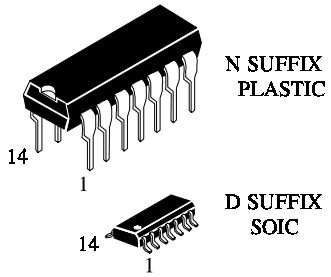
IN74ALS74

Dual D Flip-Flop with Set and Reset

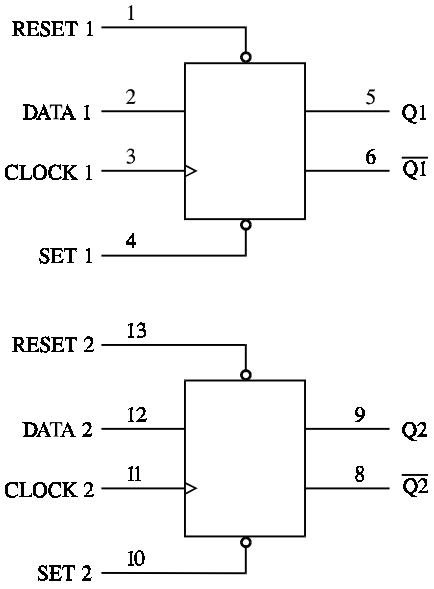


ORDERING INFORMATION
IN74ALS74N Plastic
IN74ALS74D SOIC
T_A = -10° to 70° C
for all packages

Each of the two independent positive edge-triggered flip-flops in this circuit has individual Data, Clock, Set and Reset inputs, and complementary Q and $\overline{Q}$ outputs.

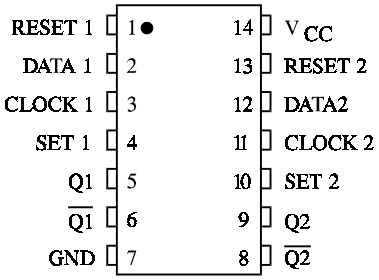
- Switching specifications at 50 pF
- Switching specifications guaranteed over full temperature and V_{CC} range
- Functionally and pin-for-pin compatible with Schottky and LS TTL counterpart
- Improved AC performance over LS74 at approximately half the power

LOGIC DIAGRAM



PIN 14 =V_{CC}
PIN 7 = GND

PIN ASSIGNMENT



FUNCTION TABLE

Inputs				Outputs	
Set	Reset	Clock	Data	Q	$\overline{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	⌐	H	H	L
H	H	⌐	L	L	H
H	H	L	X	No Change	
H	H	H	X	No Change	
H	H	⌐	X	No Change	

*Both outputs will remain high as long as Set and Reset are low, but the output states are unpredictable if Set and Reset go high simultaneously.
X = don't care

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	7.0	V
V_{IN}	Input Voltage	7.0	V
V_{OUT}	Output Voltage	5.5	V
Tstg	Storage Temperature Range	-65 to +150	°C

*Maximum Ratings are those values beyond which damage to the device may occur.
Functional operation should be restricted to the Recommended Operating Conditions.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage	4.5	5.5	V
V_{IH}	High Level Input Voltage	2.0		V
V_{IL}	Low Level Input Voltage		0.8	V
I_{OH}	High Level Output Current		-0.4	mA
I_{OL}	Low Level Output Current		8.0	mA
T_A	Ambient Temperature Range	-10	+70	°C

DC ELECTRICAL CHARACTERISTICS over full operating conditions

Symbol	Parameter	Test Conditions		Guaranteed Limit		Unit
				Min	Max	
V_{IK}	Input Clamp Voltage	V_{CC} = min, I_{IN} = -18 mA			-1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = min, I_{OH} = -0.4 mA		2.5		V
V_{OL}	Low Level Output Voltage	V_{CC} = min, I_{OL} = 4 mA			0.4	V
		V_{CC} = min, I_{OL} = 8 mA			0.5	
I_{IH}	High Level Input Current	V_{CC} = max, V_{IN} = 2.7 V			20	µA
		V_{CC} = max, V_{IN} = 7.0 V			0.1	mA
I_{IL}	Low Level Input Current	V_{CC} = max,	Clock, Data		-0.2	mA
		V_{IN} = 0.4 V	Reset, Set		-0.4	
I_O	Output Short Circuit Current	V_{CC} = max, V_O = 2.25 V		-15	-70	mA
I_{CC}	Supply Current	V_{CC} = max (Note 1)			4.0	mA

Note 1. I_{CC} is measured with Data, Clock and Reset grounded, then with Data, Clock and Set grounded.

AC ELECTRICAL CHARACTERISTICS over full operating conditions (V_{CC} = 5.0 V±10%, C_L = 50 pF, R_L = 500 Ω, Input $t_r = t_f$ = 2.0 ns)

Symbol	Parameter	Min	Max	Unit
f_{max}	Maximum Clock Frequency		30	MHz
t_{PLH}	Propagation Delay Time, Clock to Q or $\overline{Q}$		16	ns
t_{PHL}	Propagation Delay Time, Clock to Q or $\overline{Q}$		18	ns
t_{PLH}	Propagation Delay Time, Set or Reset to Q or $\overline{Q}$		13	ns
t_{PHL}	Propagation Delay Time, Set or Reset to Q or $\overline{Q}$		15	ns
t_{su}	Setup Time, Data to Clock	15		ns
t_h	Hold Time, Clock to Data	0		ns
t_{rec}	Recovery Time, Set or Reset Inactive to Clock	10		ns
t_w	Pulse Width, Clock	14.5		ns
t_w	Pulse Width, Set or Reset	15		ns

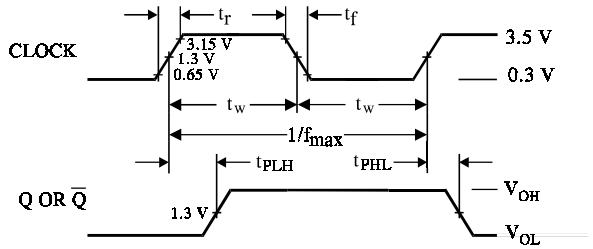


Figure 1. Switching Waveforms

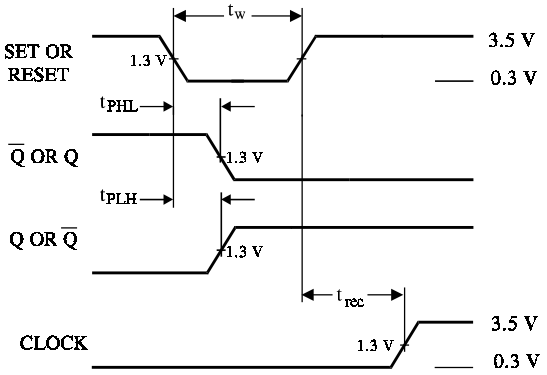


Figure 2. Switching Waveforms

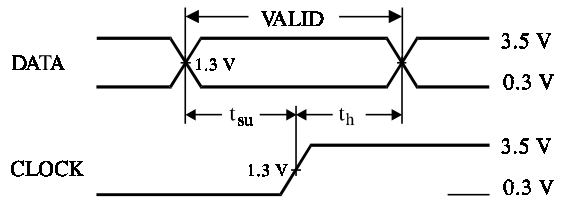
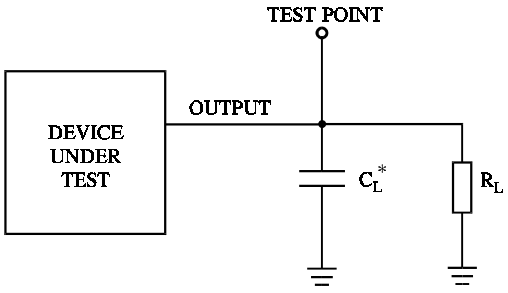


Figure 3. Switching Waveforms



* Includes all probe and jig capacitance

Figure 4. Test Circuit