

MITSUBISHI LSTTLs

M74LS22P

DUAL 4-INPUT POSITIVE NAND GATE WITH OPEN COLLECTOR OUTPUT

DESCRIPTION

The M74LS22P is a semiconductor integrated circuit containing two 4-input positive-logic NAND gates with open collector outputs, usable as negative-logic NOR gates.

FEATURES

- Usable in wire-AND connection
- High breakdown input voltage ($V_i \geq 15V$)
- High breakdown output voltage ($V_O \geq 7V$)
- Low power dissipation ($P_d = 4mW$ typical)
- High speed ($t_{pd} = 18ns$ typical)
- Wide operating temperature range ($T_a = -20 \sim +75^\circ C$)

APPLICATION

General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

With the use of open collector outputs and SBD inputs featuring a high breakdown voltage, the high-level output impedance can be selected freely by use of an external load resistor. This permits wire-AND connection which has been impossible with conventional gates.

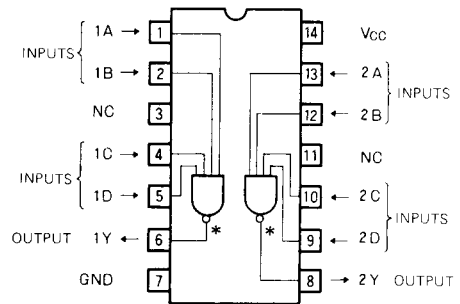
When inputs A, B, C and D are high, output Y is low and when one or more of the inputs is low, output Y is high.

FUNCTION TABLE

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

$$N = B \cdot C \cdot D$$

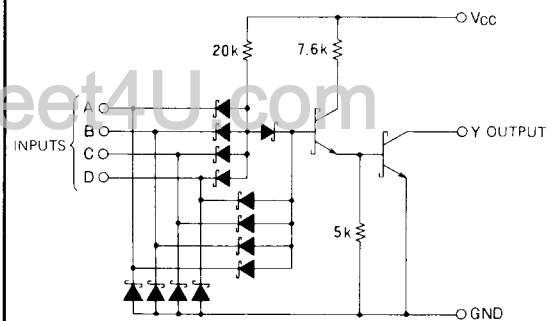
PIN CONFIGURATION (TOP VIEW)



* : OPEN COLLECTOR OUTPUT
NC : NO CONNECTION

Outline 14P4

CIRCUIT SCHEMATIC (EACH GATE)



UNIT : Ω

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	$-0.5 \sim +7$	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 WITH OPEN COLLECTOR OUTPUT
RECOMMENDED OPERATING CONDITIONS ($T_a = -20 \sim +75^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter		Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage		4.75	5	5.25	V
I_{OH}	High-level output current	$V_O = 5.5\text{V}$	0		100	μA
I_{OL}	Low-level output current	$V_{OL} \leq 0.4\text{V}$	0		4	mA
		$V_{OL} \leq 0.5\text{V}$	0		8	mA

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$, unless otherwise noted)

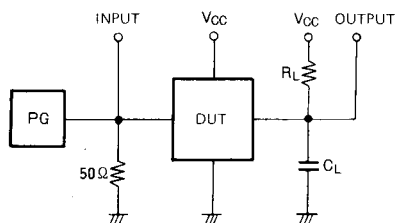
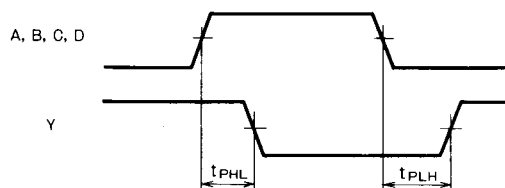
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ *	Max	
V_{IH}	High-level input voltage		2			V
V_{IL}	Low-level input voltage				0.8	V
V_{IC}	Input clamp voltage	$V_{CC} = 4.75\text{V}$, $I_{IC} = -18\text{mA}$			-1.5	V
I_{OH}	High-level output current	$V_{CC} = 4.75\text{V}$, $V_I = 0.8\text{V}$ $V_O = 5.5\text{V}$			100	μA
V_{OL}	Low-level output voltage	$V_{CC} = 4.75\text{V}$ $V_I = 2\text{V}$	$I_{OL} = 4\text{mA}$	0.25	0.4	V
			$I_{OL} = 8\text{mA}$	0.35	0.5	V
I_{IH}	High-level input current	$V_{CC} = 5.25\text{V}$, $V_I = 2.7\text{V}$			20	μA
		$V_{CC} = 5.25\text{V}$, $V_I = 10\text{V}$			0.1	mA
I_{IL}	Low-level input current	$V_{CC} = 5.25\text{V}$, $V_I = 0.4\text{V}$			-0.4	mA
I_{CCH}	Supply current, all inputs high	$V_{CC} = 5.25\text{V}$, $V_I = 0\text{V}$		0.4	0.8	mA
I_{CCL}	Supply current, all inputs low	$V_{CC} = 5.25\text{V}$, $V_I = 4.5\text{V}$		1.2	2.2	mA

* : All typical values are at $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$

SWITCHING CHARACTERISTICS ($V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{PLH}	Low-to-high-level/high-to-low-level output propagation time	$R_L = 2\text{k}\Omega$ $C_L = 15\text{pF}$ (Note 1)		10	32	ns
t_{PHL}				25	28	ns

Note 1: Measurement circuit


TIMING DIAGRAM (Reference level = 1.3V)


(1) The pulse generator (PG) has the following characteristics:

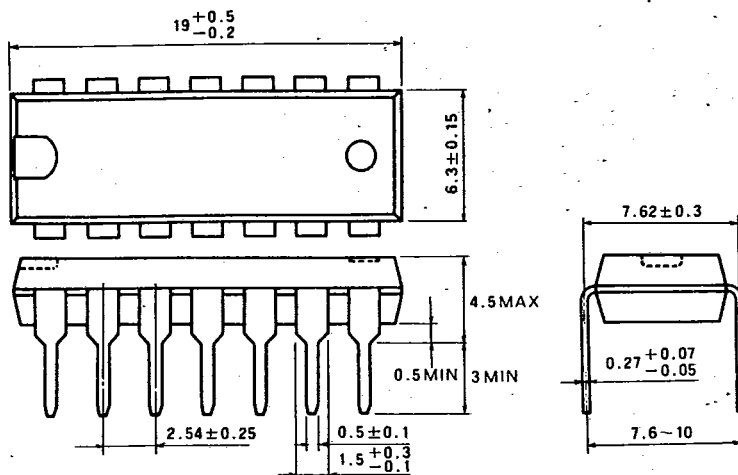
PRR = 1MHz, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$, $t_w = 500\text{ns}$;

$V_p = 3V_{p-p}$, $Z_0 = 50\Omega$

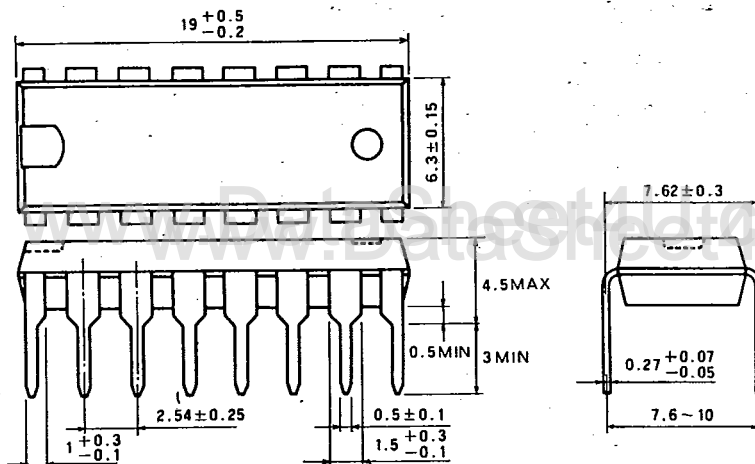
(2) C_L includes probe and jig capacitance.

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

