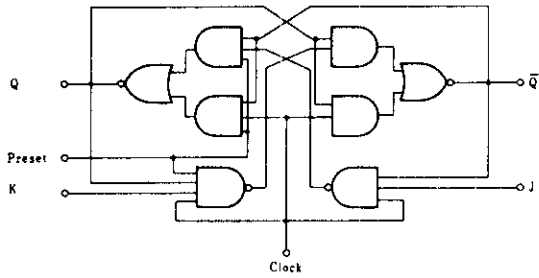
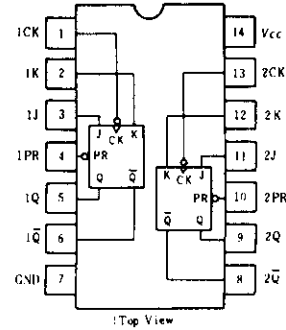


HD74LS113 ● Dual J-K Negative-edge-triggered Flip-Flops (with Preset)

■ BLOCK DIAGRAM (1/2)



■ PIN ARRANGEMENT



■ RECOMMENDED OPERATING CONDITIONS

Item	Symbol	min	typ	max	Unit
Clock frequency	f_{clock}	0	—	30	MHz
Pulse width	CK	20	—	—	ns
	PR	25	—	—	
Setup time	"H" level	20↓	—	—	ns
	"L" level	20↓	—	—	
Hold time	t_h	0↓	—	—	ns

Note) ↓; The arrow indicates the falling edge.

■ FUNCTION TABLE

Inputs				Outputs	
Preset	Clock	J	K	Q	\bar{Q}
L	×	×	×	H	L
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 Q_0 or level of \bar{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 ↓.

■ ELECTRICAL CHARACTERISTICS ($T_a = -20 \sim +75^\circ\text{C}$)

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

* $V_{CC}=5\text{V}, T_a=25^\circ\text{C}$

** 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.

HD74LS113

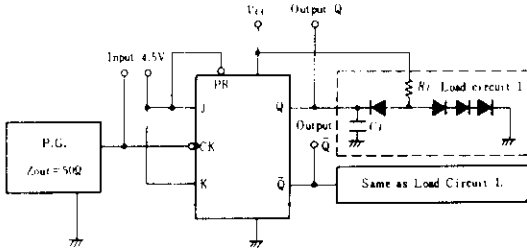
SWITCHING CHARACTERISTICS ($V_{CC}=5V$, $T_a=25^\circ C$)

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}	Preset Clock	Q, \bar{Q}		—	11	20	ns
	t_{PHL}				—	15	30	ns

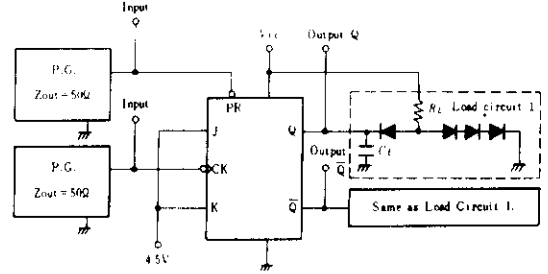
TESTING METHOD

1.1) Test Circuit

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



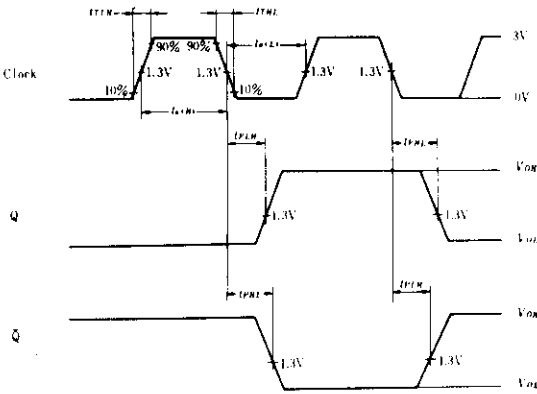
1.2) t_{PHL} (Preset \rightarrow Q), t_{PLH} (Preset \rightarrow Q)



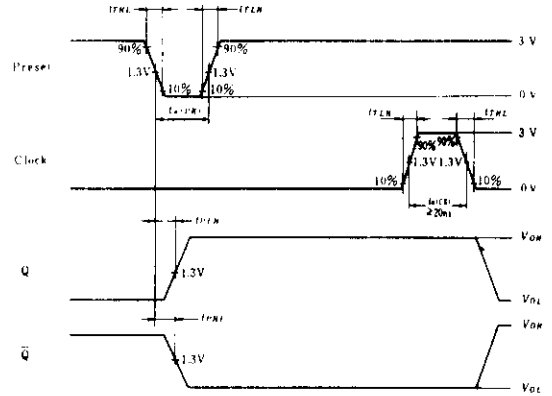
- Notes) 1. Test is put into the each flip-flop.
 2. All diodes are 1S2074 \oplus .
 3. C_L includes probe and jig capacitance.

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

Waveform



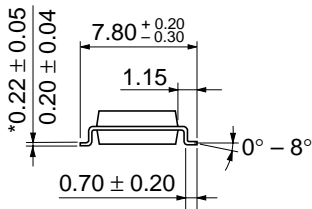
Note) Clock input pulse; $t_{TLH} \leq 15ns$, $t_{THL} \leq 6ns$, $PRR=1MHz$, duty cycle=50% and; for f_{max} , $t_{TLH}=t_{THL} \leq 2.5ns$.



Note) Preset and clock input pulse: $t_{TLH} \leq 15ns$, $t_{THL} \leq 6ns$, $PRR=1MHz$



Hitachi Code	DP-14
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.97 g



Hitachi Code	FP-14DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.23 g

*Dimension including the plating thickness
Base material dimension



Hitachi Code	FP-14DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.13 g

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