

74F174 Hex D Flip-Flop with Master Reset

General Description

The 'F174 is a high-speed hex D flip-flop. The device is used primarily as a 6-bit edge-triggered storage register. The information on the D inputs is transferred to storage during the LOW-to-HIGH clock transition. The device has a Master Reset to simultaneously clear all flip-flops.

Features

- Edge-triggered D-type inputs
- Buffered positive edge-triggered clock
- Asynchronous common reset
- Guaranteed 4000V minimum ESD protection

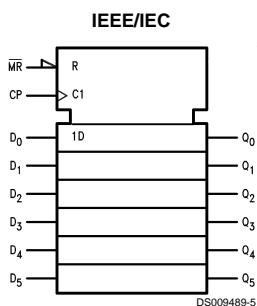
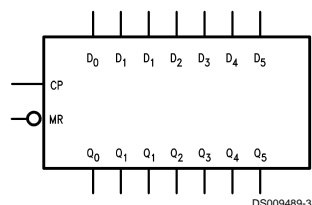
Ordering Code:

Commercial	Military	Package Number	Package Description
74F174PC		N16E	16-Lead (0.300" Wide) Molded Dual-In-Line
	54F174DM (Note 2)	J16A	16-Lead Ceramic Dual-In-Line
74F174SC (Note 1)		M16A	16-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F174SJ (Note 1)		M16D	16-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F174FM (Note 2)	W16A	16-Lead Cerpack
	54F174LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

Note 1: Devices also available in 13" reel. Use Suffix = SCX and SJX.

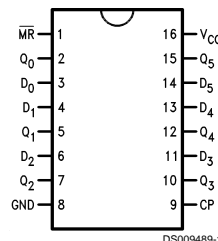
Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbols

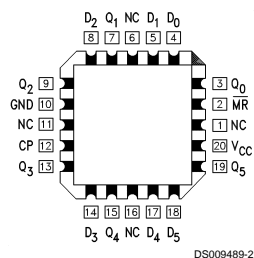


Connection Diagrams

Pin Assignment for DIP, SOIC and Flatpak



Pin Assignment for LCC



Unit Loading/Fan Out

Pin Names	Description	54F74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
D ₀ -D ₅	Data Inputs	1.0/1.0	20 μ A/-0.6 mA
CP	Clock Pulse Input (Active Rising Edge)	1.0/1.0	20 μ A/-0.6 mA
$\overline{\text{MR}}$	Master Reset Input (Active LOW)	1.0/1.0	20 μ A/-0.6 mA
Q ₀ -Q ₅	Outputs	50/33.3	-1 mA/20 mA

Functional Description

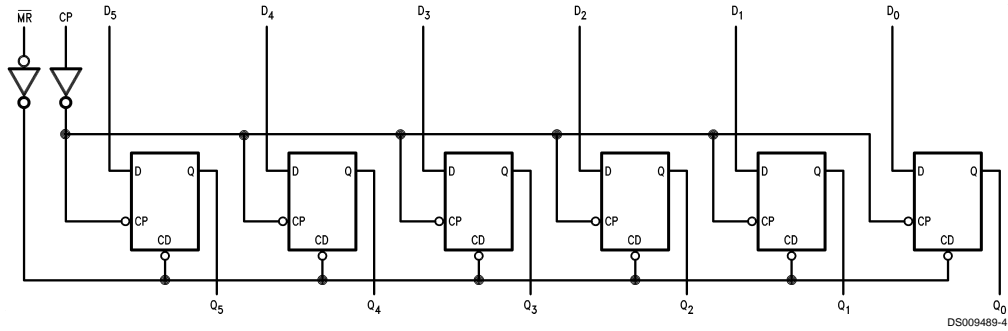
The 'F174 consists of six edge-triggered D flip-flops with individual D inputs and Q outputs. The Clock (CP) and Master Reset (MR) are common to all flip-flops. Each D input's state is transferred to the corresponding flip-flop's output following the LOW-to-HIGH Clock (CP) transition. A LOW input to the Master Reset ($\overline{\text{MR}}$) will force all outputs LOW independent of Clock or Data inputs. The 'F174 is useful for applications where the true output only is required and the Clock and Master Reset are common to all storage elements.

Truth Table

Inputs			Outputs
$\overline{\text{MR}}$	CP	D _n	Q _n
L	X	X	L
H	\nearrow	H	H
H	\nearrow	L	L

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 \nearrow = LOW-to-HIGH Clock Transition

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings (Note 3)

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	-55°C to +175°C
Plastic	-55°C to +150°C
V _{CC} Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 4)	-0.5V to +7.0V
Input Current (Note 4)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V _{CC} = 0V)	
Standard Output	-0.5V to V _{CC}
3-STATE Output	-0.5V to +5.5V
Current Applied to Output	

in LOW State (Max) twice the rated I_{OL} (mA)
ESD Last Passing Voltage (Min) 4000V


Recommended Operating Conditions

Free Air Ambient Temperature	
Military	-55°C to +125°C
Commercial	0°C to +70°C
Supply Voltage	
Military	+4.5V to +5.5V
Commercial	+4.5V to +5.5V

Note 3: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 4: Either voltage limit or current limit is sufficient to protect inputs.

DC Electrical Characteristics

Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage			-1.2	V	Min	I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	54F 10% V _{CC}	2.5		V	Min	I _{OH} = -1 mA
		74F 10% V _{CC}	2.5				
		74F 5% V _{CC}	2.7				
V _{OL}	Output LOW Voltage	54F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA
		74F 10% V _{CC}		0.5			
I _{IH}	Input HIGH Current	54F		20.0	μA	Max	V _{IN} = 2.7V
		74F		5.0			
I _{BVI}	Input HIGH Current Breakdown Test	54F		100	μA	Max	V _{IN} = 7.0V
		74F		7.0			
I _{CEX}	Output HIGH Leakage Current	54F		250	μA	Max	V _{OUT} = V _{CC}
		74F		50			
V _{ID}	Input Leakage Test	74F	4.75		V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current	74F		3.75	μA	0.0	V _{IOD} = 150 mV All Other Pins Grounded
I _{IL}	Input LOW Current			-0.6	mA	Max	V _{IN} = 0.5V
I _{OS}	Output Short-Circuit Current			-60	-150	mA	Max V _{OUT} = 0V
I _{CCH}	Power Supply Current		30	45	mA	Max	CP =  D _n = \overline{MR} = HIGH
I _{CCL}	Power Supply Current		30	45	mA	Max	V _O = LOW

AC Electrical Characteristics

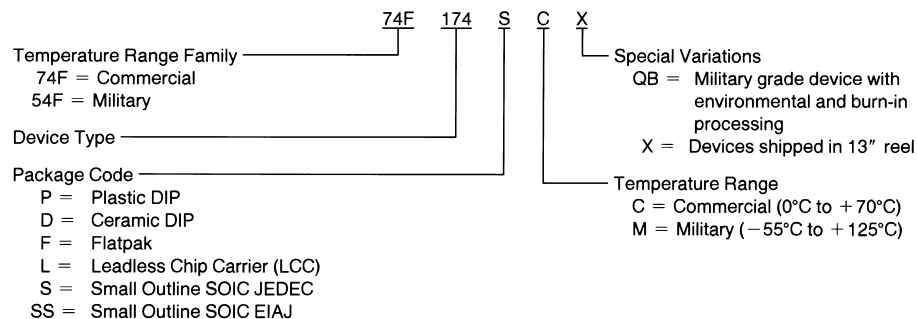
Symbol	Parameter	74F			54F		74F		Units
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{ pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$		
		Min	Typ	Max	Min	Max	Min	Max	
f_{max}	Maximum Clock Frequency	80			70		80		MHz
t_{PLH}	Propagation Delay	3.5	5.5	8.0	3.0	10.0	3.5	9.0	ns
t_{PHL}	CP to Q_n	4.0	7.0	10.0	4.0	12.0	4.0	11.0	
t_{PHL}	Propagation Delay MR to Q_n	5.0	10.0	14.0	5.0	16.0	5.0	15.0	ns

AC Operating Requirements

Symbol	Parameter	74F		54F		74F		Units
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$		$T_A, V_{CC} = \text{Mil}$		$T_A, V_{CC} = \text{Com}$		
		Min	Max	Min	Max	Min	Max	
$t_s(\text{H})$	Setup Time, HIGH or LOW	4.8		5.0		4.8		ns
$t_s(\text{L})$	D_n to CP	4.0		5.0		4.0		
$t_h(\text{H})$	Hold Time, HIGH or LOW	0		2.0		0		ns
$t_h(\text{L})$	D_n to CP	0		2.0		0		
$t_w(\text{H})$	CP Pulse Width	4.0		5.0		4.0		ns
$t_w(\text{L})$	HIGH or LOW	6.0		7.5		6.0		
$t_w(\text{L})$	MR Pulse Width, LOW	5.0		6.5		5.0		ns
t_{rec}	Recovery Time, MR to CP	5.0		6.0		5.0		

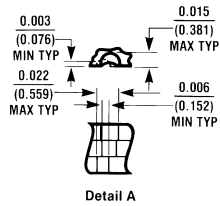
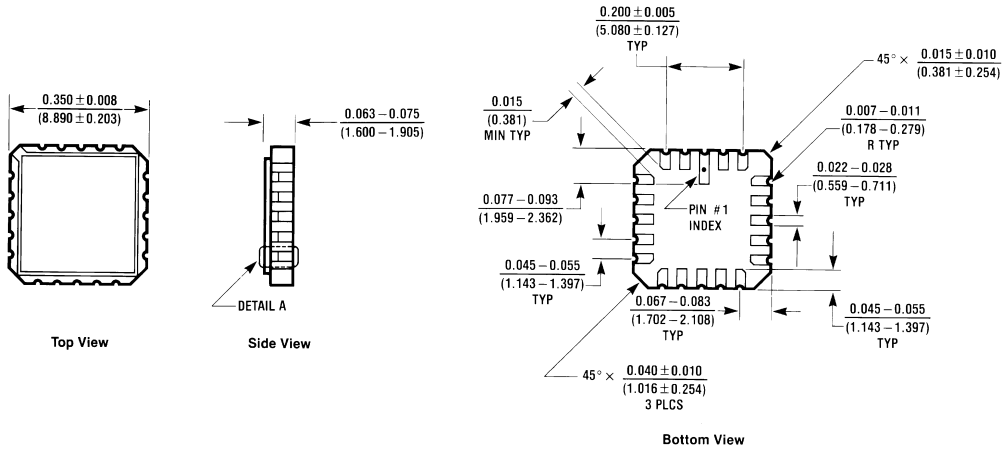
Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



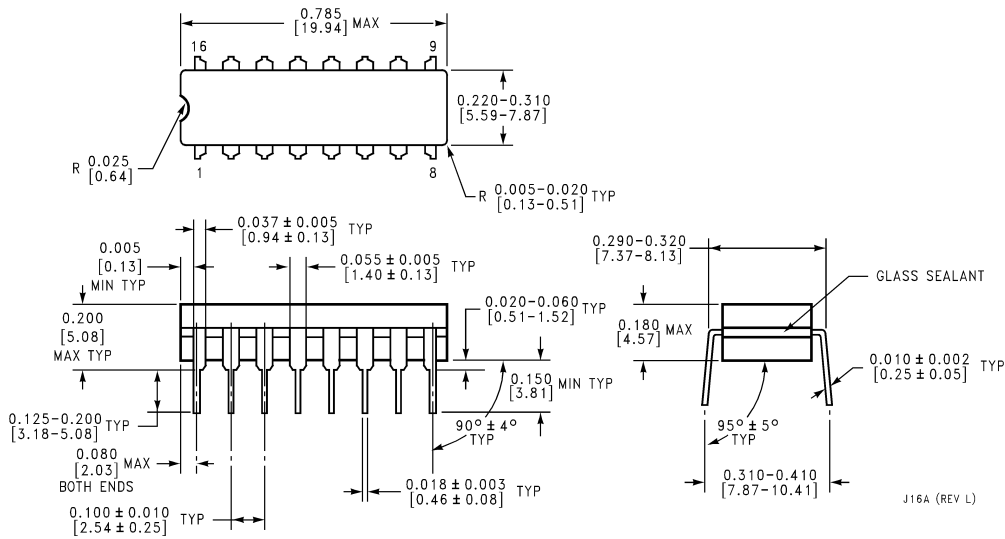
DS009489-6

Physical Dimensions inches (millimeters) unless otherwise noted



**20-Terminal Ceramic Leadless Chip Carrier (L)
 Package Number E20A**

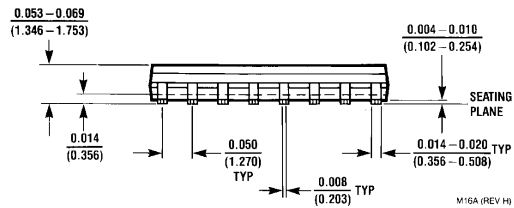
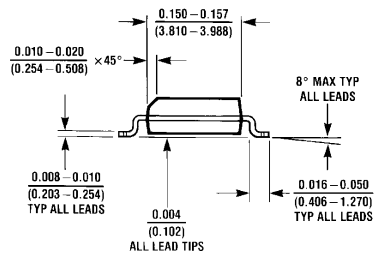
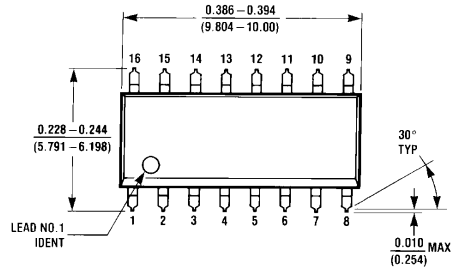
E20A (REV D)



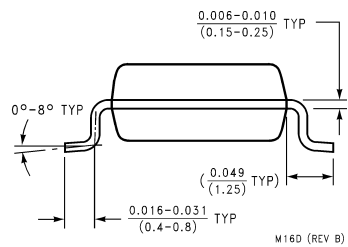
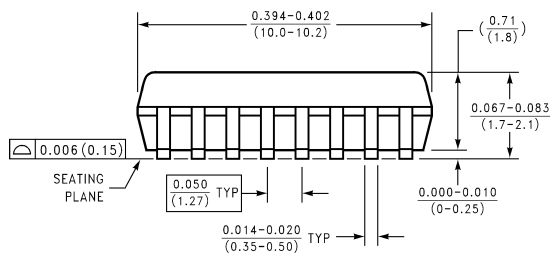
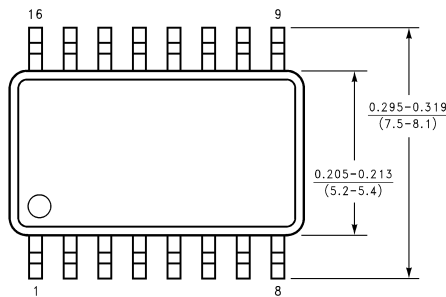
**16-Lead Ceramic Dual-In-Line Package (D)
 Package Number J16A**

J16A (REV L)

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

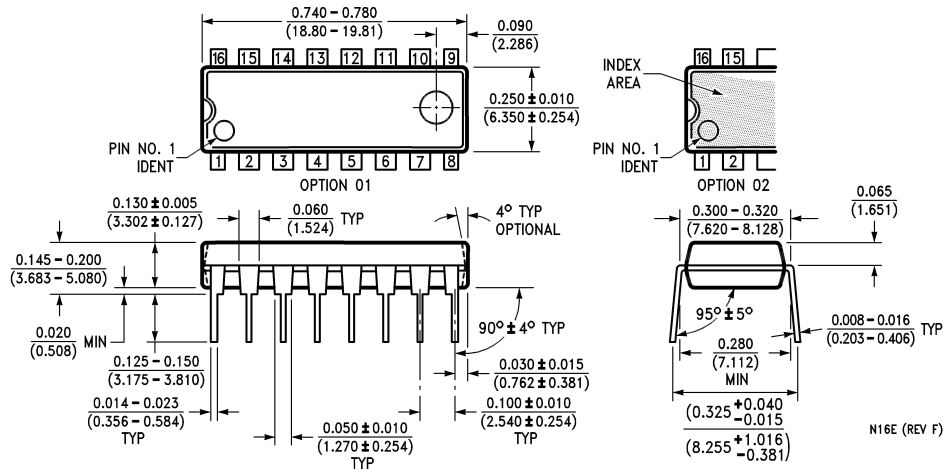


16-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)
Package Number M16A

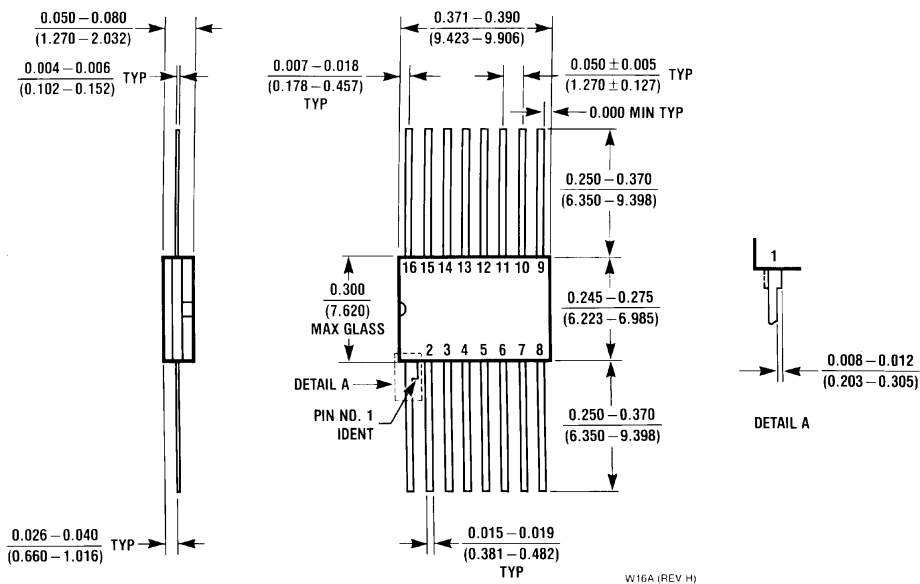


16-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
Package Number M16D

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



16-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
Package Number N16E



16 Lead Ceramic Flatpak (F)
Package Number W16A

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Fairchild Semiconductor Corporation Americas
Customer Response Center
Tel: 1-888-522-5372

Fairchild Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 8 141-35-0
English Tel: +44 (0) 1 793-85-68-56
Italy Tel: +39 (0) 2 57 5631

Fairchild Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: +852 2737-7200
Fax: +852 2314-0061

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

www.fairchildsemi.com