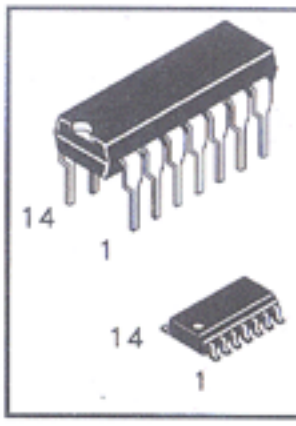
Dual JK Negative Edge-Triggered Flip-Flops with PRESET

DV74LS113A
DV74ALS113A

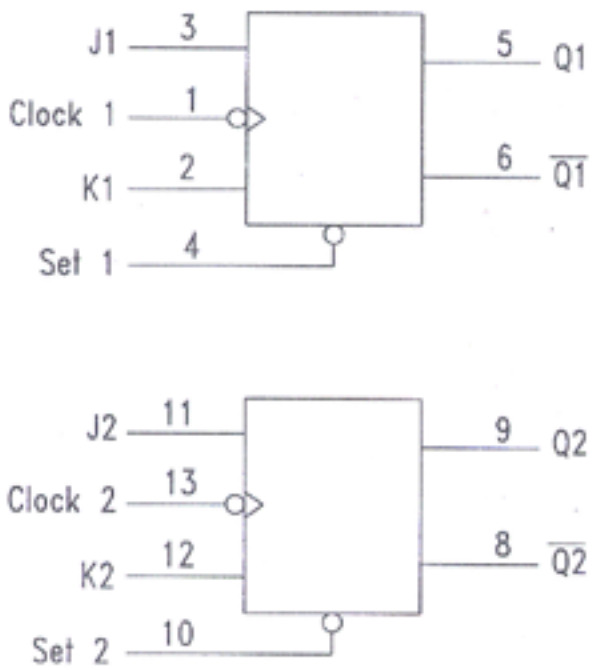


N Suffix
Plastic DIP
AVG-001 Case

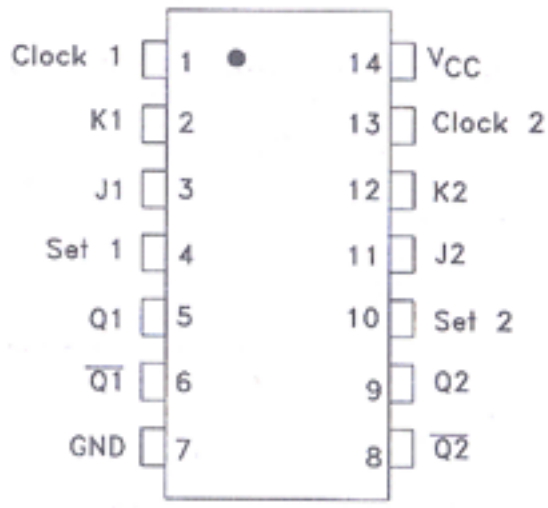
D Suffix
Plastic SOP
AVG-002 Case

This device contains individual J, K, set, and clock inputs. When the clock goes HIGH, the inputs are enabled and data will be accepted. The logic level of the J and K inputs may be allowed to change when the clock pulse is HIGH and the flip-flop will perform according to the truth table as long as minimum setup times are observed. Input data is transferred to the outputs on the negative-going edge of the clock pulse.

- **AVG's LS operates over extended Vcc from 4.5 to 5.5 V**
- **AVG's LS and ALS both have guaranteed DC and AC specification over full temperature and Vcc range**
- **Switching specifications for ALS at 50 pF**
- **AVG's ALS has the lowest speed power product (4pJ per gate typical) of all logic series**



PIN ASSIGNMENT



PIN 14 = V_{CC}
PIN 7 = GND

TRUTH TABLE

Inputs				Output	
Set	Clock	J	K	Q	$\overline{Q}$
L	X	X	X	H	L
H	↓	L	L	Q_0	$\overline{Q}_0$
H	↓	H	L	H	L
H	↓	L	H	L	H
H	↓	H	H	Toggle	
H	H	X	X	Q_0	$\overline{Q}_0$

H=HIGH Voltage Level
L=LOW Voltage Level
X=Immaterial
Q0=Previous Condition of Q

ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	LS113A	ALS113A	Unit
V_{CC}	Supply Voltage	7.0	7.0	V
V_{IN}	Input Voltage	-0.5 to + 7.0	7.0	V
T_{STG}	Storage Temperature Range	-65 to +150	-65 to +150	°C

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	LS113A		ALS113A		Unit
		Min	Max	Min	Max	
V_{CC}	Supply Voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High Level Input Voltage	2.0		2.0		V
V_{IL}	Low Level Input Voltage		0.8		0.8	V
I_{OH}	High Level Output Current		-0.4		-0.4	mA
I_{OL}	Low Level Output Current		8.0		8.0	mA
T_A	Operating Free Air Temperature Range	–10 to +70		–10 to +70		°C

Sym-bol	Parameter	Condition	LS113A			ALS113A			Unit
			Min	Typ	Max	Min	Typ	Max	
V_{IK}	Input Clamp Voltage	V_{CC}= min, I_{IN} = -18 mA			-1.5			-1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = min, I_{OH} =max	Vcc-2	3.5		Vcc-2			V
V_{OL}	Low Level Output Voltage	V_{CC}=min I_{OL} = 4 mA I_{OL} = 8 mA		0.25 0.35	0.4 0.5		0.25 0.35	0.4 0.5	V V
I_{IH}	High Level Input Current J, K Clock Set	V_{CC}=max, V_{IN}= 2.7V			 20 80 60			 20 20 40	µA
	J, K Clock Set	V_{CC}=max, V_{IN}= 7V			0.1 0.4 0.3			0.1 0.1 0.2	mA
I_{IL}	Low Level Input Current J, K Clock Set	V_{CC}=max, V_{IN}=0.4V			 -0.4 -0.8 -0.8			 -0.2 -0.2 -0.4	mA
I_{OS}	Output Short Circuit Current	V_{CC}=max, V_{OUT} =2.25V	–20		–110	–30		–112	mA
I_{CC}	Power Supply Current	V_{CC}=max			6.0		2.5	4.5	mA

SWITCHING CHARACTERISTICS over full operating range

Symbol	Parameter	INPUT	OUTPUT	LS113A C_L=15 pF		ALS113A C_L=50pF R_L=500Ω		Unit
				Min	Max	Min	Max	
f_{MAX}	Maximum Clock Frequency			30		30		MHz
t_{PLH}	Propagation Delay Time Low-to-High Level Output	Clock	Any Q		20	3	15	ns
t_{PHL}	Propagation Delay Time High-to-Low Level Output	Clock	Any Q		20	5	19	ns
t_{PLH}	Propagation Delay Time Low-to-High Level Output	Set	Any Q		20	3	14	ns
t_{PHL}	Propagation Delay Time High-to-Low Level Output	Set	Any Q		20	4	16	ns

AC SETUP REQUIREMENTS

Symbol	Parameter		LS113A		ALS 113A		Unit
			MIN	MAX	MIN	MAX	
t_W	Pulse Width	Set Low Clock High Clock Low	25 20		10 16.5 16.5		ns
t_S	Setup Time		20		22		ns
t_h	Hold Time		0		0		ns

SWITCHING WAVEFORMS