

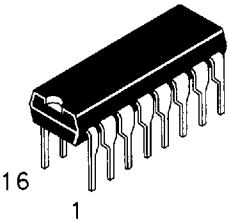
Available Q3, 1995

Quad D Flip-Flop with Master Reset

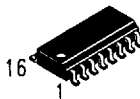
This device consists of four D flip-flops with common Reset and Clock inputs, and separate D inputs. Reset (active-low) is asynchronous and occurs when a low level is applied to the Reset input. Information at D inputs is transferred to the corresponding Q outputs on the next positive-going edge of the Clock input.

- 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°C

DV74AC175
DV74ACT175

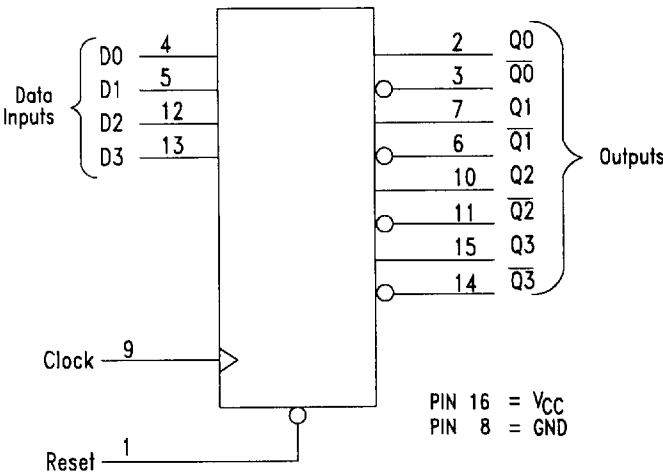


N Suffix
Plastic DIP
AVG-003 Case



D Suffix
Plastic SOP
AVG-004 Case

LOGIC DIAGRAM



PIN ASSIGNMENT

Reset	1	16	V _{CC}
Q0	2	15	Q3
Q0-bar	4	14	Q3-bar
D0	5	13	D3
D1	3	12	D2
Q1-bar	6	11	Q2-bar
Q1	7	10	Q2
GND	8	9	Clock

TRUTH TABLE

Inputs			Output	
Reset	CP	D	Q _n	Q _n -bar
L	X	X	L	H
H	↑	H	H	L
H	↑	L	L	H
H	L	X	Q _n	Q _n -bar

H=HIGH Voltage Level, L=LOW Voltage Level
X=Either Low or High Logic Level
↑=LOW to HIGH transition of Clock

ABSOLUTE MAXIMUM RATINGS

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

Symbol	Parameter	AC175, ACT175	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

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter		Min	Typ	Max	Unit
V _{CC}	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
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	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	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		45		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 — 175

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	AC175			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 I _{OH} −24mA −24 mA	3.0		2.56	2.46	V
			4.5		3.86	3.76	
			5.5		4.86	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 I _{OH} 24mA 24 mA	3.0		0.36	0.44	V
			4.5		0.36	0.44	
			5.5		0.36	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)	AC175				Unit
			T _A = +25°C		T _A = − 40°C to +85°C		
			Min	Max	Min	Max	
f _{max}	Maximum Clock Frequency	3.3 5.0	149 187		139 187		MHz
t _{PLH}	Propagation Delay CP to Q _n	3.3 5.0	2.0 1.5	12 9.0	2.0 1.0	13.5 9.5	ns
t _{PHL}		3.3 5.0	2.5 1.5	13 9.5	2.0 1.5	14.5 10.5	
t _{PLH}	Propagation Delay Reset to Q _n	3.3 5.0	3.0 2.0	12.5 9.0	2.5 1.5	13.5 10.0	ns
t _{PHL}		3.3 5.0	3.0 2.0	11.0 8.5	2.5 1.5	12.5 9.0	

AC OPERATING REQUIREMENTS

Symbol	Parameter (C _L = 50 pF)	V _{CC} 10% (V)(ς)	AC175			Unit
			T _A = +25°C		T _A = − 40°C to +85°C	
			Typ	Guaranteed Minimum		
t _s	Setup Time, HIGH or LOW, Dn to CP	3.3 5.0		4.5 3.0	4.5 3.0	ns
t _h	Hold Time, HIGH or LOW, Dn to CP	3.3 5.0		1.0 1.0	1.0 1.0	ns
t _w	MR Pulse Width, LOW	3.3 5.0		4.5 3.5	4.5 3.5	ns
t _w	CP Pulse Width	3.3 5.0		4.5 3.5	5.0 3.5	ns
t _{rec}	Recovery Time, MR to CP	3.3 5.0		0 0	0 0	ns

ACT — 175

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} (V)	ACT175		Unit
				TA = +25°C	TA = -40 to +85°C	
				Guaranteed Limits		
V _{IH}	Minimum High Level Input Voltage	V _{OUT} = 0.1V or V _{CC} - 0.1 V	4.5 5.5	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	0.8 0.8	0.8 0.8	V
V _{OH}	Minimum High Level Output Voltage	I _{OUT} = -50 μA	4.5 5.5	4.4 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	0.1 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

Symbol	Parameter	Conditions	V _{CC} (V)	ACT175		Unit
				TA = +25°C	TA = -40 to +85°C	
				Guaranteed Limits		
ΔI _{CCT}	Additional Max I _{CC} /Input	V _I =V _{CC} - 2.1 V	5.5		1.5	mA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5	8.0	80	μA

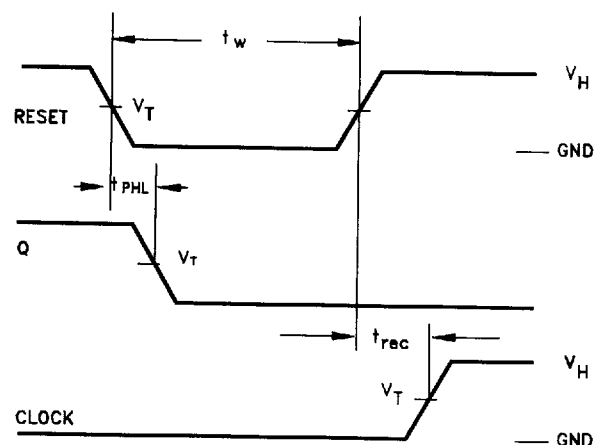
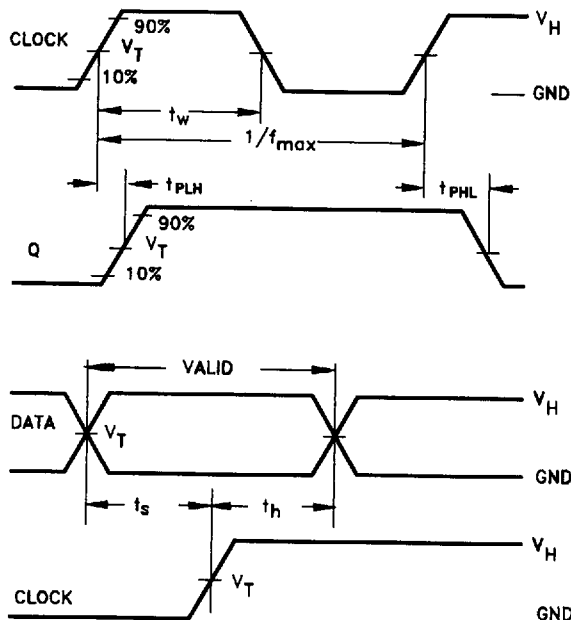
AC CHARACTERISTICS

Symbol	Parameter (C _L = 50 pF)	V _{cc} ±10% (V)	ACT175				Unit
			T _A = +25°C		T _A = - 40°C to +85°C		
			Min	Max	Min	Max	
f _{max}	Maximum Clock Frequency	5.0	175		145		MHz
t _{PLH}	Propagation Delay, Clock to Q _n	5.0	2.0	10.0	1.5	11.0	ns
t _{PHL}	Propagation Delay, Clock to Q _n	5.0	2.0	11.0	1.5	12.0	ns
t _{PHL}	Propagation Delay, Master Reset to Q _n	5.0	2.0	9.5	1.5	10.5	ns

AC OPERATING REQUIREMENTS

Symbol	Parameter (C _L = 50 pF)	V _{CC} ±10% (V)	ACT175		Unit
			T _A = +25°C	T _A = - 40°C to +85°C	
			Guaranteed Minimum		
t _s	Setup Time, HIGH or LOW, D _n to CP (H) (L)	5.0	2.0 2.5	2.0 2.5	ns
t _h	Hold Time, HIGH or LOW, D _n to CP	5.0	1.0	1.0	ns
t _w	MR Pulse Width, LOW	5.0	3.0	4.0	ns
t _w	CP Pulse Width	5.0	3.0	3.5	ns
t _{rec}	Recovery Time, MR to CP	5.0	0	0	ns

SWITCHING WAVEFORMS



Input and output threshold voltage:
V_T = 50% V_{CC} for AC; 1.5V for ACT
V_H = V_{CC} for AC, 3V for ACT