

MITSUBISHI LSTTLs  
**M74LS273P**

**OCTAL POSITIVE EDGE-TRIGGERED D-TYPE FLIP FLOP WITH RESET**

**DESCRIPTION**

The M74LS273P is a semiconductor integrated circuit containing 8 D-type positive edge-triggered flip-flop circuits with common direct reset and clock inputs.

**FEATURES**

- Positive edge-triggering
- High mounting density with 8 circuits contained
- Direct reset and clock inputs common to all 8 circuits
- Wide operating temperature range ( $T_a = -20 \sim +75^\circ\text{C}$ )

**APPLICATION**

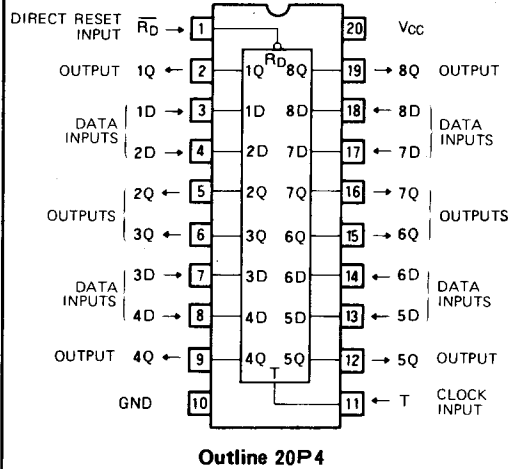
General purpose, for use in industrial and consumer equipment.

**FUNCTIONAL DESCRIPTION**

This device contains 8 edge-triggered D-type flip-flop circuits and it is provided with direct reset  $\overline{RD}$  input and clock input T common to all 8 circuits. When T changes in each flip-flop from low to high, the data input signal D immediately before the change appears in output Q.

When  $\overline{RD}$  is set low, 1Q through 8Q are all set low irrespective of the status of the 1D through 8D and T signals. For use as a D-type flip-flop,  $\overline{RD}$  must be kept in high.

**PIN CONFIGURATION (TOP VIEW)**



**FUNCTION TABLE** (Note 1)

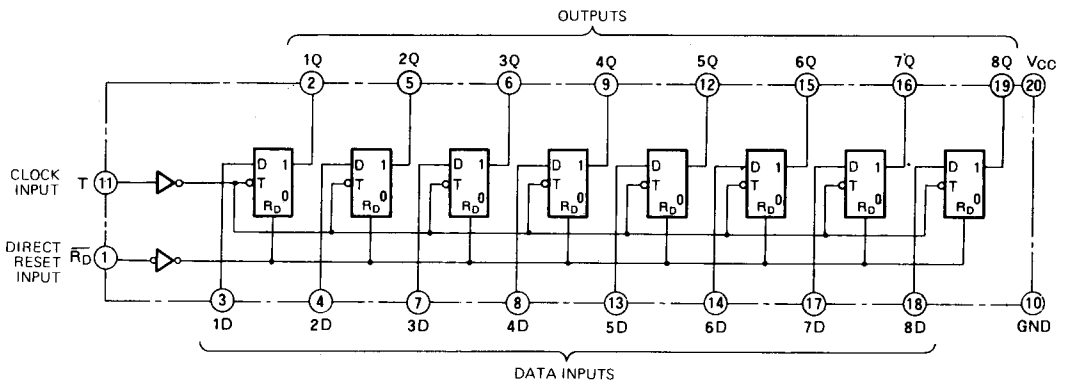
$\overline{RD}$	T	D	Q
L	X	X	L
H	↑	H	H
H	↑	L	L
H	L	X	Q <sup>0</sup>

Note 1 ↑ : Transition from low to high (positive edge trigger)

Q<sup>0</sup> : Level of Q before the indicated steady-state input conditions were established.

X : Irrelevant

**BLOCK DIAGRAM**



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**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	$-0.5 \sim V_{CC}$	V
$T_{opr}$	Operating free-air ambient temperature range		$-20 \sim +75$	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		$-65 \sim +150$	$^\circ\text{C}$

**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	$V_{OH} \geq 2.7\text{V}$	0	-400	$\mu\text{A}$
$I_{OL}$	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				-1.5	V
$V_{OH}$	High-level output voltage	$V_{CC} = 4.75\text{V}$ , $I_{IC} = -18\text{mA}$				V
$V_{OL}$	Low-level output voltage	$V_{CC} = 4.75\text{V}$ , $V_I = 0.8\text{V}$ $V_I = 2\text{V}$ , $I_{OH} = -400\mu\text{A}$	2.7	3.4		V
		$V_{CC} = 4.75\text{V}$ $V_I = 0.8\text{V}$ , $V_I = 2\text{V}$				V
$I_{IH}$	High-level input current	$V_{CC} = 5.25\text{V}$ , $V_I = 2.7\text{V}$			20	$\mu\text{A}$
		$V_{CC} = 5.25\text{V}$ , $V_I = 10\text{V}$			0.1	mA
$I_{IL}$	Low-level input current	$V_{CC} = 5.25\text{V}$ , $V_I = 0.4\text{V}$			-0.4	mA
$I_{OS}$	Short-circuit output current (Note 2)	$V_{CC} = 5.25\text{V}$ , $V_O = 0\text{V}$	-20		-100	mA
$I_{CC}$	Supply current	$V_{CC} = 5.25\text{V}$ (Note 3)		17	27	mA

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

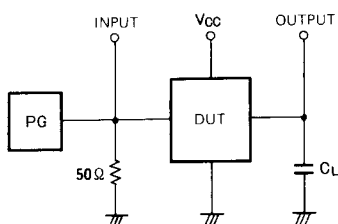
Note 2: All measurements should be done quickly, and not more than one output should be shorted at a time.

Note 3:  $I_{CC}$  is measured after  $1\text{D} \sim 8\text{D}$  and  $\overline{\text{RD}}$  are made 4.5V and T has been changed from 0V to 4.5V.

**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	
$f_{max}$	Maximum clock frequency		30	40		MHz
$t_{PLH}$	Low-to-high-level, high-to-low-level output propagation time, from T to 1Q~8Q	$C_L = 15\text{pF}$ (Note 4)		12	27	ns
$t_{PHL}$	High-to-low-level output propagation time, from $\overline{\text{RD}}$ to 1Q~8Q			13	27	ns
$t_{PHL}$	High-to-low-level output propagation time, from $\overline{\text{RD}}$ to 1Q~8Q			15	27	ns

Note 4: Measurement circuit



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

PRR = 1MHz,  $t_r = 6\text{ns}$ ,  $t_f = 6\text{ns}$ ,  $t_w = 500\text{ns}$ ,  
 $V_p = 3\text{V}_{p-p}$ ,  $Z_0 = 50\Omega$ .

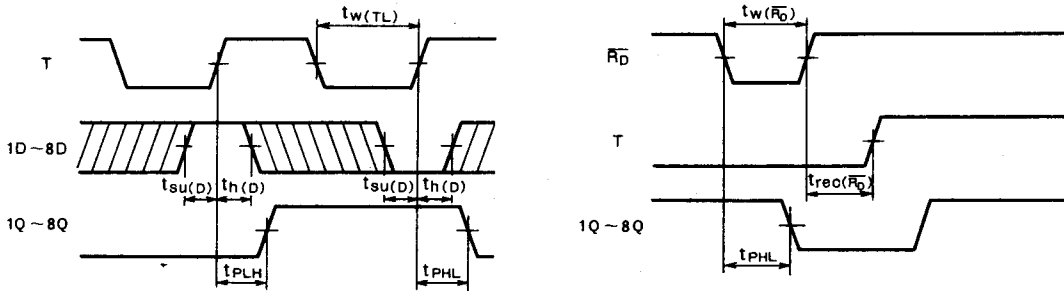
(2)  $C_L$  includes probe and jig capacitance.

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**TIMING REQUIREMENTS** ( $V_{CC}=5V$ ,  $T_a=25^\circ C$ , unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$t_w(TL)$	Clock input T low pulse width		20	7		ns
$t_w(R\bar{D})$	Direct reset pulse width		20	6		ns
$t_{su}(D)$	Setup time $1D \sim 8D$ to T		20	7		ns
$t_h(D)$	Hold time $1D \sim 8D$ to T		5	-3		ns
$t_{rec}(R\bar{D})$	Recovery time $R\bar{D}$ to T		25	8		ns

**TIMING DIAGRAM (Reference level = 1.3V)**

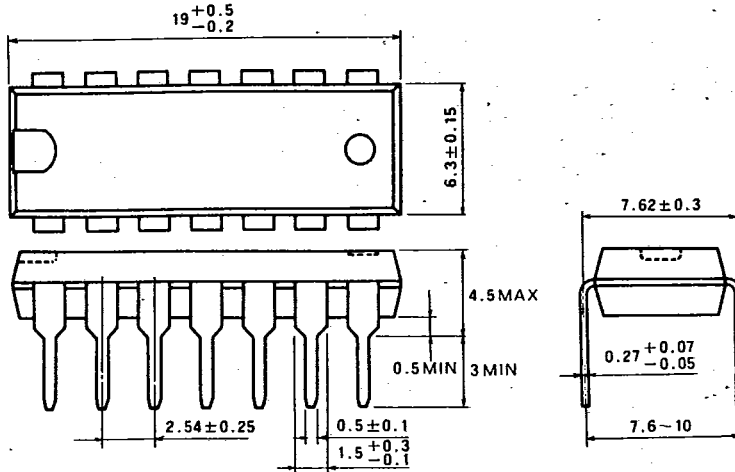


Note 5: The shaded areas indicate when the input is permitted to change for predictable output performance.

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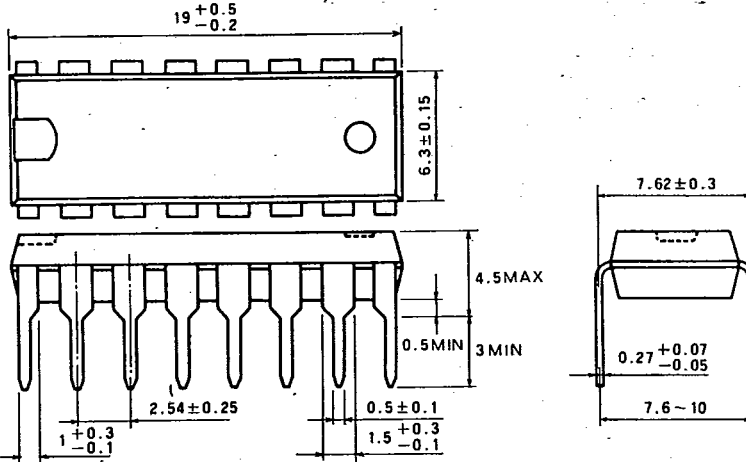
**TYPE 14P4 14-PIN MOLDED PLASTIC DIL**

Dimension in mm



**TYPE 16P4 16-PIN MOLDED PLASTIC DIL**

Dimension in mm



**TYPE 20P4 20-PIN MOLDED PLASTIC DIL**

Dimension in mm

