FAIRCHILD

SEMICONDUCTOR™

74F574
Octal D-Type Flip-Flop with 3-STATE Outputs

General Description

The 74F574 is a high-speed, low power octal flip-flop with a buffered common Clock (CP) and a buffered common Output Enable ($\overline{OE}$). The information presented to the D inputs is stored in the flip-flops on the LOW-to-HIGH Clock (CP) transition.

This device is functionally identical to the 74F374 except for the pinouts.

Features

■ Inputs and outputs on opposite sides of package allowing easy interface with microprocessors

■ Useful as input or output port for microprocessors

■ Functionally identical to 74F374

■ 3-STATE outputs for bus-oriented applications

Ordering Code:

Order Number	Package Number	Package Description
74F574SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
74F574SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F574PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Symbols

IEEE/IEC

Connection Diagram
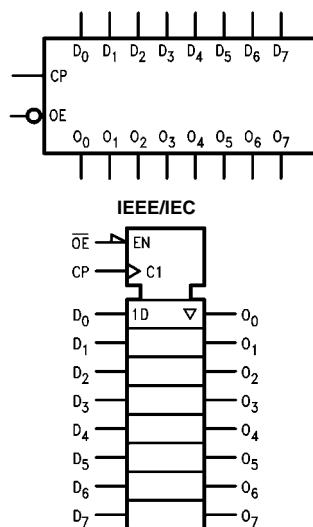
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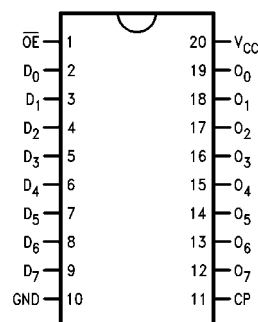
Unit Loading/Fan Out

| Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
$D_0–D_7$	Data Inputs	1.0/1.0	20 µA/–0.6 mA
CP	Clock Pulse Input (Active LOW)	1.0/1.0	20 µA/–0.6 mA
$\overline{OE}$	3-STATE Output Enable Input (Active LOW)	1.0/1.0	20 µA/–0.6 mA
$O_0–O_7$	3-STATE Outputs	150/40 (33.3)	–3 mA/24 mA (20 mA)

Functional Description

The 74F574 consists of eight edge-triggered flip-flops with individual D-type inputs and 3-STATE true outputs. The buffered clock and buffered Output Enable are common to all flip-flops. The eight flip-flops will store the state of their individual D inputs that meet the setup and hold times requirements on the LOW-to-HIGH Clock (CP) transition. With the Output Enable ($\overline{OE}$) LOW, the contents of the eight flip-flops are available at the outputs. When $\overline{OE}$ is HIGH, the outputs go to the high impedance state. Operation of the $\overline{OE}$ input does not affect the state of the flip-flops.

Function Table

Inputs			Internal	Outputs	Function
$\overline{OE}$	CP	D	Q	O	
H	H	L	NC	Z	Hold
H	H	H	NC	Z	Hold
H	╱	L	L	Z	Load
H	╱	H	H	Z	Load
L	╱	L	L	L	Data Available
L	╱	H	H	H	Data Available
L	H	L	NC	NC	No Change in Data
L	H	H	NC	NC	No Change in Data

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
Z = High Impedance
╱ = LOW-to-HIGH Transition
NC = No Change

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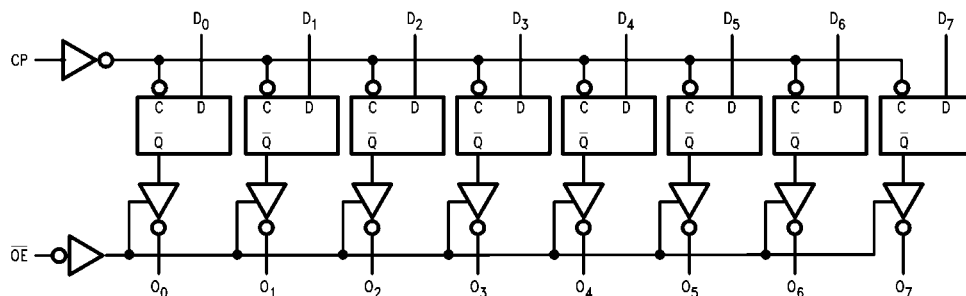
Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings(Note 1)

Storage Temperature	−65°C to +150°C
Ambient Temperature under Bias	−55°C to +125°C
Junction Temperature under Bias	−55°C to +150°C
V_{CC} Pin Potential to Ground Pin	−0.5V to +7.0V
Input Voltage (Note 2)	−0.5V to +7.0V
Input Current (Note 2)	−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)

Recommended Operating Conditions

Free Air Ambient Temperature	0°C to +70°C
Supply Voltage	+4.5V to +5.5V

Note 1: 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 2: Either voltage limit or current limit is sufficient to protect inputs.
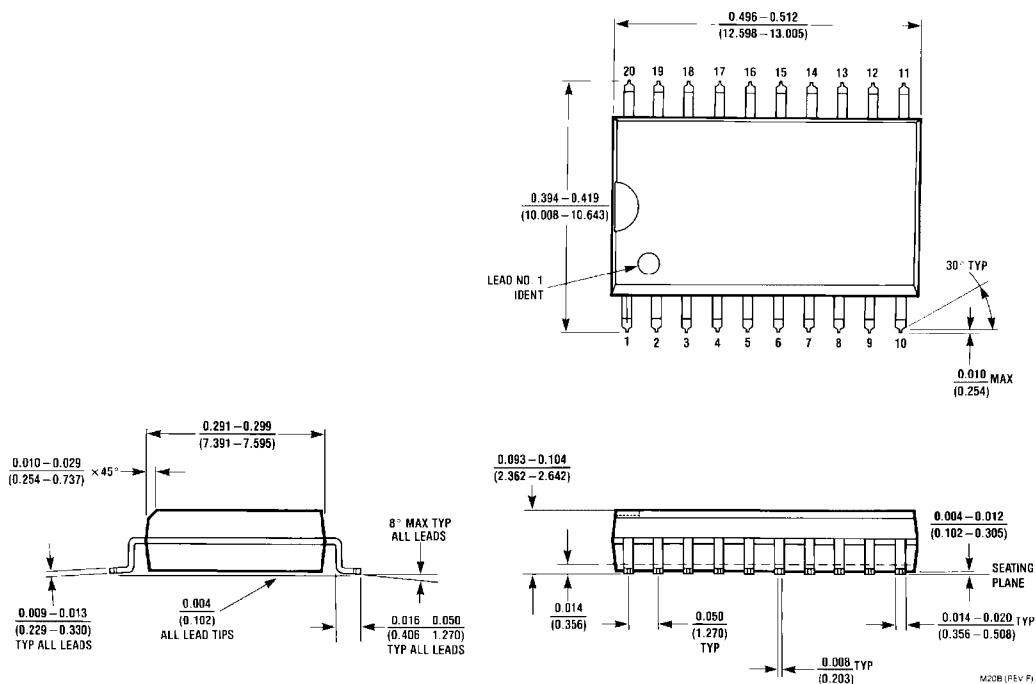
DC Electrical Characteristics

Symbol	Parameter		Min	Typ	Max	Units	V_{CC}	Conditions
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	10% V_{CC}	2.5					I_{OH} = −1 mA
	Voltage	10% V_{CC}	2.4			V	Min	I_{OH} = −3 mA
		5% V_{CC}	2.7					I_{OH} = −1 mA
		5% V_{CC}	2.7					I_{OH} = −3 mA
V_{OL}	Output LOW	10% V_{CC}			0.5	V	Min	I_{OL} = 24 mA
	Voltage							
I_{IH}	Input HIGH				5.0	µA	Max	V_{IN} = 2.7V
	Current							
I_{BVI}	Input HIGH Current				7.0	µA	Max	V_{IN} = 7.0V
	Breakdown Test							
I_{CEX}	Output HIGH				50	µA	Max	V_{OUT} = V_{CC}
	Leakage Current							
V_{ID}	Input Leakage		4.75			V	0.0	I_{ID} = 1.9 µA
	Test							All Other Pins Grounded
I_{OD}	Output Leakage				3.75	µA	0.0	V_{IOD} = 150 mV
	Circuit Current							All Other Pins Grounded
I_{IL}	Input LOW Current				−0.6	mA	Max	V_{IN} = 0.5V
I_{OZH}	Output Leakage Current				50	µA	Max	V_{OUT} = 2.7V
I_{OZL}	Output Leakage Current				−50	µA	Max	V_{OUT} = 0.5V
I_{OS}	Output Short-Circuit Current		−60		−150	mA	Max	V_{OUT} = 0V
I_{ZZ}	Bus Drainage Test				500	µA	0.0V	V_{OUT} = 5.25V
I_{CCZ}	Power Supply Current			55	86	mA	Max	V_O = HIGH Z

74F574

AC Electrical Characteristics

Symbol	Parameter	$T_A = +25°C$ $V_{CC} = +5.0V$ $C_L = 50$ pF			$T_A = -55°C$ to $+125°C$ $V_{CC} = +5.0V$ $C_L = 50$ pF		$T_A = 0°C$ to $+70°C$ $V_{CC} = +5.0V$ $C_L = 50$ pF		Units
		Min	Typ	Max	Min	Max	Min	Max	
f_{MAX}	Maximum Clock Frequency	100			60		70		MHz
t_{PLH}	Propagation Delay	2.5	5.3	8.5	2.5	9.5	2.5	8.5	ns
t_{PHL}	CP to O_n	2.5	5.3	8.5	2.5	9.5	2.5	8.5	
t_{PZH}	Output Enable Time	3.0	5.5	9.0	2.5	10.5	2.5	10.0	ns
t_{PZL}		3.0	6.0	9.0	2.5	10.5	2.5	10.0	
t_{PHZ}	Output Disable Time	1.5	3.3	5.5	1.5	7.0	1.5	6.5	
t_{PLZ}		1.5	2.8	5.5	1.5	7.0	1.5	6.5	

AC Operating Requirements

Symbol	Parameter	$T_A = +25°C$ $V_{CC} = +5.0V$		$T_A = -55°C$ to $+125°C$ $V_{CC} = +5.0V$		$T_A = 0°C$ to $+70°C$ $V_{CC} = +5.0V$		Units
		Min	Max	Min	Max	Min	Max	
$t_S(H)$	Set-up Time, HIGH or LOW	2.5		3.0		2.5		ns
$t_S(L)$	D_n to CP	2.0		2.5		2.0		
$t_H(H)$	Hold Time, HIGH or LOW	2.0		2.0		2.0		
$t_H(L)$	D_n to CP	2.0		2.0		2.0		
$t_W(H)$	CP Pulse Width	5.0		5.0		5.0		ns
$t_W(L)$	HIGH or LOW	5.0		5.0		5.0		

Physical Dimensions inches (millimeters) unless otherwise noted

0.496 – 0.512
(12.598 – 13.005)

0.394 – 0.419
(10.008 – 10.643)

LEAD NO. 1
IDENT

30° TYP

0.010 MAX
(0.254)

0.010 – 0.029
(0.254 – 0.737) × 45°

0.291 – 0.299
(7.391 – 7.595)

8° MAX TYP
ALL LEADS

0.009 – 0.013
(0.229 – 0.330)
TYP ALL LEADS

0.004
(0.102)
ALL LEAD TIPS

0.016   0.050
(0.406   1.270)
TYP ALL LEADS

0.093 – 0.104
(2.362 – 2.642)

0.004 – 0.012
(0.102 – 0.305)

SEATING
PLANE

0.014
(0.356)

0.050
(1.270)
TYP

0.014 – 0.020 TYP
(0.356 – 0.508)

0.008 TYP
(0.203)

M20B (REV F)

**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
Package Number M20B**

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

12.6±0.10
-A-
0.40 TYP
20
11
7.8
3.9
5.3±0.10
-B-
PIN #1 IDENT. 1
10
△ 0.2 C B A
ALL LEAD TIPS

ALL LEAD TIPS
△ 0.1 C
2.1 MAX.
1.8±0.1
-C-
0.15±0.05
1.27 TYP
0.35-0.51
⊕ 0.12 Ⓜ C A
DIMENSIONS ARE IN MILLIMETERS
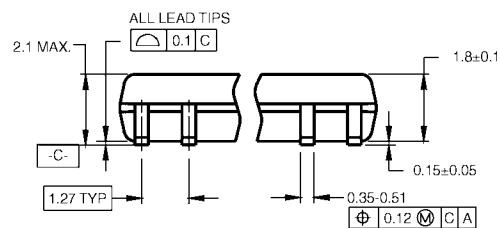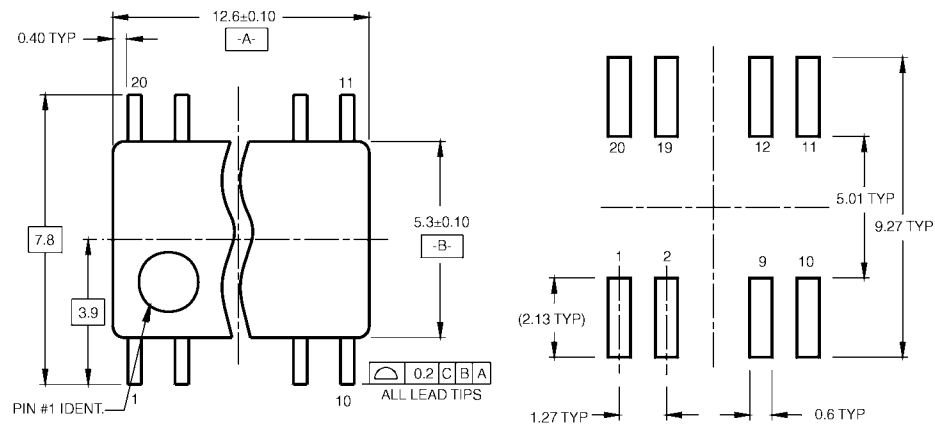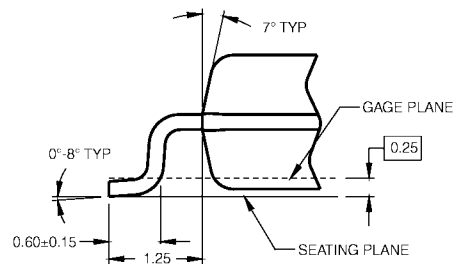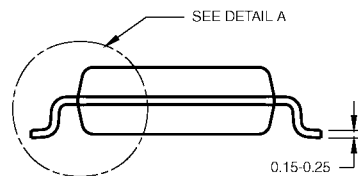
NOTES:
A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

20 19   12 11
5.01 TYP
9.27 TYP
(2.13 TYP)
1   2   9   10
1.27 TYP   0.6 TYP
LAND PATTERN RECOMMENDATION

SEE DETAIL A
0.15-0.25

7° TYP
GAGE PLANE
0°-8° TYP
0.25
0.60±0.15
1.25
SEATING PLANE
DETAIL A

20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M20D

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)
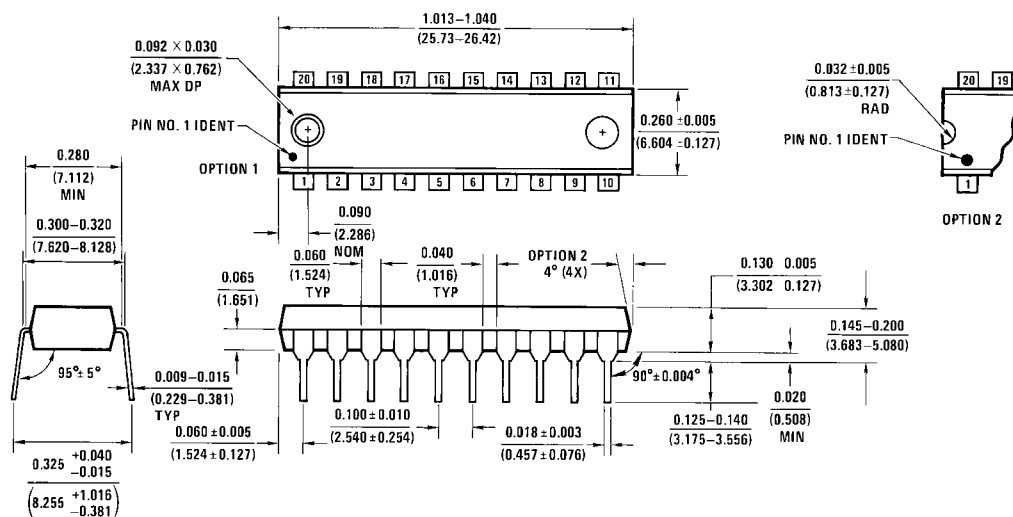
20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
Package Number N20A

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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.

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