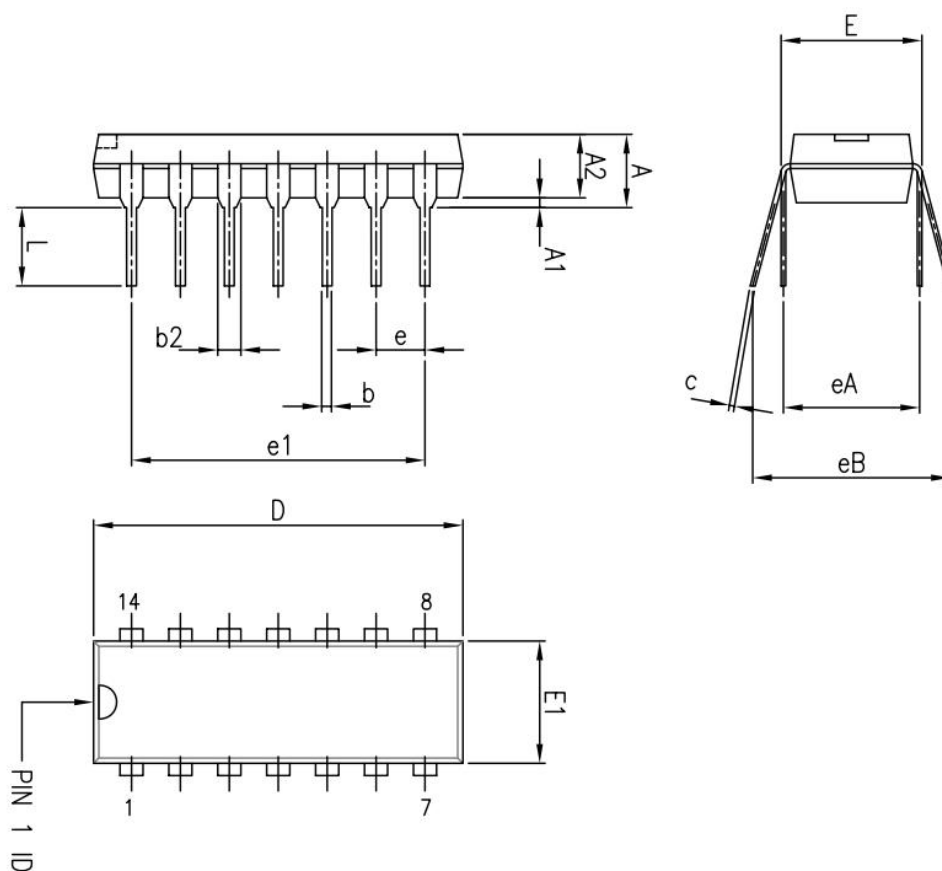
Figure 5.1: Typical application schematic

6. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
74HC20ND14ATBE	DIP	14	Tube	25
74HC20NS14ARDQ	SOP	14	Tape & Reel	4000
74HC20TS14ARBQ	TSSOP	14	Tape & Reel	2000

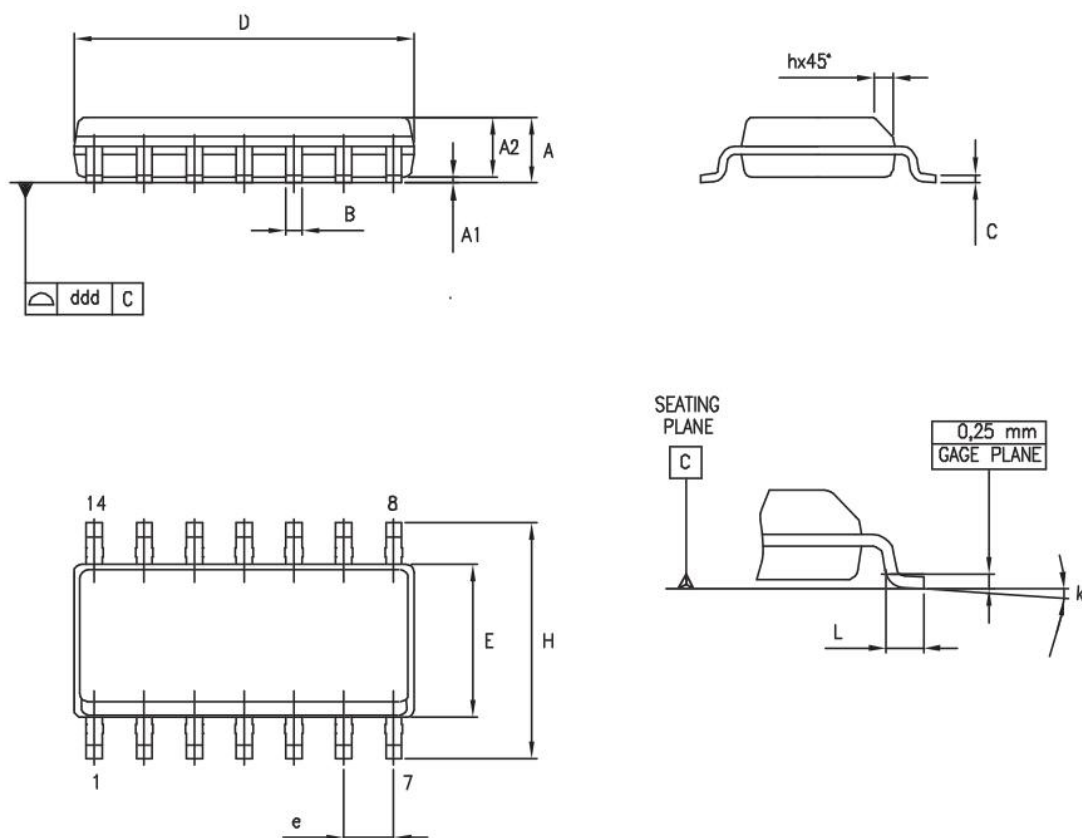
7. Package Information

7.1 DIP14



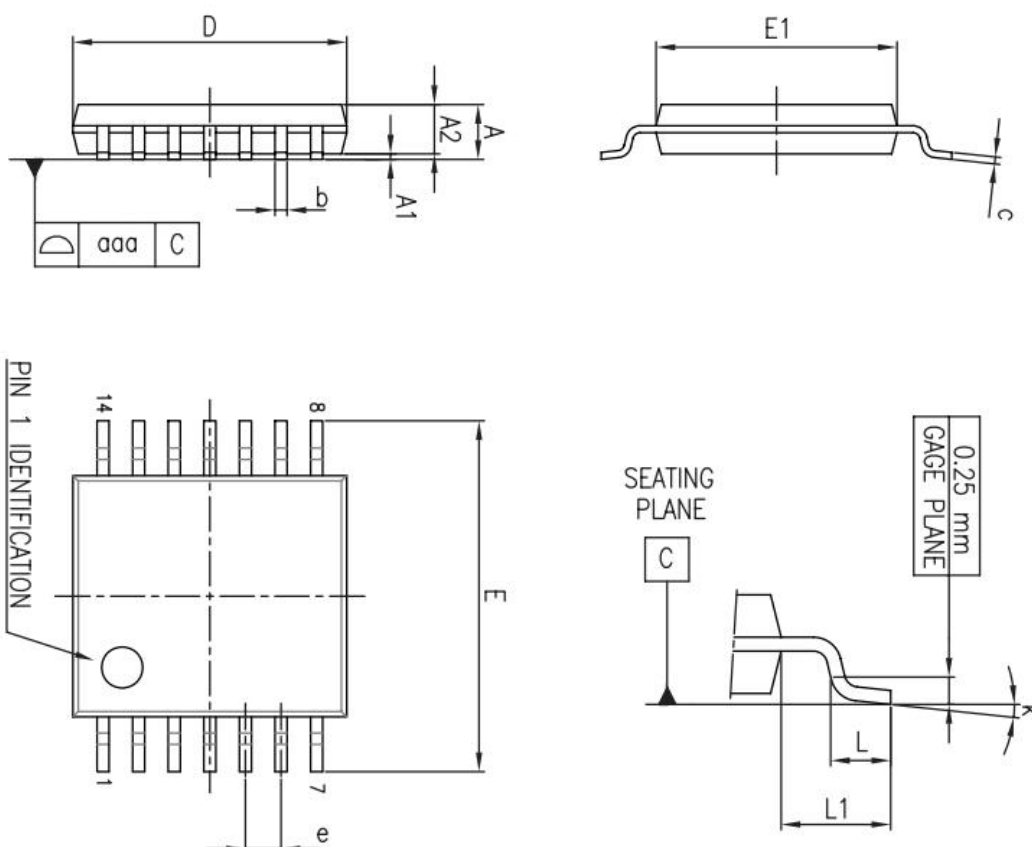
Dimensions						
Ref.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.33			0.21
A1	0.38			0.015		
A2	2.92	3.30	4.95	0.11	0.13	0.19
b	0.36	0.46	0.56	0.014	0.018	0.022
b2	1.14	1.52	1.78	0.04	0.06	0.07
c	0.20	0.25	0.36	0.007	0.009	0.01
D	18.67	19.05	19.69	0.73	0.75	0.77
E	7.62	7.87	8.26	0.30	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

7.2 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

7.3 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