M74LS51P

DUAL 2-WIDE 2-INPUT/3-INPUT AND-OR-INVERT GATE

DESCRIPTION

The M74LS51P is a semiconductor integrated circuit containing dual 2-wide 2-input/3-input AND-OR-INVERT gates.

FEATURES

- High breakdown input voltage ($V_I \geqq 15V$)
- Low power dissipation (P_d=5.5mW typical)
- High speed (t_{pd}=7ns typical)
- Low output impedance
- Wide operating temperature range (T_a=−20~+75°C)

APPLICATION

General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

Schottky TTL technology enables input high breakdown voltage, high speed, low power dissipation and high fan-out.

This device consists of a NOR gate with two 2-input AND gates as the inputs and a NOR gate with two 3-input AND gates as the inputs, and the following logical expressions are yielded:

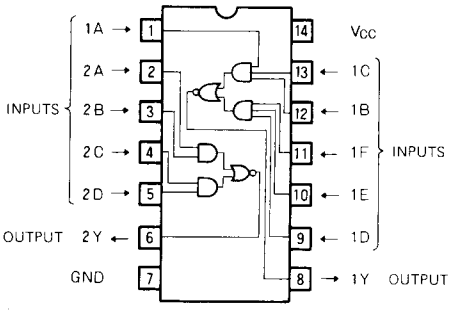
$$1Y = \overline{1A \cdot 1B \cdot 1C + 1D \cdot 1E \cdot 1F}$$
$$2Y = \overline{2A \cdot 2B + 2C \cdot 2D}$$

FUNCTION TABLE

M	N	Y
L	L	H
H	L	L
L	H	L
H	H	L

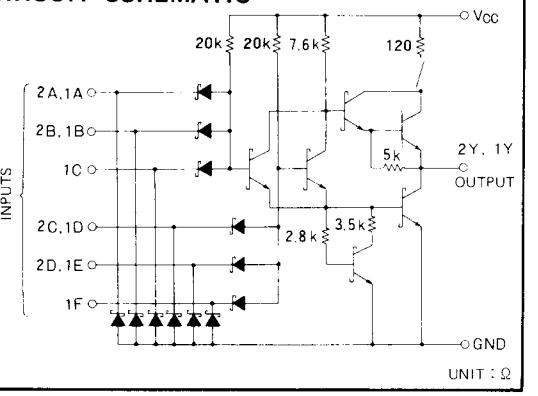
M = 1A·1B·1C
N = 1D·1E·1F
AND-OR
M = 2A·2B
N = 2C·2D

PIN CONFIGURATION (TOP VIEW)



Outline 14P4

CIRCUIT SCHEMATIC



ABSOLUTE MAXIMUM RATINGS (T_a = −20 ~ +75°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 ~ V_{CC}	V
Topr	Operating free-air ambient temperature range		−20 ~ +75	°C
Tstg	Storage temperature range		−65 ~ +150	°C

DUAL 2-WIDE 2-INPUT/3-INPUT AND-OR-INVERT GATE

RECOMMENDED OPERATING CONDITIONS ($T_a = -20 \sim +75°C$, 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	$V_{OH} \geqq 2.7V$	0		−400	μA
I_{OL}	Low-level output current	$V_{OL} \leqq 0.4V$	0		4	mA
		$V_{OL} \leqq 0.5V$	0		8	mA

ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75°C$, unless otherwise noted)

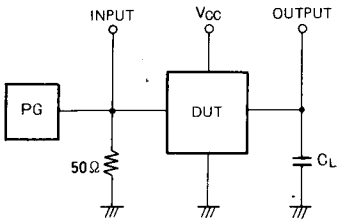
Symbol	Parameter	Test conditions		Limits			Unit
				Min	Typ *	Max	
V_{IH}	High-level input voltage			2			V
V_{IL}	Low-level input voltage					0.8	V
V_{IC}	Input clamp voltage	$V_{CC}=4.75V$, $I_{IC}=-18mA$				−1.5	V
V_{OH}	High-level output voltage	$V_{CC}=4.75V$, $V_I=0.8V$, $I_{OH}=-400\mu A$		2.7	3.4		V
V_{OL}	Low-level output voltage	$V_{CC}=4.75V$	$I_{OL}=4mA$		0.25	0.4	V
		$V_I=2V$	$I_{OL}=8mA$		0.35	0.5	V
I_{IH}	High-level input current	$V_{CC}=5.25V$, $V_I=2.7V$				20	μA
		$V_{CC}=5.25V$, $V_I=10V$				0.1	mA
I_{IL}	Low-level input current	$V_{CC}=5.25V$, $V_I=0.4V$				−0.4	mA
I_{OS}	Short-circuit output current (Note 1)	$V_{CC}=5.25V$, $V_O=0V$		−20		−100	mA
I_{CCH}	Supply current, all outputs high	$V_{CC}=5.25V$, $V_I=0V$			0.8	1.6	mA
I_{CCL}	Supply current, all outputs low	$V_{CC}=5.25V$, $V_I=4.5V$			1.4	2.8	mA

* : All typical values are at $V_{CC}=5V$, $T_a=25°C$.
Note 1: All measurements must be done quickly and not more than one output should be shorted at a time.

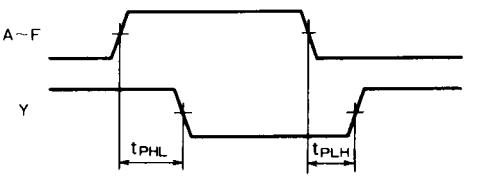
SWITCHING CHARACTERISTICS ($V_{CC}=5V$, $T_a=25°C$, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
t_{PLH}	Low-to-high-level output propagation time	$C_L=15pF$ (Note 2)		6	20	ns
t_{PHL}	High-to-low-level output propagation time			8	20	ns

Note 2: Measurement circuit



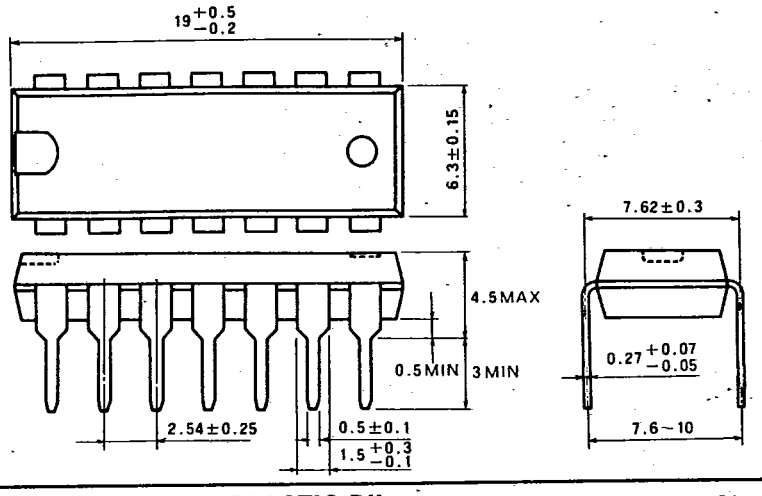
TIMING DIAGRAM (Reference level = 1.3V)



(1) The pulse generator (PG) has the following characteristics:
PRR=1MHz, t_r=6ns, t_f=6ns, t_w=500ns, V_P = $3V_{P-P}$, Z_O = 50Ω.
(2) C_L includes probe and jig capacitance.

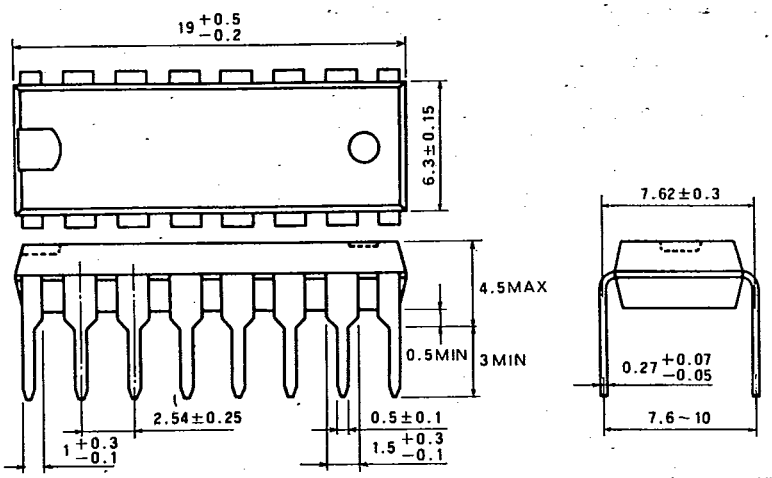
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm