

54F/74F573 Octal D-Type Latch with TRI-STATE® Outputs

General Description

The 'F573 is a high speed octal latch with buffered common Latch Enable (LE) and buffered common Output Enable (\overline{OE}) inputs.

This device is functionally identical to the 'F373 but has different pinouts.

Features

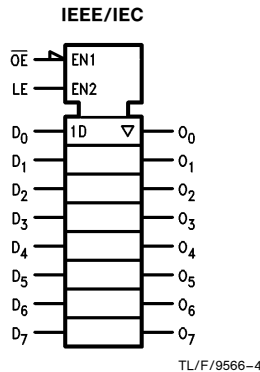
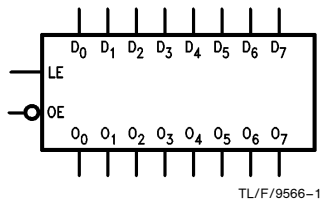
- Inputs and outputs on opposite sides of package allowing easy interface with microprocessors
- Useful as input or output port for microprocessors
- Functionally identical to 'F373
- TRI-STATE outputs for bus interfacing
- Guaranteed 4000V minimum ESD protection

Commercial	Military	Package Number	Package Description
74F573PC		N20A	20-Lead (0.300" Wide) Molded Dual-In-Line
	54F573DM (Note 2)	J20A	20-Lead Ceramic Dual-In-Line
74F573SC (Note 1)		M20B	20-Lead (0.300" Wide) Molded Small Outline, JEDEC
74F573SJ (Note 1)		M20D	20-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F573FM (Note 2)	W20A	20-Lead Cerpak
	54F573LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

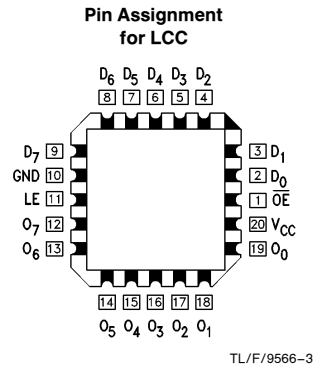
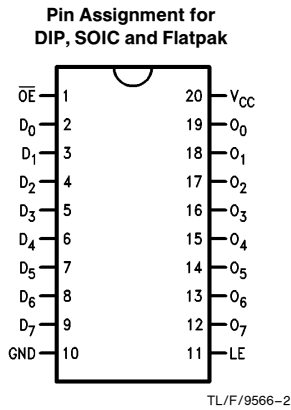
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

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

Logic Symbols



Connection Diagrams



TRI-STATE® is a registered trademark of National Semiconductor Corporation.

Unit Loading/Fan Out

Pin Names	Description	54F/74F	
		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
LE	Latch Enable Input (Active HIGH)	1.0/1.0	20 μ A/ -0.6 mA
\overline{OE}	TRI-STATE Output Enable Input (Active LOW)	1.0/1.0	20 μ A/ -0.6 mA
O ₀ -O ₇	TRI-STATE Latch Outputs	150/40(33.3)	-3 mA/24 mA (20 mA)

Functional Description

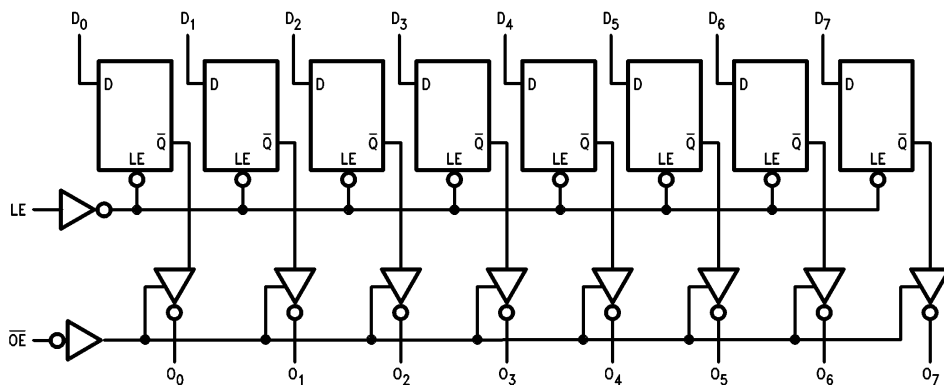
The 'F573 contains eight D-type latches with 3-state output buffers. When the Latch Enable (LE) input is HIGH, data on the D_n inputs enters the latches. In this condition the latches are transparent, i.e., a latch output will change state each time its D input changes. When LE is LOW the latches store the information that was present on the D inputs a setup time preceding the HIGH-to-LOW transition of LE. The 3-state buffers are controlled by the Output Enable (\overline{OE}) input. When \overline{OE} is LOW, the buffers are in the bi-state mode. When \overline{OE} is HIGH the buffers are in the high impedance mode but this does not interfere with entering new data into the latches.

Function Table

Inputs			Outputs
\overline{OE}	LE	D	O
L	H	H	H
L	H	L	L
L	L	X	O ₀
H	X	X	Z

H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 O₀ = Value stored from previous clock cycle

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)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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 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}
TRI-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

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.

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

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					V		Recognized as a LOW Signal
V _{CD}	Input Clamp Diode Voltage					V	Min	I _{IN} = -18 mA
V _{OH}	Output HIGH Voltage	54F 10% V _{CC} 54F 10% V _{CC} 74F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC} 74F 5% V _{CC}	2.5 2.4 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 I _{OH} = -1 mA I _{OH} = -3 mA
V _{OL}	Output LOW Voltage	54F 10% V _{CC} 74F 10% V _{CC}				V	Min	I _{OL} = 20 mA I _{OL} = 24 mA
I _{IH}	Input HIGH Current	54F 74F	20.0 5.0			μA	Max	V _{IN} = 2.7V
I _{BVI}	Input HIGH Current Breakdown Test	54F 74F	100 7.0			μA	Max	V _{IN} = 7.0V
I _{CEX}	Output HIGH Leakage Current	54F 74F	250 50			μA	Max	V _{OUT} = V _{CC}
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 _{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 _{CCL}	Power Supply Current		35 55			mA	Max	V _O = LOW
I _{CCZ}	Power Supply Current		35 55			mA	Max	V _O = HIGH Z

AC Electrical Characteristics

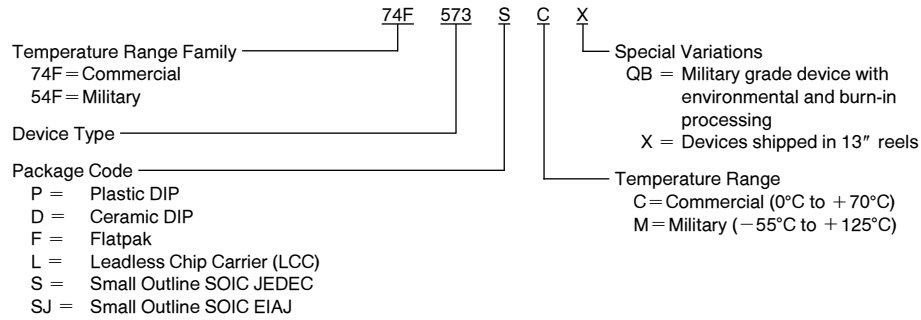
Symbol	Parameter	74F			54F		74F		Units
		T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A , V _{CC} = Mil C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
t _{PLH} t _{PHL}	Propagation Delay D _n to O _n	3.0 2.0	5.3 3.7	7.0 6.0	3.0 2.0	9.0 7.0	3.0 2.0	8.0 6.5	ns
t _{PLH} t _{PHL}	Propagation Delay LE to O _n	5.0 3.0	9.0 5.2	11.0 7.0	5.0 3.0	13.5 7.5	5.0 3.0	12.0 7.0	ns
t _{PZH} t _{PZL}	Output Enable Time	2.0 2.0	5.0 5.6	8.0 8.5	2.0 2.0	10.0 10.0	2.0 2.0	9.0 9.5	ns
t _{PHZ} t _{PLZ}	Output Disable Time	1.5 1.5	4.5 3.8	5.5 5.5	1.5 1.5	7.0 5.5	1.5 1.5	6.5 5.5	ns

AC Operating Requirements

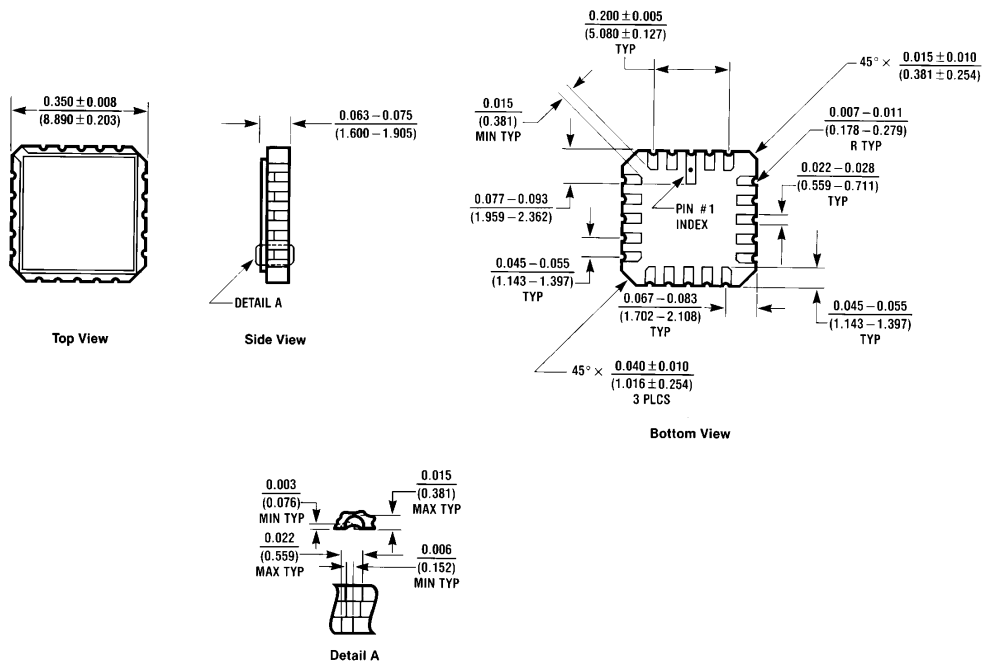
Symbol	Parameter	74F		54F		74F		Units
		T _A = +25°C V _{CC} = +5.0V		T _A , V _{CC} = Mil		T _A , V _{CC} = Com		
		Min	Max	Min	Max	Min	Max	
t _s (H) t _s (L)	Setup Time, HIGH or LOW D _n to LE	2.0 2.0		2.0 2.0		2.0 2.0		ns
t _h (H) t _h (L)	Hold Time, HIGH or LOW D _n to LE	3.0 3.5		3.0 4.0		3.0 3.5		ns
t _w (H)	LE Pulse Width, HIGH	4.0		4.0		4.0		ns

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:



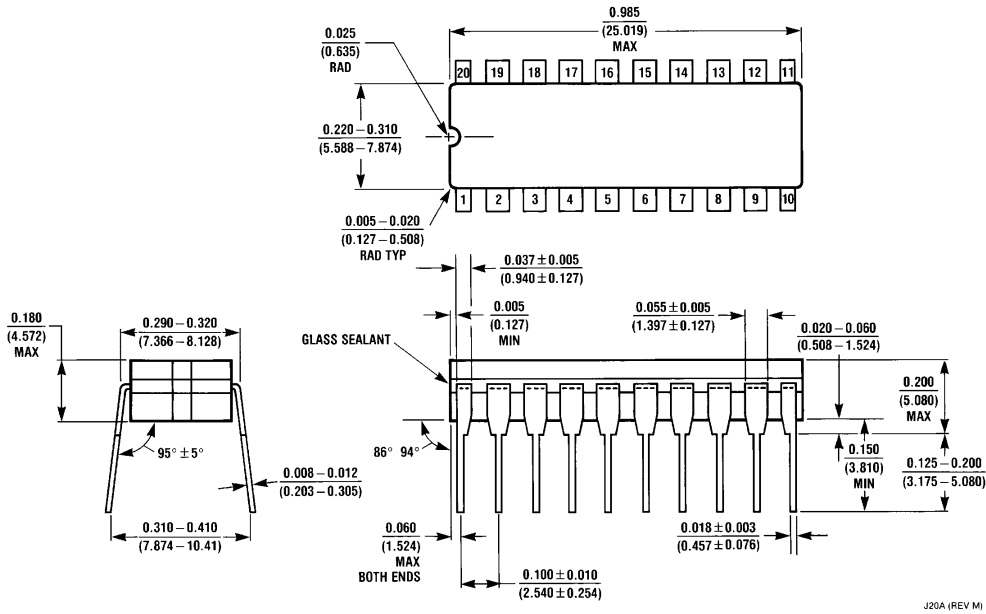
Physical Dimensions inches (millimeters)



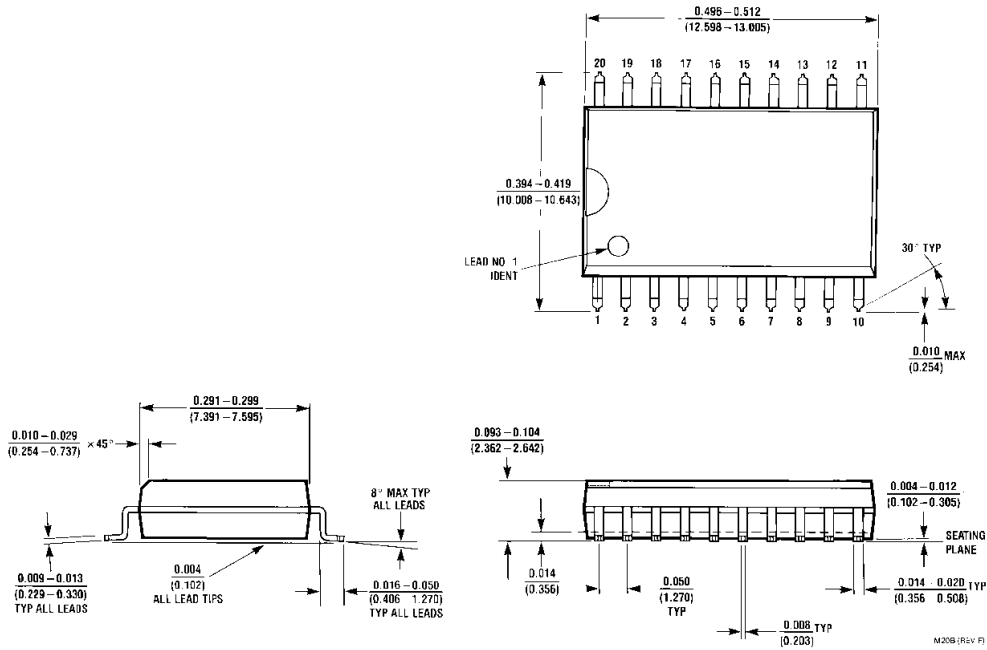
**20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A**

E20A (REV D)

Physical Dimensions inches (millimeters) (Continued)

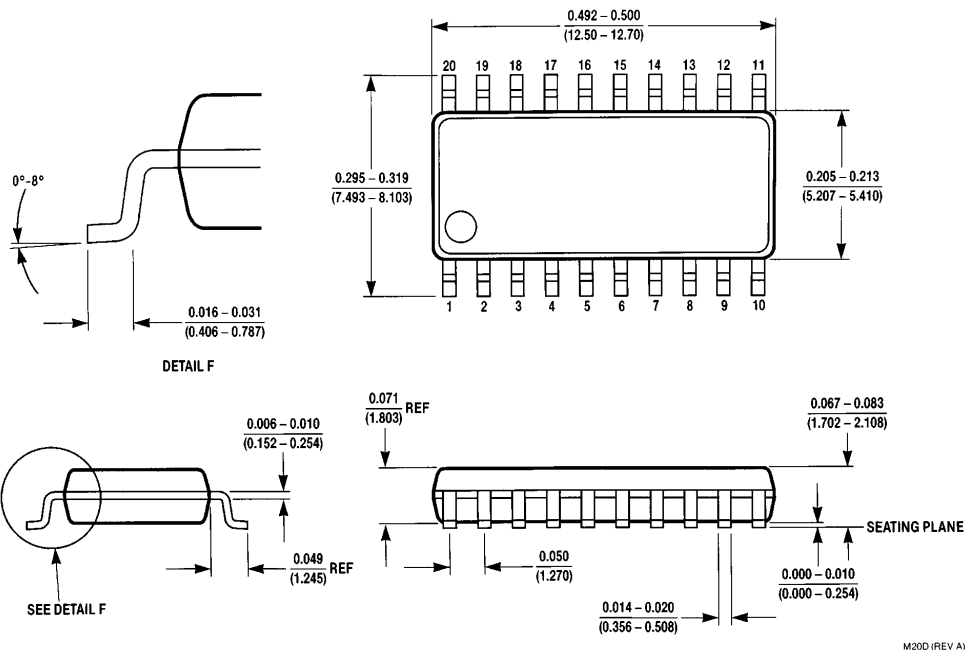


20-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

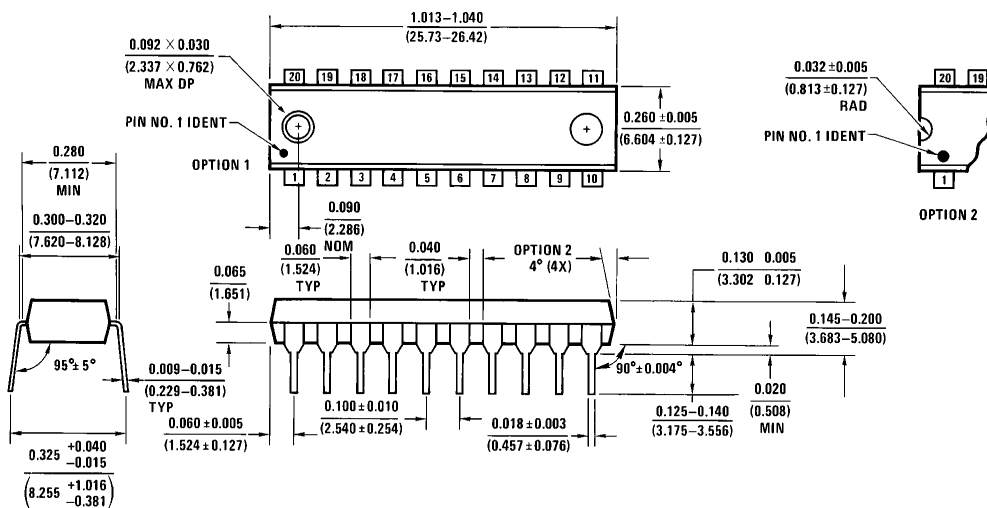


20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M20B

Physical Dimensions inches (millimeters) (Continued)

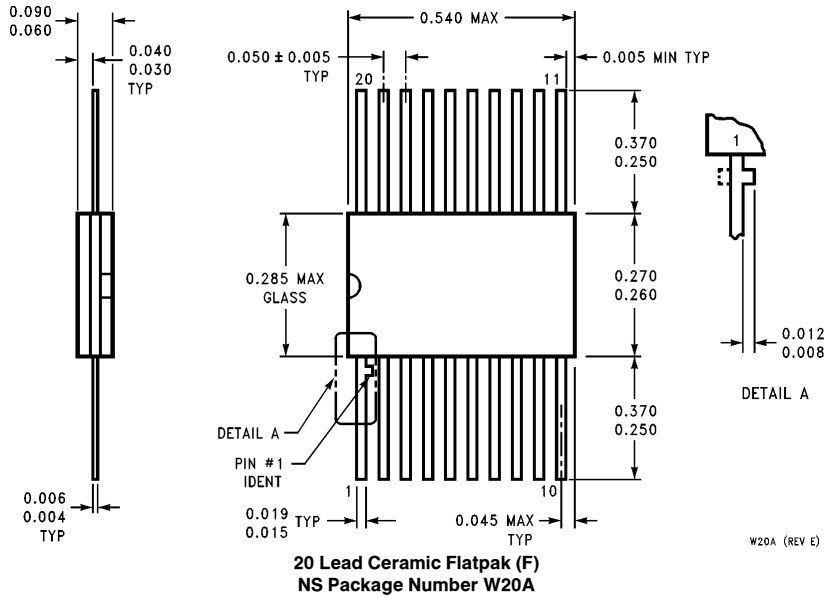


**20-Lead (0.300" Wide) Small Outline Package, EIAJ (SJ)
NS Package Number M20D**



**20-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
NS Package Number N20A**

Physical Dimensions inches (millimeters) (Continued)



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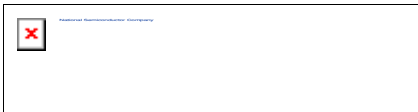
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54F573 Octal D Latch with TRI-STATE Outputs

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General Description




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 - Useful as input or output port for microprocessors
 - Functionally identical to 'F373
 - TRI-STATE outputs for bus interfacing
 - Guaranteed 4000V minimum ESD protection
-

Datasheet

Title	Size (in Kbytes)	Date	 View Online	 Download	 Receive via Email
54F573 Octal D-Type Latch with TRI-STATE(RM) Outputs	166 Kbytes	9-Dec-97	View Online	Download	Receive via Email

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Package Availability, Models, Samples & Pricing

Part Number	Package		Status	Models		Samples & Electronic Orders	Budgetary Pricing		Std Pack Size	Package Marking
	Type	# pins		SPICE	IBIS		Quantity	\$US each		
5962-9173801M2A	LCC	20	Full production	N/A	N/A	.	50+	\$8.0000	tube of 50	[logo]çZçSç4çA 54F573 LMQB/QçM\$E 5962- 9173801M2A
5962-9173801MRA	Cerdip	20	Full production	N/A	N/A		50+	\$5.4000	tube of 20	[logo]çZçSç4çA\$E 54F573DMQB /QçM 5962-9173801MRA
JM38510/34604B2	LCC	20	Full production	N/A	N/A	.	50+	\$15.1000	tube of 50	[logo] JM38510 /34604B2A 27014 QS çZçSç4çA\$E
JM38510/34604BR	Cerdip	20	Full production	N/A	N/A	.	50+	\$11.0000	tube of 20	[logo] çZçSç4çA\$E JM38510/34604BRA 27014 QS
JM38510/34604BS	Cerpack	20	Full production	N/A	N/A	.	50+	\$16.0000	tube of 19	[logo]çZçSç4çA\$E JM38510/ 34604BSA 27014 QS

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