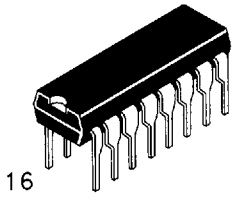
Available Q3, 1995

DV74AC175
DV74ACT175

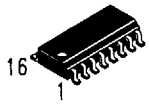
Quad D Flip-Flop with Master Reset

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**

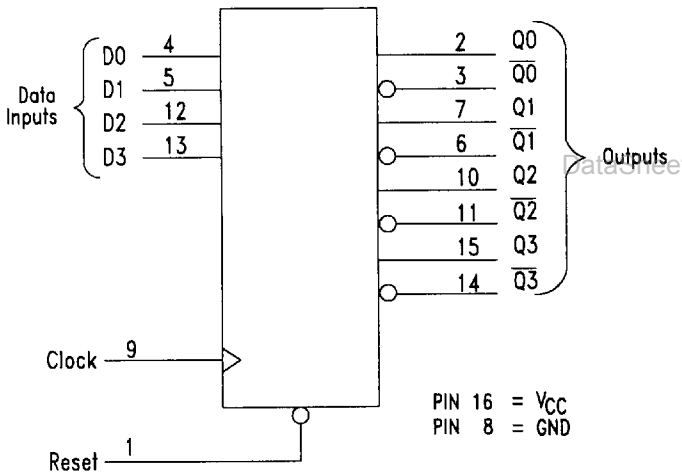


N Suffix
Plastic DIP
AVG-003 Case

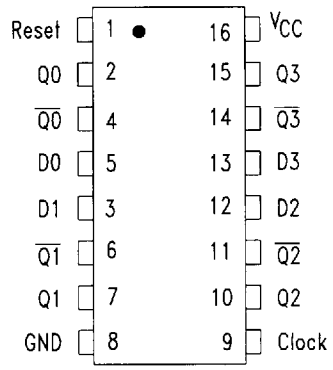


D Suffix
Plastic SOP
AVG-004 Case

LOGIC DIAGRAM



PIN ASSIGNMENT



TRUTH TABLE

Inputs			Output	
Reset	CP	D	Q_n	$\overline{Q}_n$
L	X	X	L	H
H	↑	H	H	L
H	↑	L	L	H
H	L	X	Q_n	$\overline{Q}_n$

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 T_A = +25°C Typ	AC175 T_A = +25°C Guaranteed Limits	AC175 T_A = –40 to +85°C Guaranteed Limits	Unit
V_{IH}	Minimum High Level Input Voltage	V_{OUT} = 0.1V or V_{CC} – 0.1 V	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V
V_{IL}	Maximum Low Level Input Voltage	V_{OUT} = 0.1V or V_{CC} – 0.1 V	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	V
V_{OH}	Minimum High Level Output Voltage	I_{OUT} = –50 µA	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4	2.9 4.4 5.4	V
		V_{IN} = V_{IL} or V_{IH} I_{OH} –12mA I_{OH} –24mA I_{OH} –24 mA	3.0 4.5 5.5		2.56 3.86 4.86	2.46 3.76 4.76	V
V_{OL}	MaximumLow Level Output Voltage	I_{OUT}= 50 µA	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V
		V_{IN} = V_{IL} or V_{IH} I_{OH} 12mA I_{OH} 24mA I_{OH} 24 mA	3.0 4.5 5.5		0.36 0.36 0.36	0.44 0.44 0.44	V
I_{IN}	Maximum Input Leakage Current	VI=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 T_A = +25°C Min	AC175 T_A = +25°C Max	AC175 T_A = −40°C to +85°C Min	AC175 T_A = −40°C to +85°C Max	Unit
fmax	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 T_A = +25°C Typ	AC175 T_A = +25°C Guaranteed Minimum	AC175 T_A = −40°C to +85°C Guaranteed Minimum	Unit
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 T_A = +25°C Guaranteed Limits	ACT175 T_A = −40 to +85°C Guaranteed Limits	Unit
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	Vcc (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

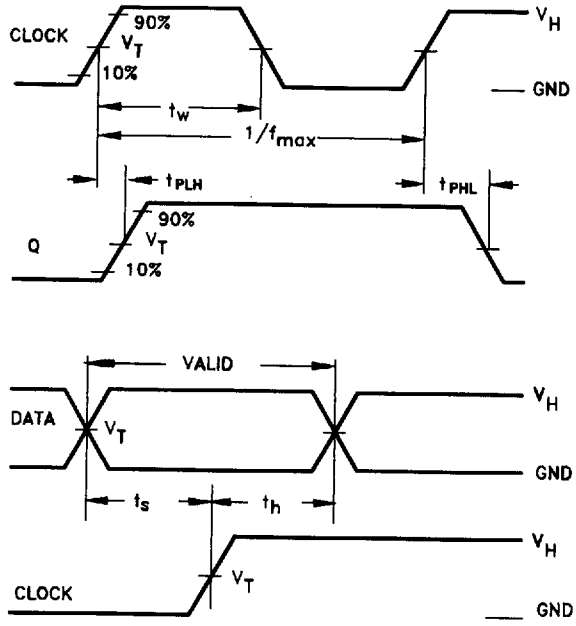
AC CHARACTERISTICS

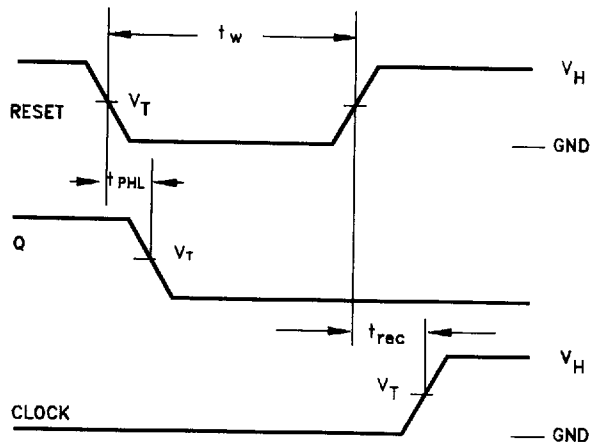
Symbol	Parameter (C_L = 50 pF)	Vcc ±10% (V)	ACT175				Unit
			T_A = +25°C		T_A = – 40°C to +85°C		
			Min	Max	Min	Max	
fmax	Maximum Clock Frequency	5.0	175		145		MHz
t_{PLH}	Propagation Delay, Clock to Q_n	5.0	2.0	10.0	1.5	11.0	ns
t_{PHL}	Propagation Delay, Clock to Q_n	5.0	2.0	11.0	1.5	12.0	ns
t_{PHL}	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)	Vcc ±10% (V)	ACT175		Unit
			T_A = +25°C	T_A = – 40°C to +85°C	
			Guaranteed Minimum		
t_s	Setup Time, HIGH or LOW, Dn to CP (H) (L)	5.0	2.0 2.5	2.0 2.5	ns
t_h	Hold Time, HIGH or LOW, Dn 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% Vcc for AC; 1.5V for ACT
V_H = Vcc for AC, 3V for ACT

175