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SEMICONDUCTOR™

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74F564

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

General Description

The 74F564 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 sorted in the flip-flops on the LOW-to-HIGH Clock (CP) transition.

This device is functionally identical to the 74F574, but has inverted outputs.

Features

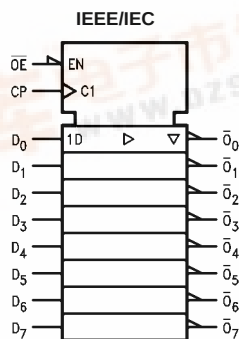
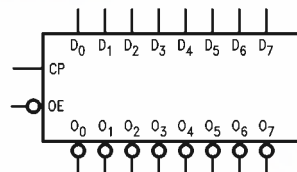
- Inputs and outputs on opposite sides of package allow easy interface with microprocessors
- Useful as input or output port for microprocessors
- Functionally identical to 74F574
- 3-STATE outputs for bus-oriented applications

Ordering Code:

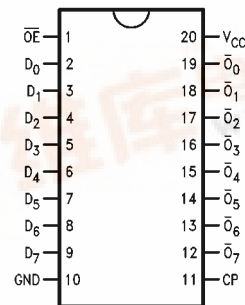
Order Number	Package Number	Package Description
74F564SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F564PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

Logic Symbols



Connection Diagram



74F564 Octal D-Type Flip-Flop with 3-STATE Outputs



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 μ A/–0.6 mA
CP	Clock Pulse Input (Active Rising Edge)	1.0/1.0	20 μ A/–0.6 mA
$\overline{OE}$	3-STATE Output Enable Input (Active LOW)	1.0/1.0	20 μ A/–0.6 mA
$\overline{O}_0$ – $\overline{O}_7$	3-STATE Outputs	150/40 (33.3)	–3 mA/24 mA (20 mA)

Functional Description

The 74F564 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.

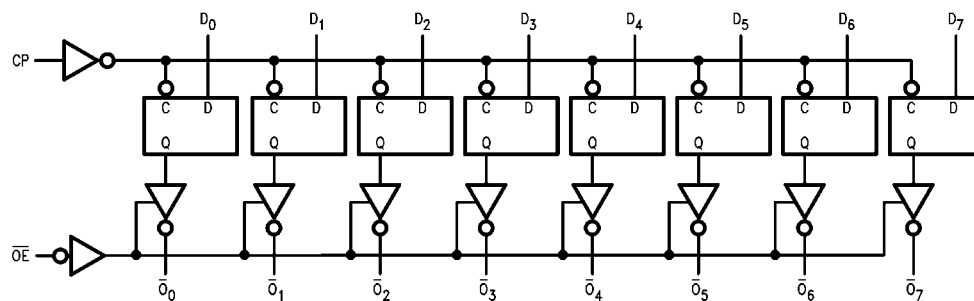
Function Table

Inputs			Internal	Outputs	Function
$\overline{OE}$	CP	D	Q	O	
H	H	L	NC	Z	Hold
H	H	H	NC	Z	Hold
H	$\nearrow$	L	H	Z	Load
H	$\nearrow$	H	L	Z	Load
L	$\nearrow$	L	H	H	Data Available
L	$\nearrow$	H	L	L	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
 $\nearrow$ = 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

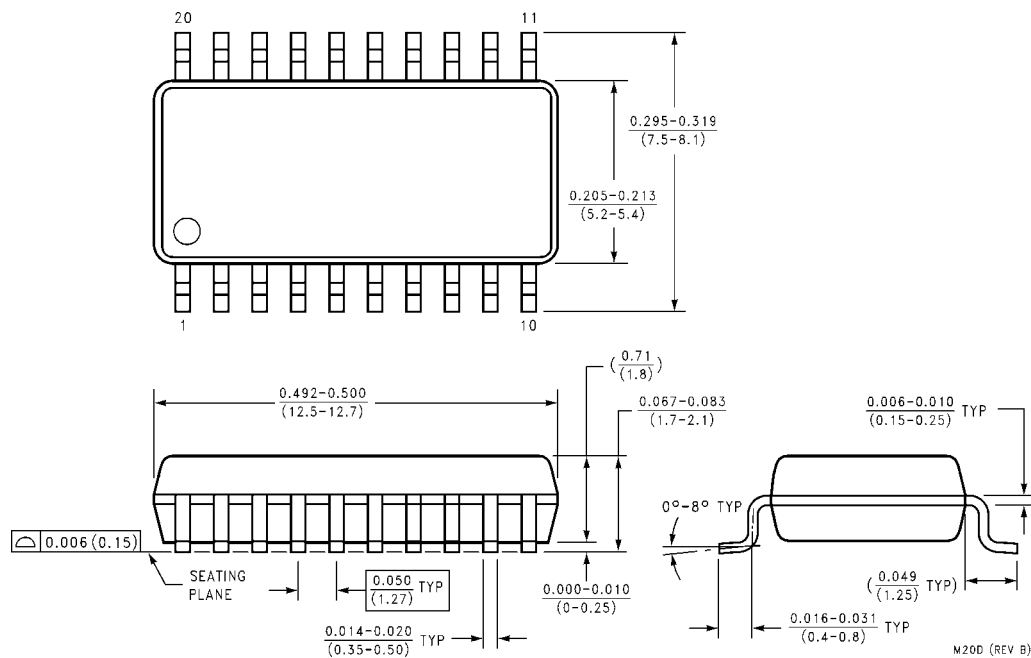
Symbol	Parameter	Min	Typ	Max	Units	V _{CC}	Conditions
V _{IH}	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V _{IL}	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage			-1.2	V	Min	I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	10% V _{CC} 10% V _{CC} 5% V _{CC} 5% V _{CC}	2.5 2.4 2.7 2.7		V	Min	I _{OH} = -1 mA I _{OH} = -3 mA I _{OH} = -1 mA I _{OH} = -3 mA
V _{OL}	Output LOW Voltage	10% V _{CC}		0.5	V	Min	I _{OL} = 24 mA
I _{IH}	Input HIGH Current			5.0	μA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test			7.0	μA	Max	V _{IN} = 7.0V
I _{CEX}	Output HIGH Leakage Current			50	μA	Max	V _{OUT} = V _{CC}
V _{ID}	Input Leakage Test	4.75			V	0.0	I _{ID} = 1.9 μA All Other Pins Grounded
I _{OD}	Output Leakage Circuit Current			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 _{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

AC Electrical Characteristics

Symbol	Parameter	T _A = +25°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	
f _{MAX}	Maximum Clock Frequency	100			70		MHz
t _{PLH}	Propagation Delay	2.5	5.2	8.5	2.5	8.5	ns
t _{PHL}	CP to $\overline{O}_n$	2.5	5.9	8.5	2.5	8.5	
t _{PZH}	Output Enable Time	3.0	5.6	9.0	2.5	10.0	ns
t _{PZL}		3.0	6.2	9.0	2.5	10.0	
t _{PHZ}	Output Disable Time	1.5	3.4	5.5	1.5	6.5	
t _{PLZ}		1.5	2.7	5.5	1.5	6.5	

AC Operating Requirements

Symbol	Parameter	T _A = +25°C V _{CC} = +5.0V		T _A = 0°C to +70°C V _{CC} = +5.0V		Units
		Min	Max	Min	Max	
t _S (H)	Setup Time, HIGH or LOW	2.0		2.0		ns
t _S (L)	D _n to CP	2.5		2.5		
t _H (H)	Hold Time, HIGH or LOW	2.0		2.0		
t _H (L)	D _n to CP	2.0		2.0		ns
t _W (H)	CP Pulse Width	5.0		5.0		
t _W (L)	HIGH or LOW	5.0		5.0		

Physical Dimensions inches (millimeters) unless otherwise noted


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

M20D (REV B)

