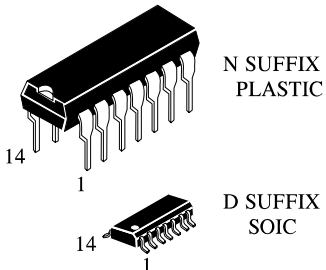


IN74AC20

Dual 4-Input NAND Gate

The IN74AC20 is identical in pinout to the LS/ALS20, HC/HCT20. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LS/ALS outputs.

- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0 μ A; 0.1 μ A @ 25°C
- High Noise Immunity Characteristic of CMOS Devices
- Outputs Source/Sink 24 mA

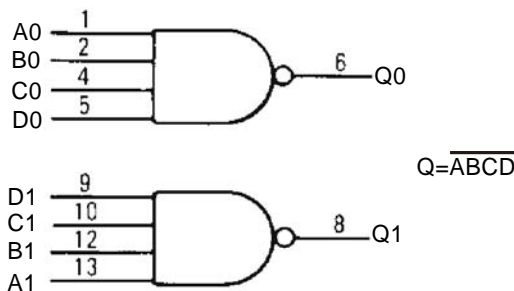


ORDERING INFORMATION

IN74AC20N	Plastic
IN74AC20D	SOIC
IZ74AC20	Chip

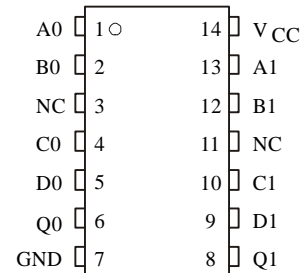
$T_A = -45^\circ$ to 85° C for all packages

LOGIC DIAGRAM



PIN 14 = V_{CC}
 PIN 7 = GND
 PINS 3,11 = NO CONNECTION

PIN ASSIGNMENT



NC = NO CONNECTION

FUNCTION TABLE

Inputs				Output
A	B	C	D	Q
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H
H	H	H	H	L

X = don't care

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V _{IN}	DC Input Voltage (Referenced to GND)	-0.5 to V _{CC} +0.5	V
V _{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V _{CC} +0.5	V
I _{IN}	DC Input Current, per Pin	±20	mA
I _{OUT}	DC Output Sink/Source Current, per Pin	±50	mA
I _{CC}	DC Supply Current, V _{CC} and GND Pins	±50	mA
P _D	Power Dissipation in Still Air, Plastic DIP** SOIC Package**	750 500	mW
T _{stg}	Storage Temperature	-65 to +150	°C
T _L	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP or SOIC Package)	260	°C

*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

**Derating - Plastic DIP: - 10 mW/°C from 65° to 85°C
SOIC Package: - 7 mW/°C from 65° to 85°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit	
V _{CC}	DC Supply Voltage (Referenced to GND)	2.0	6.0	V	
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V _{CC}	V	
T _J	Junction Temperature (PDIP)		140	°C	
T _A	Operating Temperature, All Package Types	-45	+85	°C	
I _{OH}	Output Current - High		-24	mA	
I _{OL}	Output Current - Low		24	mA	
t _r , t _f	Input Rise and Fall Time * (except Schmitt Inputs)	V _{CC} = 3.0 V V _{CC} = 4.5 V V _{CC} = 5.5 V	0 0 0	150 40 25	ns/V

* V_{IN} from 30% to 70% V_{CC}

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND ≤ (V_{IN} or V_{OUT}) ≤ V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

DC ELECTRICAL CHARACTERISTICS(Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V _{CC} V	Guaranteed Limits		Unit	
				25 °C	-45°C to 85°C		
V _{IH}	Minimum High-Level Input Voltage	V _{OUT} =0.1 V or V _{CC} -0.1 V	3.0	2.1	2.1	V	
			4.5	3.15	3.15		
			5.5	3.85	3.85		
V _{IL}	Maximum Low - Level Input Voltage	V _{OUT} =0.1 V or V _{CC} -0.1 V	3.0	0.9	0.9	V	
			4.5	1.35	1.35		
			5.5	1.65	1.65		
V _{OH}	Minimum High-Level Output Voltage	I _{OUT} ≤ -50 μA	3.0	2.9	2.9	V	
			4.5	4.4	4.4		
			5.5	5.4	5.4		
		*V _{IN} =V _{IH} or V _{IL} I _{OH} =-12 mA		3.0	2.56		2.46
		I _{OH} =-24 mA I _{OH} =-24 mA		4.5	3.86		3.76
		5.5	4.86	4.76			
V _{OL}	Maximum Low-Level Output Voltage	I _{OUT} ≤ 50 μA	3.0	0.1	0.1	V	
			4.5	0.1	0.1		
			5.5	0.1	0.1		
		*V _{IN} =V _{IH} I _{OL} =12 mA		3.0	0.36		0.44
		I _{OL} =24 mA I _{OL} =24 mA		4.5	0.36		0.44
		5.5	0.36	0.44			
I _{IN}	Maximum Input Leakage Current	V _{IN} =V _{CC} or GND	5.5	±0.1	±1.0	μA	
I _{OLD}	**Minimum Dynamic Output Current	V _{OLD} =1.65 V Max	5.5		75	mA	
I _{OHD}	**Minimum Dynamic Output Current	V _{OHD} =3.85 V Min	5.5		-75	mA	
I _{CC}	Maximum Quiescent Supply Current (per Package)	V _{IN} =V _{CC} or GND	5.5	4.0	40	μA	

* All outputs loaded; thresholds on input associated with output under test.

** Maximum test duration 2.0 ms, one output loaded at a time.

Note: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}

AC ELECTRICAL CHARACTERISTICS($C_L=50\text{pF}$, Input $t_r=t_f=3.0\text{ ns}$)

Symbol	Parameter	V_{CC}^* V	Guaranteed Limit				Unit
			25 °C		-45°C to 85°C		
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay, Input A , B, C or D to Output Q (Figure 1)	3.3 5.0	2.0 1.5	8.5 7.0	1.5 1.0	10.0 8.0	ns
t_{PHL}	Propagation Delay, Input A , B, C or D to Output Q (Figure 1)	3.3 5.0	1.5 1.5	7.0 6.0	1.0 1.0	9.0 7.0	ns
C_{IN}	Maximum Input Capacitance	5.0	4.5		-		pF

C_{PD}	Power Dissipation Capacitance	Typical @25°C, $V_{CC}=5.0\text{ V}$		pF
		40		

*Voltage Range 3.3 V is 3.3 V \pm 0.3 V
 Voltage Range 5.0 V is 5.0 V \pm 0.5 V

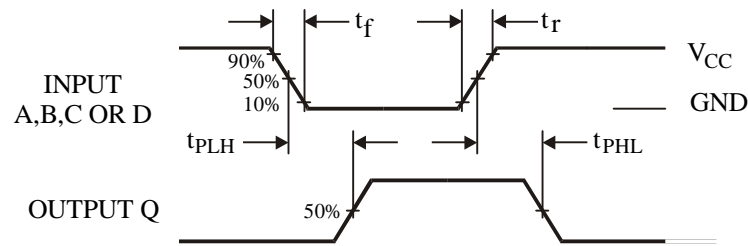
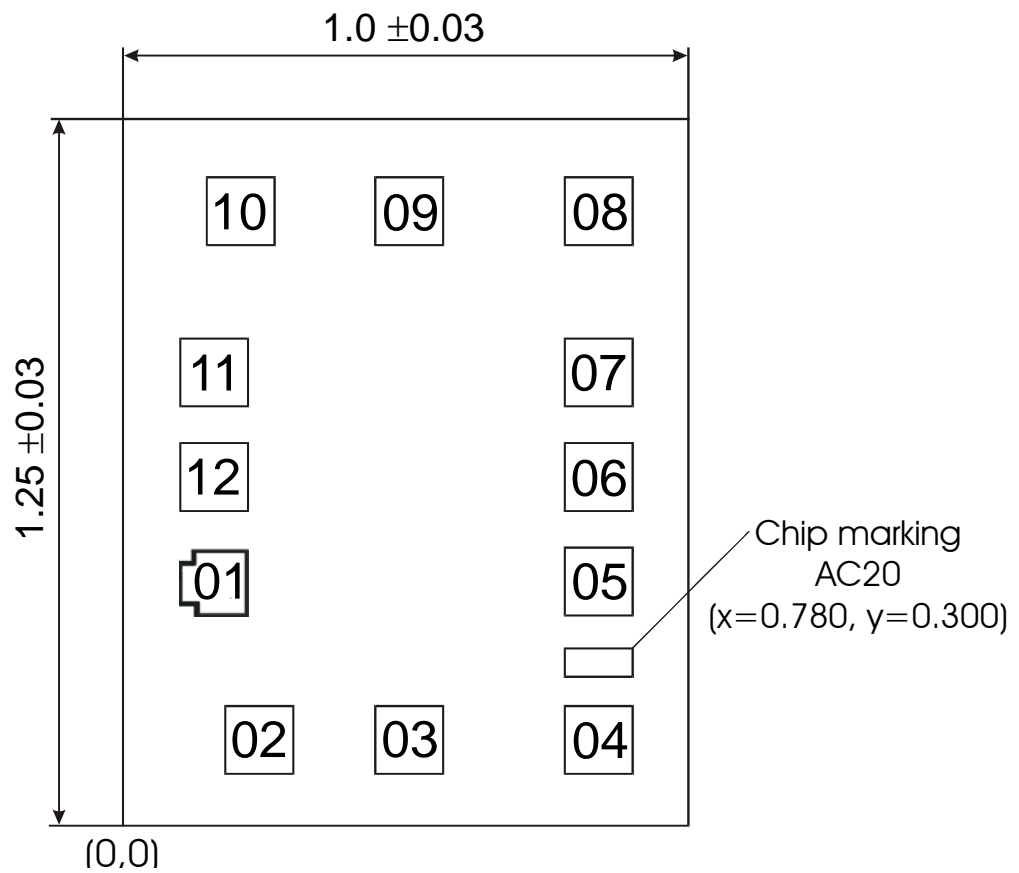


Figure 1. Switching Waveforms

CHIP PAD DIAGRAM IZ74AC20



Pad size is as per 0.46±0.02 mm

Pad size 0.120x0.120 mm (Pad size is given as per metallization layer)

PAD LOCATION

Pad No	Symbol	X	Y
01	A0	0.100	0.380
02	B0	0.180	0.100
03	C0	0.445	0.100
04	D0	0.780	0.100
05	Q0	0.780	0.380
06	GND	0.780	0.565
07	Q1	0.780	0.750
08	D1	0.780	1.035
09	C1	0.445	1.035
10	B1	0.147	1.035
11	A1	0.100	0.750
12	Vcc	0.100	0.565