

6249827 0013707 5

**QUADRUPLE 2-INPUT EXCLUSIVE OR GATES
WITH OPEN COLLECTOR OUTPUTS**

T-43-15

DESCRIPTION

The M74LS136P is a semiconductor integrated circuit containing 4 dual-input exclusive-OR gates with open collector output.

FEATURES

- Usable in wire-AND connection
- High breakdown output voltage ($V_o \geq 7V$)
- Low power dissipation ($P_d = 30.5mW$ typical)
- High speed ($t_{pd} = 13ns$ typical)
- Wide operating temperature range ($T_a = -20 \sim +75^\circ C$)

APPLICATION

General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

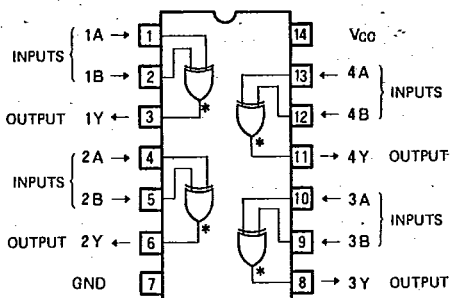
With the use of open collector output, the high-level output impedance can be freely selected by means of an external resistor. This make possible use in the wire-AND, which has been impossible with conventional gates.

When both inputs A and B are high or both low, output Y is low, and when A and B are high and low or low and high respectively, Y is high.

FUNCTION TABLE

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

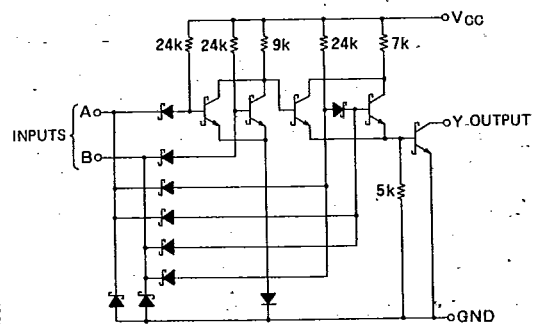
PIN CONFIGURATION (TOP VIEW)



* : OPEN COLLECTOR OUTPUT

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 ~ +7	V
V_i	Input voltage		-0.5 ~ +15	V
V_o	Output voltage	High-level state	-0.5 ~ +7	V
T_{opr}	Operating free-air ambient temperature range		-20 ~ +75	$^\circ C$
T_{stg}	Storage temperature range		-65 ~ +150	$^\circ C$

QUADRUPLE 2-INPUT EXCLUSIVE OR GATES WITH OPEN COLLECTOR OUTPUTS

T-43-15

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	$V_{CC} = 4.75\text{V}$, $V_I = 0.8\text{V}$ $V_I = 2\text{V}$, $V_O = 5.5\text{V}$			100	μA	
V_{OL}	Low-level output voltage	$V_{CC} = 4.75\text{V}$			0.25	0.4	V
		$V_I = 0.8\text{V}$, $V_I = 2\text{V}$	$I_{OL} = 4\text{mA}$		0.35	0.5	V
I_{IH}	High-level input current	$V_{CC} = 5.25\text{V}$, $V_I = 2.7\text{V}$			40	μA	
		$V_{CC} = 5.25\text{V}$, $V_I = 10\text{V}$			0.2	mA	
I_{IL}	Low-level input current	$V_{CC} = 5.25\text{V}$, $V_I = 0.4\text{V}$			-0.8	mA	
I_{CC}	Supply current	$V_{CC} = 5.25\text{V}$ (Note 1)		6.1	10	mA	

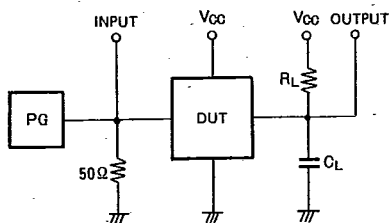
* : All typical values are at $V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$.

Note 1: I_{CC} is measured with all inputs grounded.

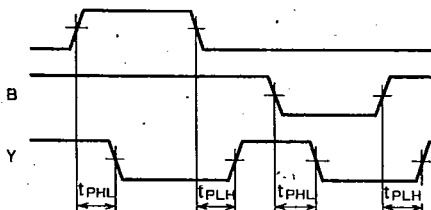
SWITCHING CHARACTERISTICS ($V_{CC} = 5\text{V}$, $T_a = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time,	$R_L = 2\text{ k}\Omega$ $C_L = 15\text{ pF}$ Other input low (Note 2)		14	30	ns
t_{PHL}				14	30	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time,	$R_L = 2\text{ k}\Omega$ $C_L = 15\text{ pF}$ Other input high (Note 2)		12	30	ns
t_{PHL}				12	30	ns

Note 2: Measurement circuit



TIMING DIAGRAM (Reference level = 1.3V)



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

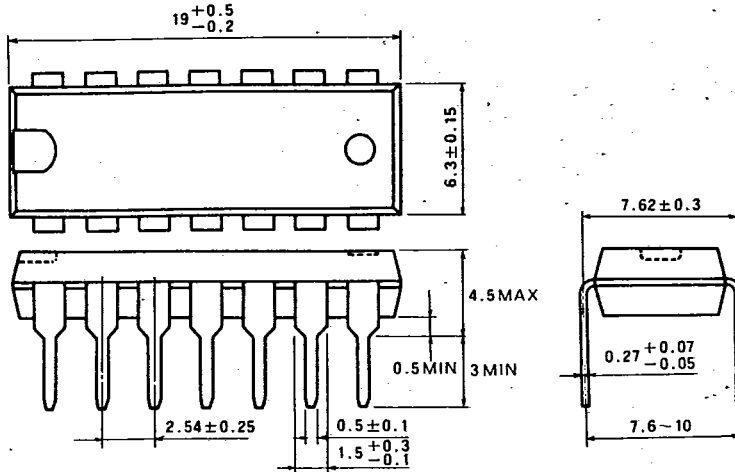
PRR = 1MHz, $t_r = 6\text{ns}$, $t_f = 6\text{ns}$, $t_w = 500\text{ns}$,
 $V_p = 3\text{V}_{p-p}$, $Z_o = 50\Omega$

(2) C_L includes probe and jig capacitance.

T-90-20

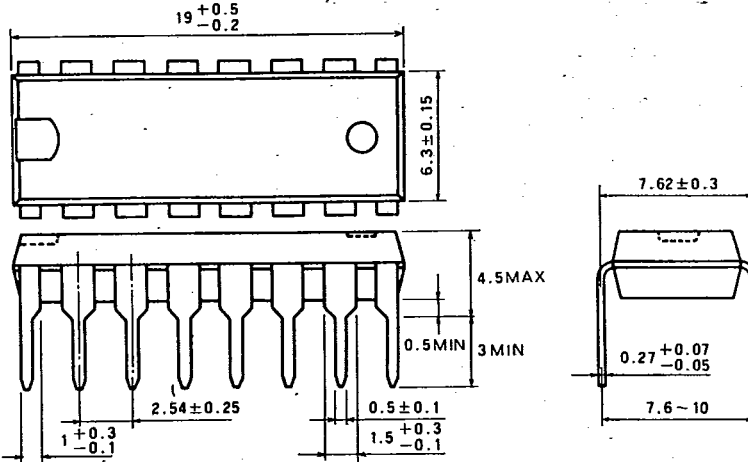
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm

