

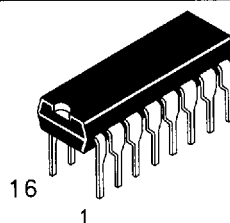
Available Q3, 1995

Hex D Flip-Flop with Master Reset

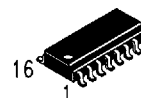
This device is a high speed hex D flip-flop. It is primarily used as a 6-bit edge triggered storage register. The information on the D inputs is transferred to storage during the LOW-to-HIGH transition. The device has a Master Reset to simultaneously clear all flip-flops.

- Advanced very high speed CMOS
- Outputs source/sink 24 mA
- Transmission line driving 50 ohms
- ACT has TTL compatible inputs
- Operation from 2 to 6 volts guaranteed
- DC & AC Parameters guaranteed over -40 to $+85^{\circ}\text{C}$

DV74AC174 DV74ACT174

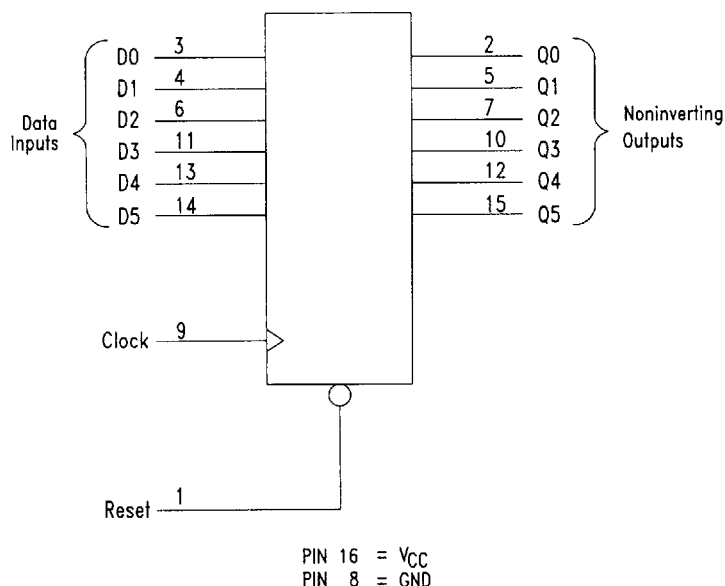


N Suffix
Plastic DIP
AVG-003 Case

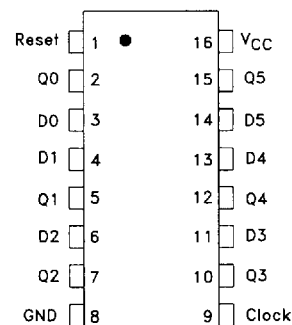


D Suffix
Plastic SOP
AVG-004 Case

LOGIC DIAGRAM



PIN ASSIGNMENT



TRUTH TABLE

Inputs			Output
Reset	Clock	D	Q
L	X	X	L
H	\uparrow	H	H
H	\uparrow	L	L
H	L	X	Q

H=HIGH Voltage Level

L=LOW Voltage Level

X=Either Low or High Logic Level

 \uparrow =LOW to HIGH transition of Clock

ABSOLUTE MAXIMUM RATINGS

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

Symbol	Parameter	AC174, ACT174	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to $+7.0$	V
V_{IN}	DC Input Voltage (Referenced to GND)	-0.5 to $V_{CC}+0.5$	V
V_{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to $V_{CC}+0.5$	V
I_{IN}	DC Input Current, per Pin	± 20	mA
I_{OUT}	DC Output Sink/Source Current, per Pin	± 50	mA
I_{CC}	DC V_{CC} or GND Current per Output Pin	± 50	mA
T_{STG}	Storage Temperature	-65 to $+150$	$^{\circ}\text{C}$

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Supply Voltage	'AC	2.0	5.0	V
		'ACT	4.5	5.0	
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage, (Ref. to GND)	0		V _{CC}	V
t _r , t _f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V _{CC} @ 3.0 V		150	ns/V
		V _{CC} @ 4.5 V		40	ns/V
		V _{CC} @ 5.5 V		25	ns/V
t _r , t _f	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V _{CC} @ 4.5 V		10	ns/V
		V _{CC} @ 5.5 V		8.0	ns/V
T _A	Operating Ambient Temperature Range	−40		85	°C
C _{PD}	Power Dissipation Capacitance	V _{CC} = 5.0 V	85		pF
C _{IN}	Input Capacitance V _{CC} = 5.0 V	V _{CC} = 5.0 V	4.5		pF

1. V_{IN} from 30% to 70% V_{CC}

2. V_{IN} from 0.8 to 2.0 V

AC — 174

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	74AC			Unit
				T _A = +25°C		T _A = −40 to +85°C	
				Typ	Guaranteed Limits		
V _{IH}	Minimum High Level Input Voltage	V _{OUT} = 0.1V or V _{CC} − 0.1 V	3.0	1.5	2.1	2.1	V
			4.5	2.25	3.15	3.15	
			5.5	2.75	3.85	3.85	
V _{IL}	Maximum Low Level Input Voltage	V _{OUT} = 0.1V or V _{CC} − 0.1 V	3.0	1.5	0.9	0.9	V
			4.5	2.25	1.35	1.35	
			5.5	2.75	1.65	1.65	
V _{OH}	Minimum High Level Output Voltage	I _{OUT} = −50 μA	3.0	2.99	2.9	2.9	V
			4.5	4.49	4.4	4.4	
			5.5	5.49	5.4	5.4	
		V _{IN} = V _{IL} or V _{IH} −12mA	3.0		2.56	2.46	V
		I _{OH} −24mA −24 mA	4.5 5.5		3.86 4.86	3.76 4.76	
V _{OL}	MaximumLow Level Output Voltage	I _{OUT} = 50 μA	3.0	0.002	0.1	0.1	V
			4.5	0.001	0.1	0.1	
			5.5	0.001	0.1	0.1	
		V _{IN} = V _{IL} or V _{IH} 12mA	3.0		0.36	0.44	V
		I _{OH} 24mA 24 mA	4.5 5.5		0.36 0.36	0.44 0.44	
I _{IN}	Maximum Input Leakage Current	V _I =V _{CC} , GND	5.5		±0.1	±1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5		8.0	80	μA

AC CHARACTERISTICS

Symbol	Parameter (C _L = 50 pF)	V _{CC} ±10% (V)	AC174					Unit
			T _A = +25°C			T _A = - 40°C to +85°C		
			Min	Typ	Max	Min	Max	
f _{max}	Maximum Clock Frequency	3.3 5.0	90 100	100 125		70 100		MHz
t _{PLH}	Propagation Delay Clock to Q _n	3.3 5.0	2.0 1.5	9.0 6.0	11.5 8.5	1.5 1.0	12.5 9.5	ns
t _{PHL}		3.3 5.0	2.0 1.5	8.5 6.0	11 8.0	1.5 1.0	12.5 9.0	
t _{PLH}	Propagation Delay Master Reset to Q _n	3.3 5.0	2.5 1.5	9.0 7.0	11.5 9.0	2.0 1.5	12.5 10.5	ns

AC OPERATING REQUIREMENTS

Symbol	Parameter (C _L = 50 pF)	V _{CC} ±10% (V)	AC174		Unit
			T _A = +25°C	T _A = − 40°C to +85°C	
			Guaranteed Minimum		
t _s	Setup Time, HIGH or LOW, Dn to Clock	3.3 5.0	6.5 5.0	7.0 5.5	ns
t _h	Hold Time, HIGH or LOW, Dn to Clock	3.3 5.0	3.0 3.0	3.0 3.0	ns
t _w	Master Reset Pulse Width, LOW	3.3 5.0	5.5 5.0	7.0 5.0	ns
t _w	Clock Pulse Width	3.3 5.0	5.5 5.0	7.0 5.0	ns
t _{rec}	Recovery Time, Master Reset to Clock	3.3 5.0	2.5 2.0	2.5 2.0	ns

ACT — 174

DC ELECTRICAL CHARACTERISTICS

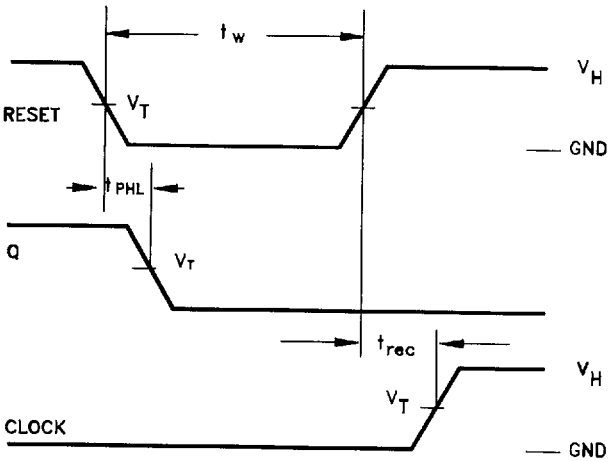
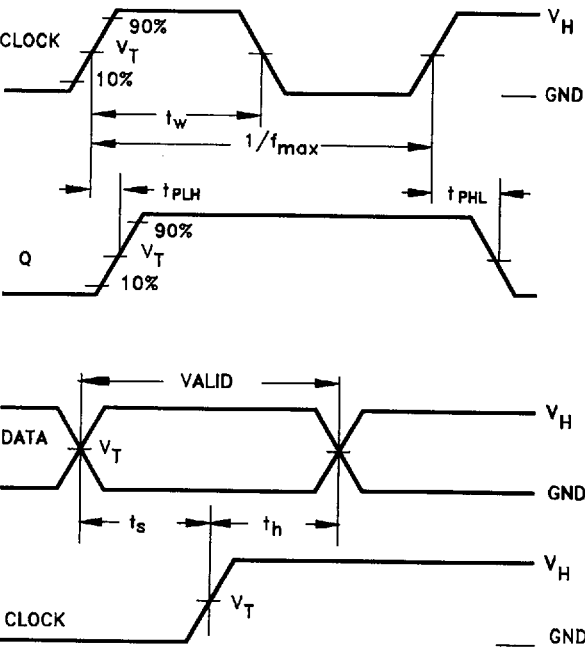
Symbol	Parameter	Conditions	V _{CC} (V)	ACT174			Unit
				TA = +25°C		TA = −40 to +85°C	
				Typ	Guaranteed Limits		
V _{IH}	Minimum High Level Input Voltage	V _{OUT} = 0.1V or V _{CC} − 0.1 V	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V
V _{IL}	Maximum Low Level Input Voltage	V _{OUT} = 0.1V or V _{CC} − 0.1 V	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V
V _{OH}	Minimum High Level Output Voltage	I _{OUT} = −50 μA	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V
		V _{IN} = V _{IL} or V _{IH} I _{OH} −24mA −24 mA	4.5 5.5		3.86 4.86	3.76 4.76	V
V _{OL}	Maximum Low Level Output Voltage	I _{OUT} = 50 μA	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V
		V _{IN} = V _{IL} or V _{IH} I _{OL} 24mA 24 mA	4.5 5.5		0.36 0.36	0.44 0.44	V
I _{IN}	Maximum Input Leakage Current	V _I = V _{CC} , GND	5.5		±0.1	±1.0	μA
ΔI _{CCT}	Additional Max I _{CC} /Input	V _I = V _{CC} − 2.1 V	5.5	0.6		1.5	mA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5		8.0	80	μA

AC CHARACTERISTICS

Symbol	Parameter (C _L = 50 pF)	V _{CC} ±10% (V)	ACT174				Unit
			T _A = +25°C		T _A = − 40°C to +85°C		
			Min	Max	Min	Max	
f _{max}	Maximum Clock Frequency	5.0	165		140		MHz
t _{PLH}	Propagation Delay, Clock to Q _n	5.0	1.5	10.5	1.5	11.5	ns
t _{PHL}	Propagation Delay, Clock to Q _n	5.0	1.5	10.5	1.5	11.5	ns
t _{PHL}	Propagation Delay, Master Reset to Q _n	5.0	1.5	9.5	1.5	11..0	ns

Symbol	Parameter (C _L = 50 pF)	V _{CC} ±10% (V)	ACT174		Unit
			T _A = +25°C	T _A = − 40°C to +85°C	
			Guaranteed Minimum		
t _s	Setup Time, HIGH or LOW, Dn to Clock	5.0	1.5	1.5	ns
t _h	Hold Time, HIGH or LOW, Dn to Clock	5.0	2.0	2.0	ns
t _w	Master Reset Pulse Width, LOW	5.0	3.0	3.5	ns
t _w	Clock Pulse Width	5.0	3.0	3.5	ns
t _{rec}	Recovery Time, Master Reset to Clock	5.0	0.5	0.5	ns

SWITCHING WAVEFORMS



Input and output threshold voltage:
VT = 50% Vcc for AC; 1.5V for ACT
VH = Vcc for AC, 3V for ACT