

MITSUBISHI LSTTLs M74LS38P

QUADRUPLE 2-INPUT POSITIVE NAND BUFFER WITH OPEN COLLECTOR OUTPUT

DESCRIPTION

The M74LS38P is a semiconductor integrated circuit containing four 2-input positive NAND and negative NOR buffer gates with open collector outputs.

FEATURES

- Usable in wire-AND connection
- High fan-out ($I_{OL} = 24\text{mA max}$)
- High breakdown input voltage ($V_I \geq 15\text{V}$)
- High breakdown output voltage ($V_O \geq 7\text{V}$)
- Low power dissipation ($P_D = 17.5\text{mW typical}$)
- High speed ($t_{pd} = 14\text{ns typical}$)
- Wide operating temperature range ($T_a = -20 \sim +75^\circ\text{C}$)

APPLICATION

General purpose, for use in industrial and consumer equipment.

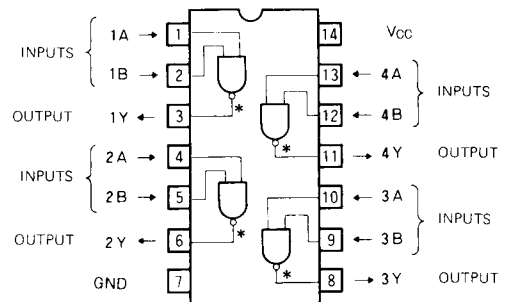
FUNCTIONAL DESCRIPTION

With the use of open collector outputs and SBD inputs having 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. The maximum low-level output current (I_{OL}) of 24mA makes this device suitable as a buffer gate. When inputs A and B are high, output Y is low and when one or both inputs are low, Y is high.

FUNCTION TABLE

A	B	Y
L	L	H
H	L	H
L	H	H
H	H	L

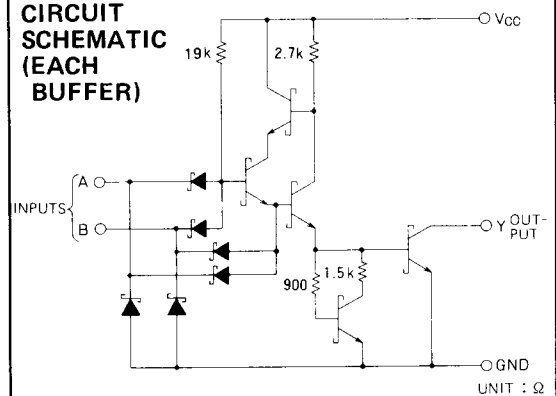
PIN CONFIGURATION (TOP VIEW)



* : OPEN COLLECTOR OUTPUT

Outline 14P4

CIRCUIT SCHEMATIC (EACH BUFFER)



UNIT : Ω

ABSOLUTE MAXIMUM RATINGS ($T_a = -20 \sim +75^\circ\text{C}$, 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		$-20 \sim +75$	$^\circ\text{C}$
T_{stg}	Storage temperature range		$-65 \sim +150$	$^\circ\text{C}$

**QUADRUPLE 2-INPUT POSITIVE NAND BUFFER
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		250	μA
I_{OL}	Low-level output current	$V_{OL} \leq 0.4\text{V}$	0		12	mA
		$V_{OL} \leq 0.5\text{V}$	0		24	mA

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

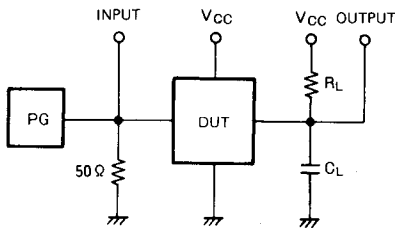
Symbol	Parameter	Test conditions	Limits			Unit	
			Min	Typ *	Max		
V_{IH}	High-level input voltage		2			V	
V_{IL}	Low-level input voltage				0.8	V	
V_{IC}	Input clamp voltage	$V_{CC} = 4.75\text{V}$, $I_{IC} = -18\text{mA}$			-1.5	V	
I_{OH}	High-level output current	$V_{CC} = 4.75\text{V}$, $V_I = 0.8\text{V}$, $V_O = 5.5\text{V}$			250	μA	
V_{OL}	Low-level output voltage	$V_{CC} = 4.75\text{V}$			0.25	0.4	V
		$V_I = 2\text{V}$			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 outputs high	$V_{CC} = 5.25\text{V}$, $V_I = 0\text{V}$		0.9	2	mA	
I_{CCL}	Supply current, all outputs low	$V_{CC} = 5.25\text{V}$, $V_I = \text{Open}$		6	12	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)

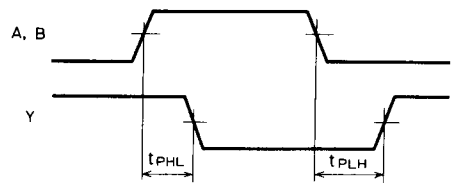
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{PLH}	Low-to-high-level output propagation time	$R_L = 667\Omega$		13	32	ns
t_{PHL}	High-to-low-level output propagation time	$C_L = 45\text{pF}$ (Note 1)		14	28	ns

Note 1: Measurement circuit



- (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.

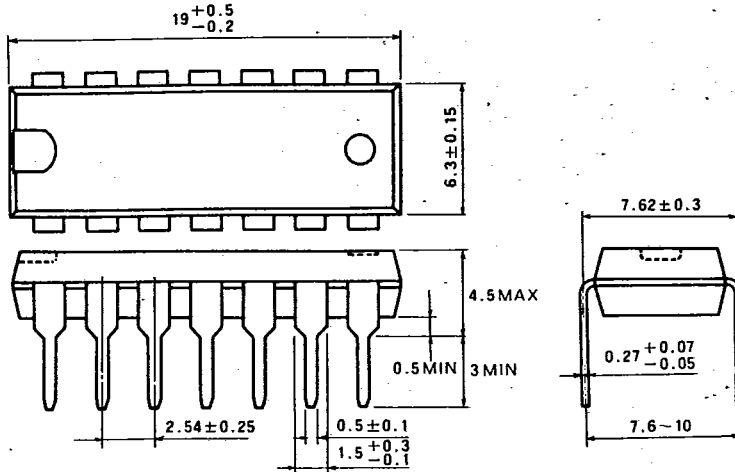
TIMING DIAGRAM (Reference level = 1.3V)



T-90-20

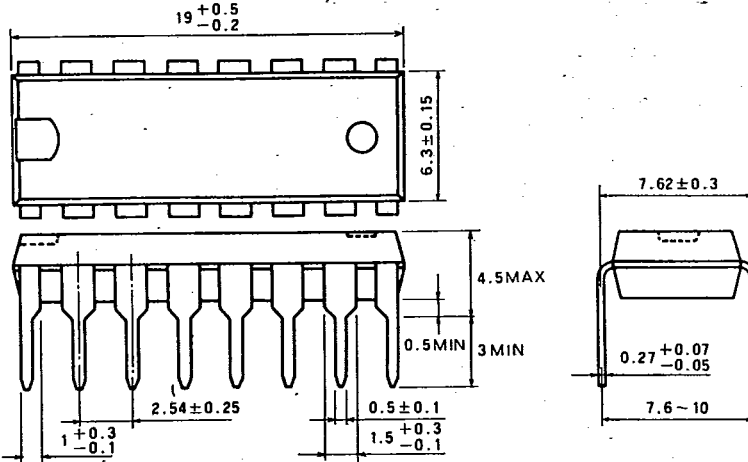
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

