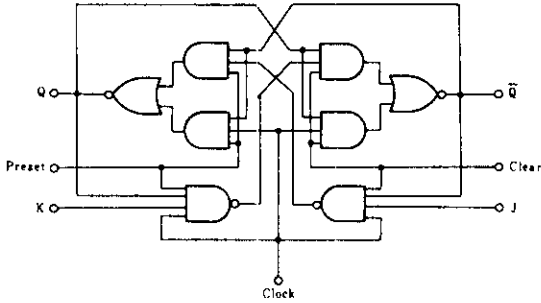
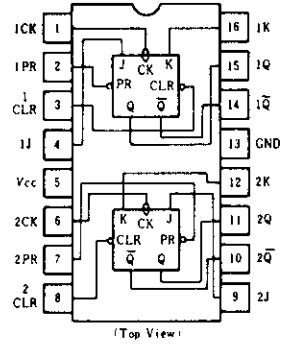


HD74LS76A • Dual J-K Flip-Flops (with Preset and Clear)

■ BLOCK DIAGRAM (1/2)



■ PIN ARRANGEMENT

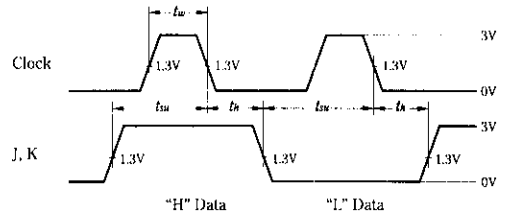


■ RECOMMENDED OPERATING CONDITIONS

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

Note) ↓; The arrow indicates the falling edge.

■ TIMING DEFINITION



■ 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}	$V_{CC} = 4.75\text{V}, V_{IH} = 2\text{V}, V_{IL} = 0.8\text{V}$	$I_{OL} = 8\text{mA}$	—	—	0.5	V
			$I_{OL} = 4\text{mA}$	—	—	0.4	
Input current	J, K	I_{IH}	$V_{CC} = 5.25\text{V}, V_I = 2.7\text{V}$	—	—	20	μA
	Clear			—	—	60	
	Preset			—	—	60	
	Clock			—	—	80	
	J, K	I_{IL}^{**}	$V_{CC} = 5.25\text{V}, V_I = 0.4\text{V}$	—	—	-0.4	mA
	Clear			—	—	-0.8	
	Preset			—	—	-0.8	
	Clock			—	—	-0.8	
J, K	I_I	$V_{CC} = 5.25\text{V}, V_I = 7\text{V}$	—	—	0.1	mA	
Clear			—	—	0.3		
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	6	mA	
Input clamp voltage	V_{IK}	$V_{CC} = 4.75\text{V}, I_{IK} = -18\text{mA}$	—	—	-1.5	V	

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

** I_{IL} should not be measured when preset and clear inputs are low at same time.

*** 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.

HD74LS76A

FUNCTION TABLE

Inputs					Outputs	
Preset	Clear	Clock	J	K	Q	\bar{Q}
L	H	×	×	×	H	L
H	L	×	×	×	L	H
L	L	×	×	×	H*	H*
H	H	↓	L	L	Q ₀	\bar{Q}_0
H	H	↓	H	L	H	L
H	H	↓	L	H	L	H
H	H	↓	H	H	Toggle	
H	H	H	×	×	Q ₀	\bar{Q}_0

Notes) H: high level, L: low level, X: irrelevant

↓: transition from high to low level

Q₀: level of Q before the indicated steady-state input conditions were established.

\bar{Q}_0 : complement of Q₀ 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 ↓.

*: This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

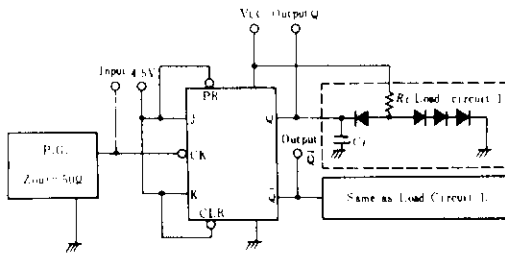
SWITCHING CHARACTERISTICS (V_{CC}=5V, T_a=25°C)

Item	Symbol	Inputs	Outputs	Test Conditions	min	typ	max	Unit
Maximum clock frequency	f _{max}			C _L = 15pF, R _L = 2kΩ	30	45	—	MHz
Propagation delay time	t _{PLH}	Clear Preset	Q, \bar{Q}		—	15	20	ns
	t _{PHL}	Clock			—	15	20	ns

TESTING METHOD

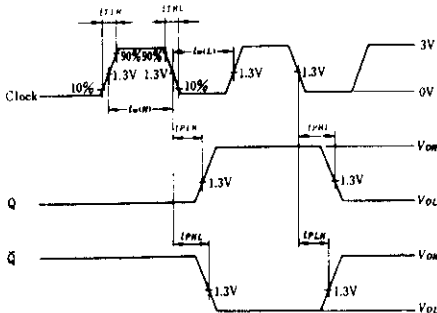
1) Test Circuit

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



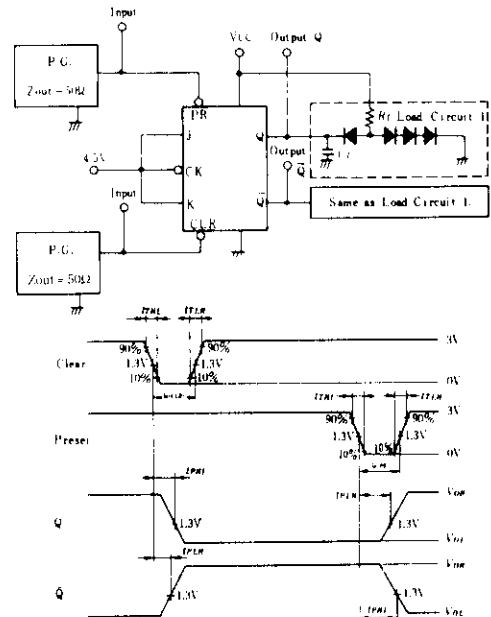
- Notes) 1. Test is put into the each flip-flop
2. All diodes are 1S2074 Ⓢ
3. C_L includes probe and jig capacitance.

Waveform



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

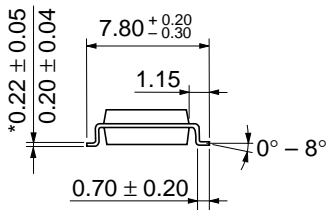
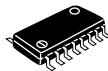
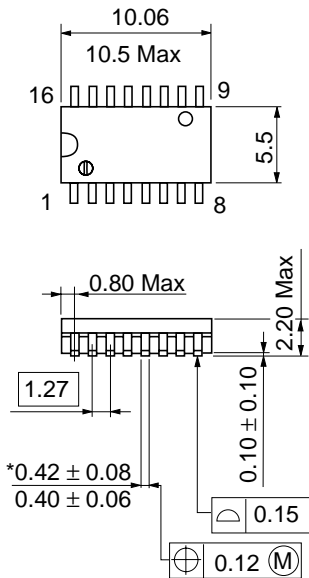
1.2) t_{PHL}, t_{PLH} (Clear, Preset → Q, \bar{Q})



Note) Clear and preset input pulse; t_{TLH} ≤ 15ns, t_{THL} ≤ 6ns, PRR = 1MHz

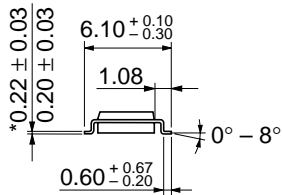


Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g



*Dimension including the plating thickness
 Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

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