

DUAL 4-INPUT POSITIVE NAND GATE

DESCRIPTION

The M74LS20P is a semiconductor integrated circuit containing two 4-input positive NAND gates, usable as negative-logic NOR gates.

FEATURES

- High breakdown input voltage ($V_I \geq 15V$)
- Low power dissipation ($P_D = 4mW$ typical)
- High speed ($t_{PD} = 10ns$ typical)
- Low output impedance
- Wide operating temperature range ($T_a = -20 \sim +75^\circ C$)

APPLICATION

General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

The use of Schottky TTL technology enables the achievement of input high breakdown voltage, high speed, low power dissipation and high fan-out.

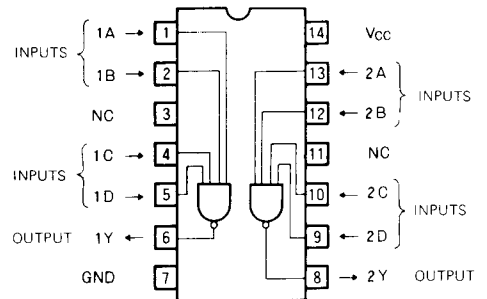
When inputs A, B and C are high, output Y is low, and when one or more of the inputs is low, output Y is high.

FUNCTION TABLE

A	N	Y
L	L	H
H	L	H
L	H	H
H	H	L

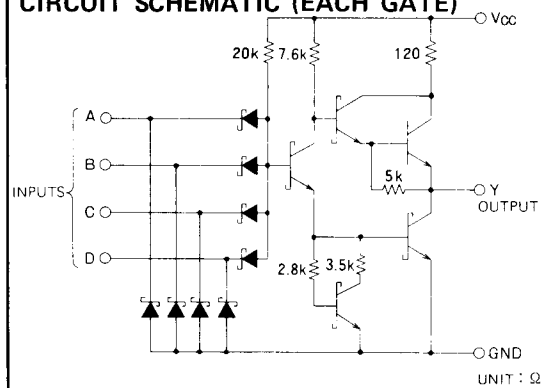
$N = B \cdot C \cdot D$

PIN CONFIGURATION (TOP VIEW)



Outline 14P4 NC: NO CONNECTION

CIRCUIT SCHEMATIC (EACH GATE)



ABSOLUTE MAXIMUM RATINGS ($T_a = -20 \sim +75^\circ C$, unless otherwise noted)

Symbol	Parameter	Conditions	Limits	Unit
V_{CC}	Supply voltage		$-0.5 \sim +7$	V
V_I	Input voltage		$-0.5 \sim +15$	V
V_O	Output voltage	High-level state	$-0.5 \sim V_{CC}$	V
T_{opr}	Operating free-air ambient temperature range		$-20 \sim +75$	$^\circ C$
T_{stg}	Storage temperature range		$-65 \sim +150$	$^\circ C$

DUAL 4-INPUT POSITIVE NAND GATE

RECOMMENDED OPERATING CONDITIONS (Ta = -20 ~ +75°C, unless otherwise noted)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
VCC	Supply voltage		4.75	5	5.25	V
IOH	High-level output current	VOH ≥ 2.7V	0		-400	μA
IOL	Low-level output current	VOL ≤ 0.4V	0		4	mA
		VOL ≤ 0.5V	0		8	mA

ELECTRICAL CHARACTERISTICS (Ta = -20 ~ +75°C, unless otherwise noted)

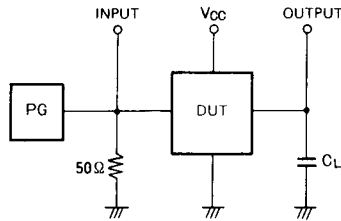
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ *	Max	
VIH	High-level input voltage		2			V
VIL	Low-level input voltage				0.8	V
VIC	Input clamp voltage	VCC = 4.75V, IIC = -18mA			-1.5	V
VOH	High-level output voltage	VCC = 4.75V, VI = 0.8V, IOH = -400 μA	2.7	3.4		V
VOL	Low-level output voltage	VCC = 4.75V, VI = 2V, IOL = 4mA		0.25	0.4	V
		VCC = 4.75V, VI = 2V, IOL = 8mA		0.35	0.5	V
IIH	High-level input current	VCC = 5.25V, VI = 2.7V			20	μA
		VCC = 5.25V, VI = 10V			0.1	mA
IIl	Low-level input current	VCC = 5.25V, VI = 0.4V			-0.4	mA
IOS	Short-circuit output current (Note 1)	VCC = 5.25V, VO = 0V	-20		-100	mA
IOCH	Supply current, all inputs high	VCC = 5.25V, VI = 0V		0.4	0.8	mA
IACL	Supply current, all inputs low	VCC = 5.25V, VI = 4.5V		1.2	2.2	mA

* : All typical values are at VCC = 5V, Ta = 25°C
Note 1: All measurements should be done quickly and not more than one output should be shorted at a time.

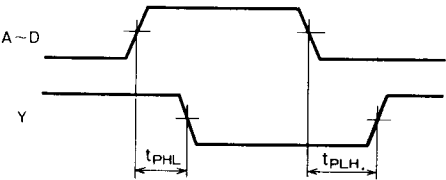
SWITCHING CHARACTERISTICS (VCC = 5V, Ta = 25°C, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
tPLH	Low-to-high-level/high-to-low-level output propagation time	CL = 15pF (Note 2)		6	15	ns
tPHL				13	15	ns

Note 2: Measurement circuit



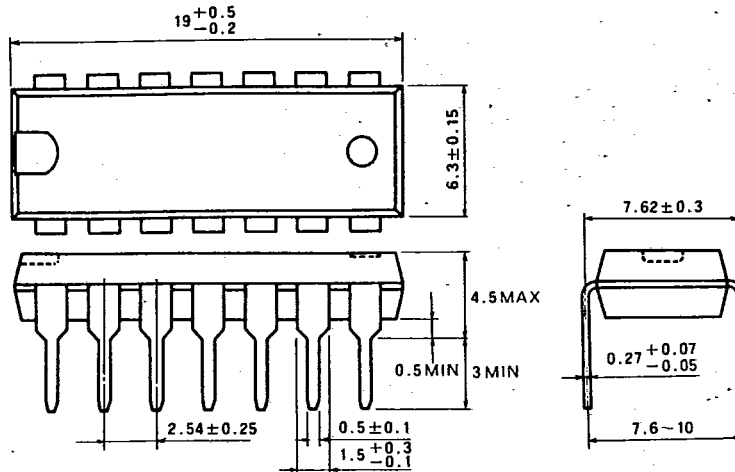
TIMING DIAGRAM (Reference level = 1.3V)



- (1) The pulse generator (PG) has the following characteristics:
PRR = 1MHz, tr = 6ns, tf = 6ns, tw = 500ns,
Vp = 3Vp.p, Zo = 50Ω.
(2) CL includes probe and jig capacitance.

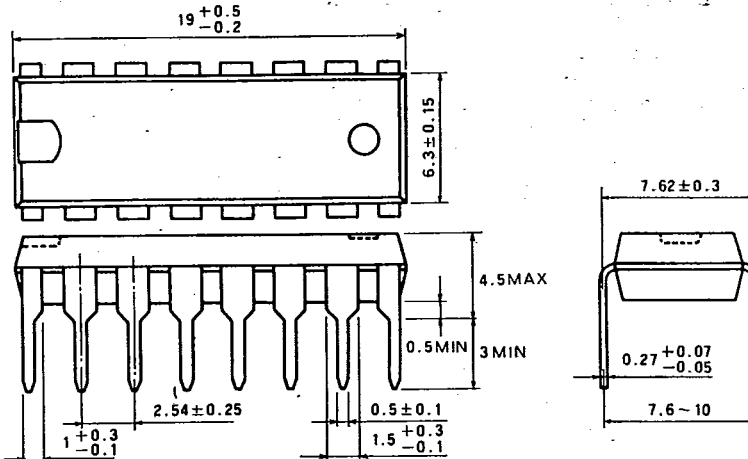
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

