National Semiconductor

August 1995

54F/74F379
Quad Parallel Register with Enable

General Description

The ’F379 is a 4-bit register with buffered common Enable. This device is similar to the ’F175 but features the common Enable rather than common Master Reset.

Features

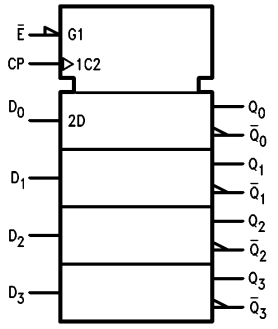
- Edge triggered D-type inputs
- Buffered positive edge-triggered clock
- Buffered common enable input
- True and complement outputs
- Guaranteed 4000V minimum ESD protection

Commercial	Military	Package Number	Package Description
74F379PC		N16E	16-Lead (0.300″ Wide) Molded Dual-In-Line
	54F379DM (QB)	J16A	16-Lead Ceramic Dual-In-Line
74F379SC (Note 1)		M16A	16-Lead (0.300″ Wide) Molded Small Outline, JEDEC
74F379SJ (Note 1)		M16D	16-Lead (0.300″ Wide) Molded Small Outline, EIAJ
	54F379FM (QB)	W16A	16-Lead Cerpack
	54F379LM (QB)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

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

Logic Symbols

IEEE/IEC



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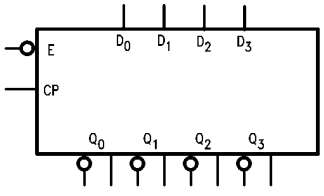

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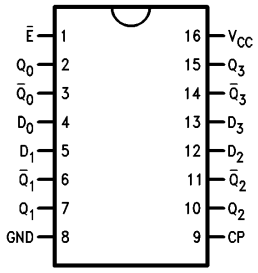
Connection Diagrams

Pin Assignment DIP, SOIC and Flatpak



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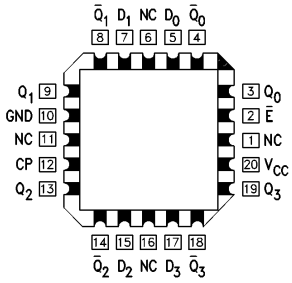
Pin Assignment for LCC



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Unit Loading/Fan Out

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
$\overline{E}$	Enable Input (Active LOW)	1.0/1.0	20 μA/ −0.6 mA
D_0–D_3	Data Inputs	1.0/1.0	20 μA/ −0.6 mA
CP	Clock Pulse Input (Active Rising Edge)	1.0/1.0	20 μA/ −0.6 mA
Q_0–Q_3	Flip-Flop Outputs	50/33.3	−1 mA/20 mA
$\overline{Q}_0$–$\overline{Q}_3$	Complement Outputs	50/33.3	−1 mA/20 mA

Functional Description

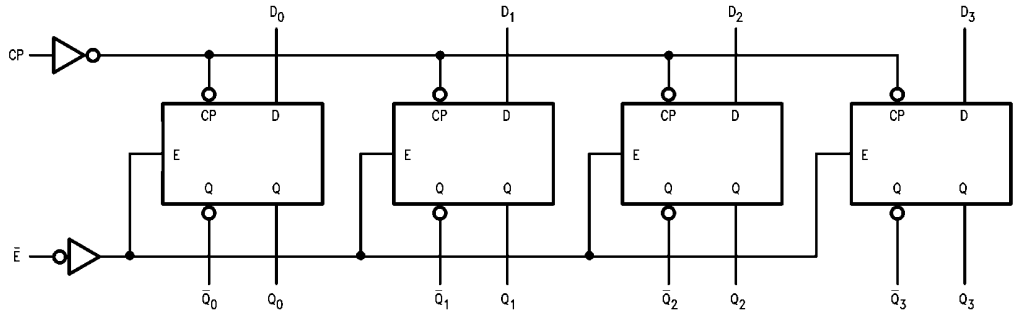
The 'F379 consists of four edge-triggered D-Type flip-flops with individual D inputs and Q and $\overline{Q}$ outputs. The Clock (CP) and Enable ($\overline{E}$) inputs are common to all flip-flops. When the $\overline{E}$ is input HIGH, the register will retain the present data independent of the CP input. The D_n and $\overline{E}$ inputs can change when the clock is in either state, provided that the recommended setup and hold times are observed.

Truth Table

Inputs			Outputs	
$\overline{E}$	CP	D_n	Q_n	$\overline{Q}_n$
H	⌐⌐	X	NC	NC
L	⌐⌐	H	H	L
L	⌐⌐	L	L	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
⌐⌐ = LOW-to-HIGH Transition
NC = No Change

Logic Diagram



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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 Voltge (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 Min	54F/74F Typ	54F/74F 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	54F	10% V_{CC}	2.5			V	Min	I_{OH} = −1 mA
		74F	10% V_{CC}	2.5					I_{OH} = −1 mA
		74F	5% V_{CC}	2.7					I_{OH} = −1 mA
V_{OL}	Output LOW Voltage	54F	10% V_{CC}			0.5	V	Min	I_{OL} = 20 mA
		74F	10% V_{CC}			0.5			I_{OL} = 20 mA
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_{CCL}	Power Supply Current				28	40	mA	Max	V_O = LOW

AC Electrical Characteristics

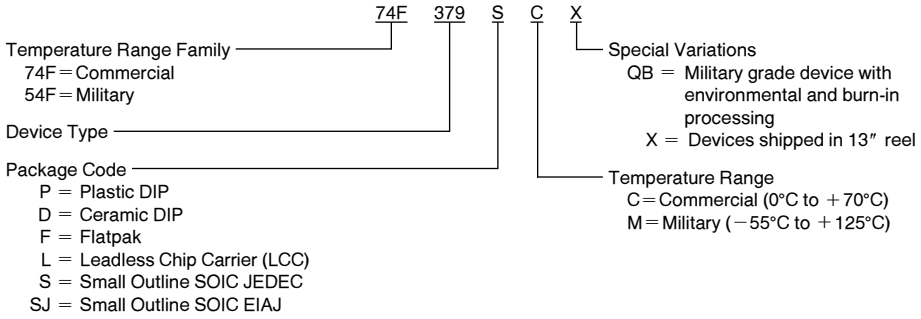
Symbol	Parameter	74F $T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF			54F T_A, V_{CC} = Mil, $C_L = 50$ pF		74F T_A, V_{CC} = Com, $C_L = 50$ pF		Units
		Min	Typ	Max	Min	Max	Min	Max	
f_{max}	Maximum Clock Frequency	100	140		75		100		MHz
t_{PLH}	Propagation Delay	3.5	5.0	6.5	3.0	8.5	3.5	7.5	ns
t_{PHL}	CP to Q_n, $\overline{Q}_n$	5.0	6.5	8.5	4.0	10.0	5.0	9.5	

AC Operating Requirements

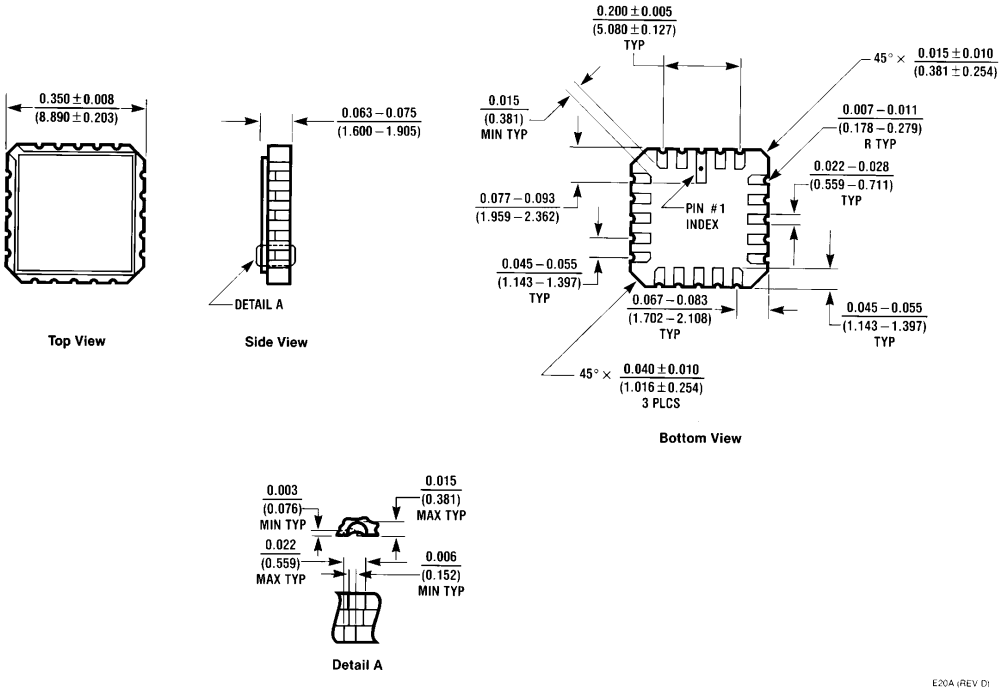
Symbol	Parameter	74F $T_A = +25°C$, $V_{CC} = +5.0V$		54F T_A, V_{CC} = Mil		74F T_A, V_{CC} = Com		Units
		Min	Max	Min	Max	Min	Max	
$t_s(H)$	Setup Time, HIGH or LOW	3.0		4.0			3.0	ns
$t_s(L)$	D_n to CP	3.0		4.0			3.0	
$t_h(H)$	Hold Time, HIGH or LOW	1.0		2.0			1.0	
$t_h(L)$	D_n to CP	1.0		2.0			1.0	
$t_s(H)$	Setup Time, HIGH or LOW	6.0		8.0			6.0	ns
$t_s(L)$	$\overline{E}$ to CP	6.0		8.0			6.0	
$t_h(H)$	Hold Time, HIGH or LOW	0		0			0	
$t_h(L)$	$\overline{E}$ to CP	0		0			0	
$t_w(H)$	CP Pulse Width	4.0		5.0			4.0	ns
$t_w(L)$	HIGH or LOW	5.0		7.0			5.0	

Ordering Information

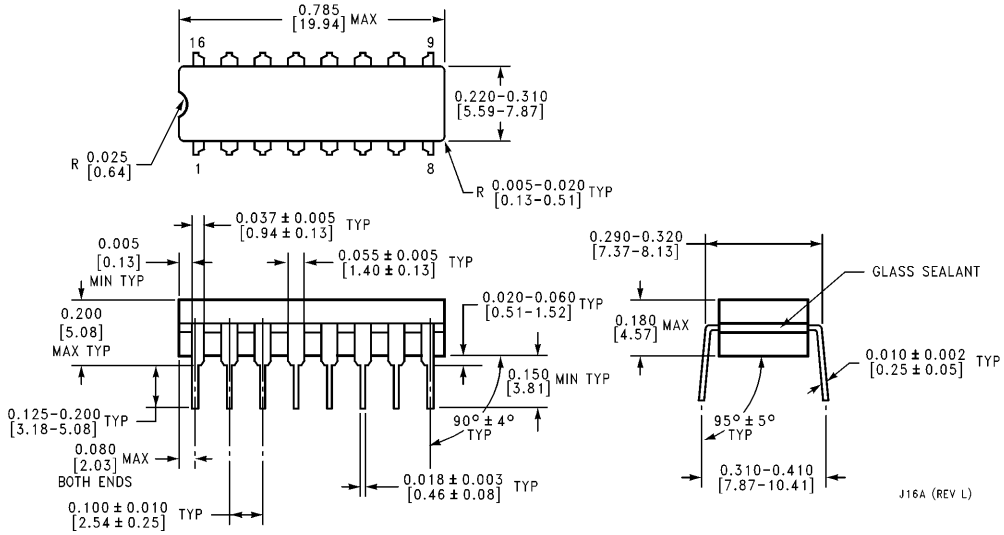
The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



Physical Dimensions inches (millimeters)

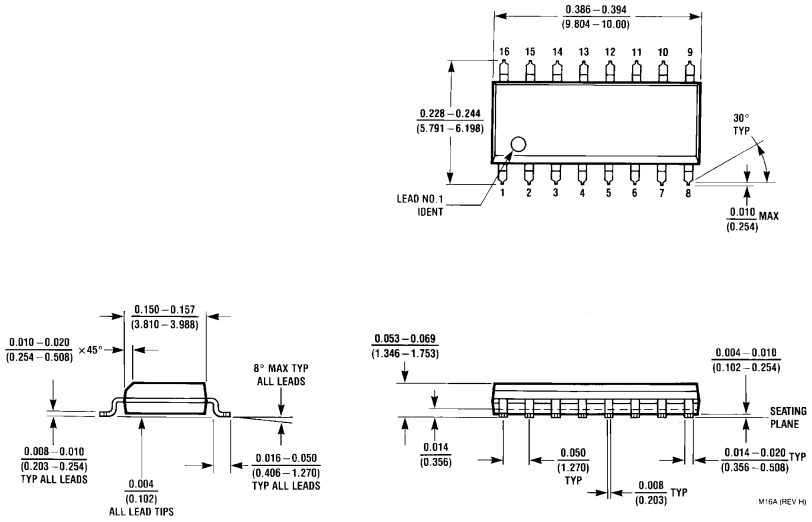


20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

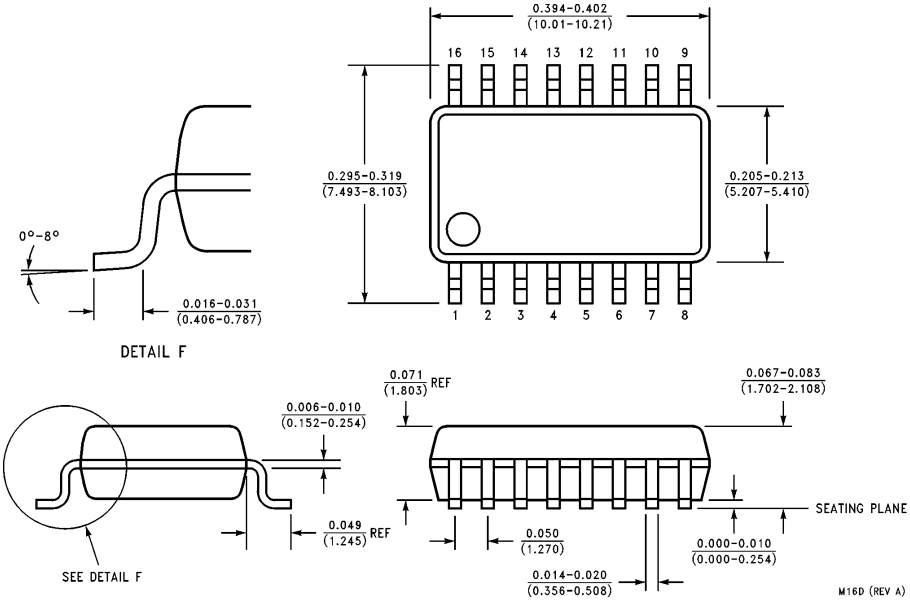


16-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J16A

Physical Dimensions inches (millimeters) (Continued)

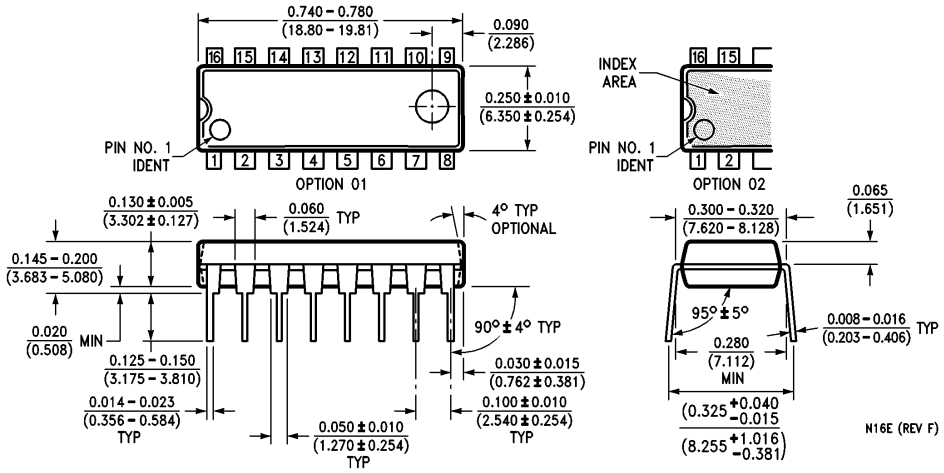


16-Lead (0.150″ Wide) Molded Small Outline Integrated Circuit (S)
NS Package Number M16A



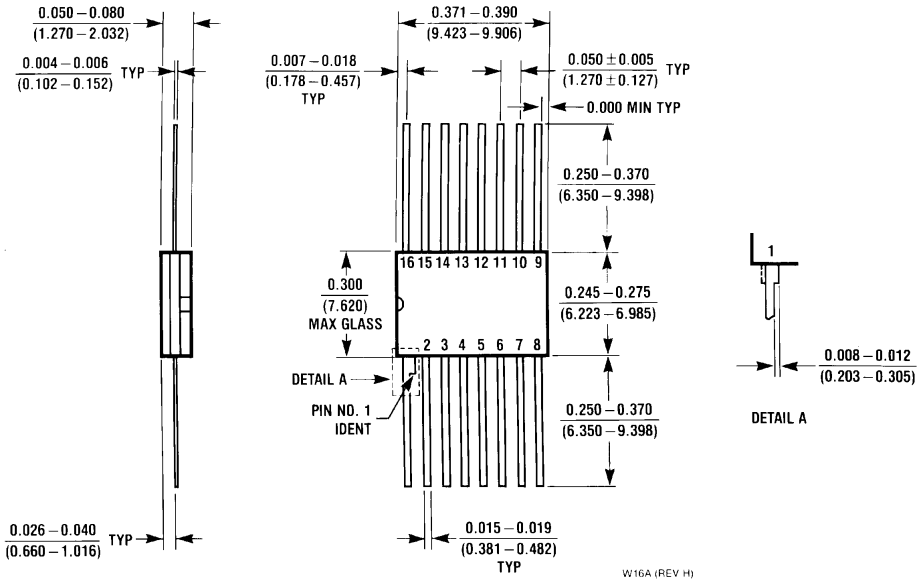
16-Lead (0.300″ Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M16D

Physical Dimensions inches (millimeters) (Continued)



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

Physical Dimensions inches (millimeters) (Continued)



16-Lead Ceramic Flatpak (F)
NS Package Number W16A

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