M74LS375P

4-BIT BISTABLE LATCH

DESCRIPTION

The M74LS375P is a semiconductor integrated circuit containing 4 bistable latch circuits and is provided with outputs Q and $\overline{Q}$.

FEATURES

- Enable inputs common to two circuits each
- Q and $\overline{Q}$ outputs
- pin 8 GND, pin 16 V_{CC}
- Wide operating temperature range (T_a = −20 ~ +75°C)

APPLICATION

General purpose, for use in industrial and consumer equipment.

FUNCTIONAL DESCRIPTION

This device contains 4 D-type latch circuits and is provided with enable inputs E common to 2 circuits each. When E is high, the information from the data input D appears in the outputs Q and $\overline{Q}$. When the D signal changes, the signal that appears in outputs Q and $\overline{Q}$ also changes. When E changes from high to low, the status of D immediately before the change is latched. While E is low, the status of Q and $\overline{Q}$ does not change even if D is changed.

This IC has the same functions and electrical characteristics as M74LS75P and differs only in its pin configuration.

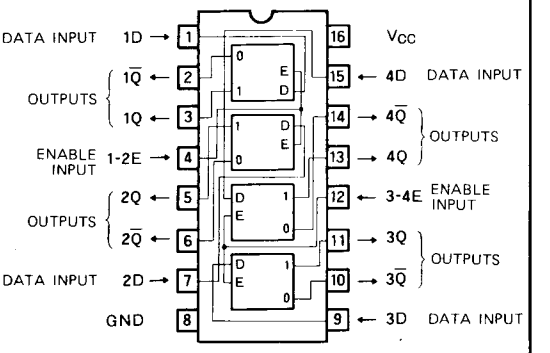
FUNCTION TABLE (Note 1)

E	D	Q	$\overline{Q}$
H	H	H	L
H	L	L	H
L	X	Q^0	$\overline{Q^0}$

Note 1 Q^0, $\overline{Q^0}$: Level of Q and $\overline{Q}$ before the indicated steady-state input conditions were established.

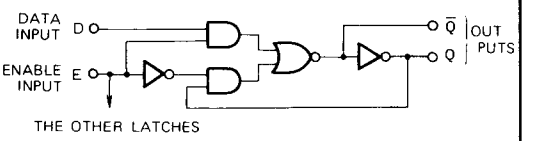
X : Irrelevant

PIN CONFIGURATION (TOP VIEW)



Outline 16P4

BLOCK DIAGRAM (EACH LATCH)



ABSOLUTE MAXIMUM RATINGS (Ta = −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

RECOMMENDED OPERATING CONDITIONS (Ta = −20 ~ +75℃, 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 (Ta = −20 ~ +75℃, 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 V_I=2V, I_{OH}=−400μA		2.7	3.5		V
V_{OL}	Low-level output voltage		V_{CC}=4.75V	I_{OL}=4mA		0.25	0.4	V
			V_I=0.8V, V_I=2V	I_{OL}=8mA		0.35	0.5	V
I_{IH}	High-level input current	D	V_{CC}=5.25V				20	μA
		E	V_I=2.7V				80	
		D	V_{CC}=5.25V				0.1	mA
		E	V_I=10V				0.4	
I_{IL}	Low-level input current	D	V_{CC}=5.25V				−0.4	mA
		E	V_I=0.4V				−1.6	
I_{OS}	Short-circuit output current (Note 2)		V_{CC}=5.25V, V_O=0V		−20		−100	mA
I_{CC}	Supply current		V_{CC}=5.25V (Note 3)			6.3	12	mA

* : All typical values are at V_{CC}=5V, Ta=25℃

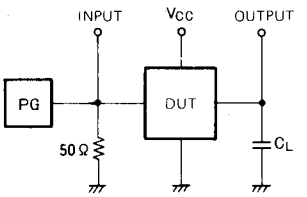
Note 2: All measurements should be done quickly and not more than one output should be shorted at a time.

Note 3: I_{CC} is measured with all inputs at 0V.

SWITCHING CHARACTERISTICS (V_{CC}=5V, Ta=25℃, 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, from input D to output Q	C_L=15pF (Note 4)		12	27	ns
t_{PHL}				8	17	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from input D to output $\overline{Q}$			10	20	ns
t_{PHL}				6	15	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from input E to output Q			13	27	ns
t_{PHL}				12	25	ns
t_{PLH}	Low-to-high-level, high-to-low-level output propagation time, from input E to output $\overline{Q}$			12	30	ns
t_{PHL}				6	15	ns

Note 4: Measurement circuit



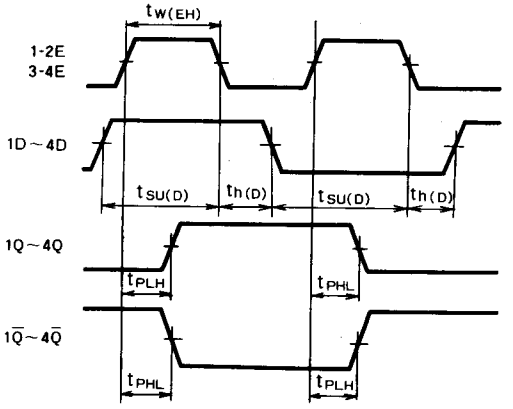
(1) The pulse generator (PG) has the following characteristics:
PRR = 1MHz, t_r = 6ns, t_f = 6ns, t_w = 500ns,
V_P = $3V_{P-P}$, Z_O = 50Ω.

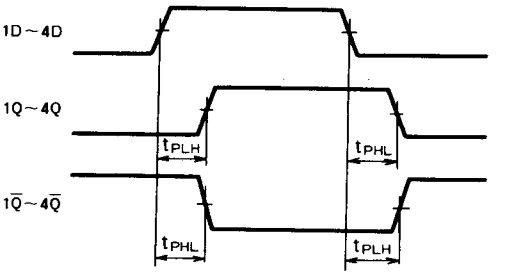
(2) C_L includes probe and jig capacitance.

TIMING REQUIREMENTS (V_{CC}=5V, Ta=25°C, unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$t_{W(EH)}$	Enable input E high pulse width		20	7		ns
$t_{SU(D)}$	Setup time 1D ~ 4D to E		20	12		ns
$t_{h(D)}$	Hold time 1D ~ 4D to E		8	5		ns

TIMING DIAGRAM (Reference level = 1.3V)

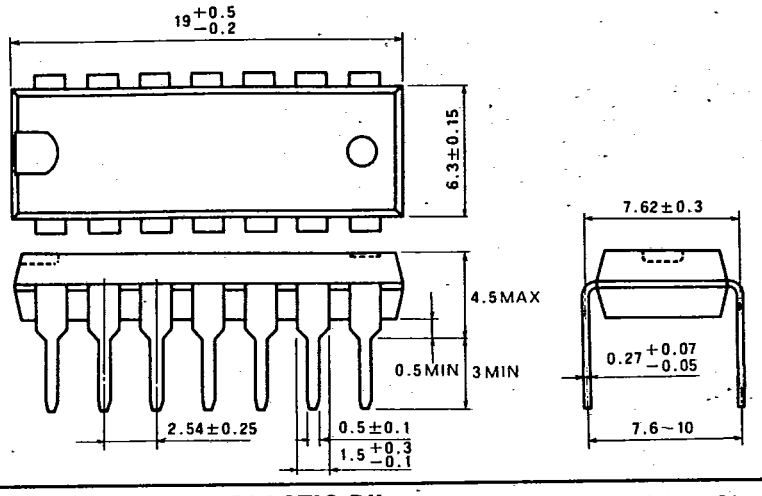




High-level 3-4E, 1-2E

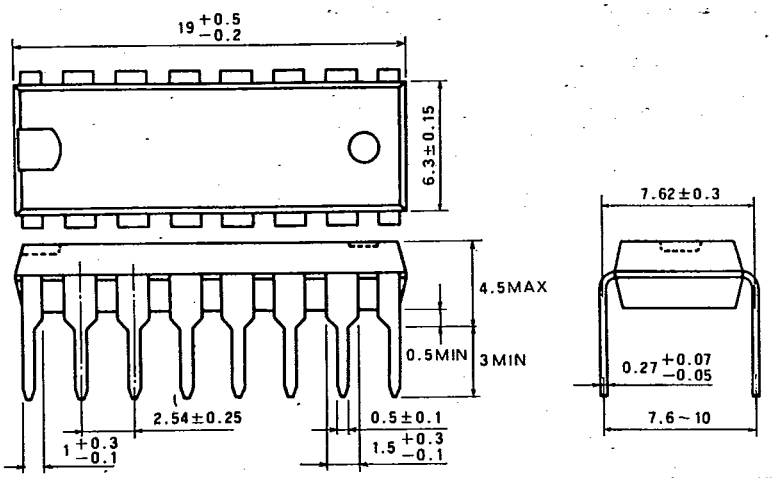
TYPE 14P4 14-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 16P4 16-PIN MOLDED PLASTIC DIL

Dimension in mm



TYPE 20P4 20-PIN MOLDED PLASTIC DIL

Dimension in mm