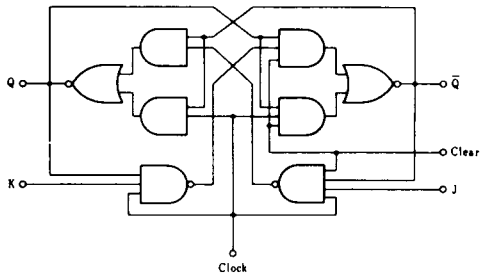
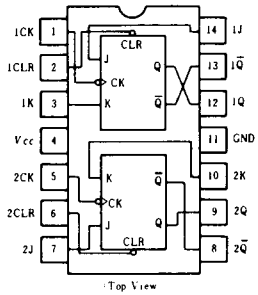
HD74LS73A ●Dual J-K Flip-Flops (with Clear)

■BLOCK DIAGRAM(½)



■PIN ARRANGEMENT



■FUNCTION TABLE

Inputs				Outputs	
Clear	Clock	J	K	Q	$\bar{Q}$
L	×	×	×	L	H
H	↓	L	L	Q_0	$\bar{Q}_0$
H	↓	H	L	H	L
H	↓	L	H	L	H
H	↓	H	H	Toggle	
H	H	×	×	Q_0	$\bar{Q}_0$

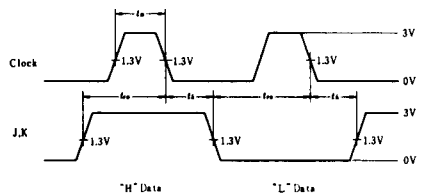
Notes) H; high level, L; low level, X; irrelevant
↓; transition from high to low level
Q_0; level of Q before the indicated steady-state input conditions were established.
$\bar{Q}_0$; complement of $\bar{Q}0$ or level of Q before the indicated steady-state input conditions were established.
Toggle; each output changes to the complement of its previous level on each active transition indicated by ↓.

■RECOMMENDED OPERATING CONDITION

Item		Symbol	min	typ	max	Unit
Clock frequency		f_{clock}	0	–	30	MHz
Pulse width	Clock High	t_w	20	–	–	ns
	Clear Low		25	–	–	
Setup time	"H" Data	t_{su}	20↓	–	–	ns
	"L" Data		20↓	–	–	
Hold time		t_h	0↓	–	–	ns

Note) ↓; The arrow indicates the falling edge.

■TIMING DEFINITION



■ELECTRICAL CHARACTERISTICS ($Ta = -20 \sim +75°C$)

Item		Symbol	Test Conditions		min	typ*	max	Unit
Input voltage		V_{IH}			2.0	–	–	V
		V_{IL}			–	–	0.8	V
Output voltage		V_{OH}	$V_{CC}=4.75V$, $V_{IH}=2V$, $V_{IL}=0.8V$, $I_{OH}=-400\mu A$		2.7	–	–	V
		V_{OL}	$V_{CC}=4.75V$, $V_{IH}=2V$, $V_{IL}=0.8V$	$I_{OL}=8mA$	–	–	0.5	V
				$I_{OL}=4mA$	–	–	0.4	
Input current	J, K	I_{IH}	$V_{CC}=5.25V$, $V_I=2.7V$		–	–	20	μA
	Clear				–	–	60	
	Clock				–	–	80	
	J, K	I_{IL}	$V_{CC}=5.25V$, $V_I=0.4V$		–	–	−0.4	mA
	Clear				–	–	−0.8	
	Clock				–	–	−0.8	
	J, K	I_I	$V_{CC}=5.25V$, $V_I=7V$		–	–	0.1	mA
	Clear				–	–	0.3	
	Clock				–	–	0.4	
Short-circuit output current		I_{OS}	$V_{CC}=5.25V$		−20	–	−100	mA
Supply current **		I_{CC}	$V_{CC}=5.25V$		–	4	6	mA
Input clamp voltage		V_{IK}	$V_{CC}=4.75V$, $I_{IN}=-18mA$		–	–	−1.5	V

* $V_{CC}=5V$, $Ta=25°C$

** With all outputs open, I_{CC} is measured with the Q and $\bar{Q}$ outputs high in turn. At the time of measurement, the clock input is grounded.

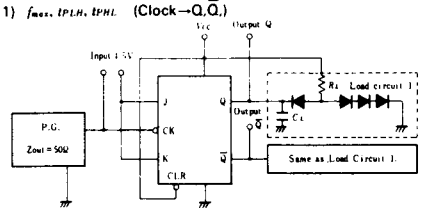
■SWITCHING CHARACTERISTICS ($V_{CC}=5V$, $Ta=25°C$)

Item	Symbol	Inputs	Outputs	Test Conditions	min	typ	max	Unit
Maximum clock frequency	f_{max}			$C_L=15pF$, $R_L=2k\Omega$	30	45	–	MHz
Propagation delay time	t_{PLH}	Clear	Q, $\bar{Q}$		–	15	20	ns
	t_{PHL}	Clock			–	15	20	ns

■TESTING METHOD

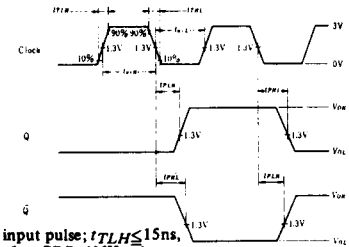
1) Test Circuit

1.1) f_{max}, t_{PLH}, t_{PHL} (Clock→Q,$\bar{Q}$)



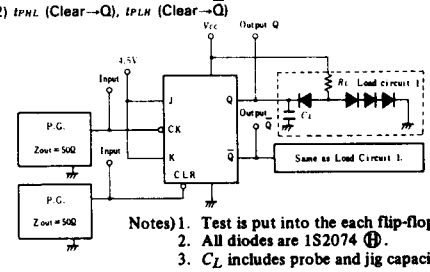
Notes) 1. Test is put into the each flip flop
2 All diodes are 1S2074 Ⓗ.
3. C_L includes probe and jig capacitance.

Waveform



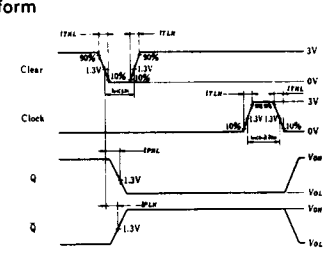
Note) Clock input pulse; $t_{TLH} \leqq 15ns$, $t_{THL} \leqq 6ns$, $PRR=1MHz$, duty cycle=50% and: for f_{max}, $t_{TLH}=t_{THL} \leqq 2.5ns$.

1.2) t_{PHL} (Clear→Q), t_{PLH} (Clear→$\bar{Q}$)



Notes) 1. Test is put into the each flip-flop
2. All diodes are 1S2074 Ⓗ.
3. C_L includes probe and jig capacitance.

Waveform



Note) Clear and clock input pulse; $t_{TLH} \leqq 15ns$, $t_{THL} \leqq 6ns$, $PRR=1MHz$