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FAIRCHILD SEMICONDUCTOR™

April 1988
Revised October 2000

74F579
8-Bit Bidirectional Binary Counter with 3-STATE Outputs

General Description

The 74F579 is a fully synchronous 8-stage up/down counter with multiplexed 3-STATE I/O ports for bus-oriented applications. It features a preset capability for programmable operation, carry lookahead for easy cascading and a U/$\overline{D}$ input to control the direction of counting. All state changes, whether in counting or parallel loading, are initiated by the rising edge of the clock.

Features

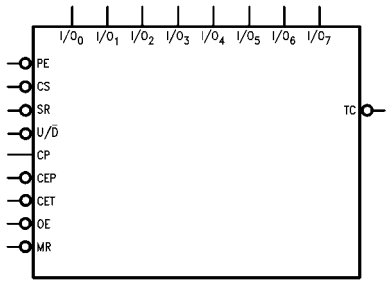
- Multiplexed 3-STATE I/O ports
- Built-in lookahead carry capability
- Count frequency 100 MHz typical
- Supply current 75 mA typical
- Guaranteed 4000V minimum ESD protection

Ordering Code:

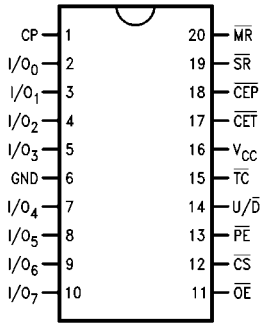
Order Number	Package Number	Package Description
74F579SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74F579SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F579PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

Logic Symbol



Connection Diagram



Unit Loading/Fan Out

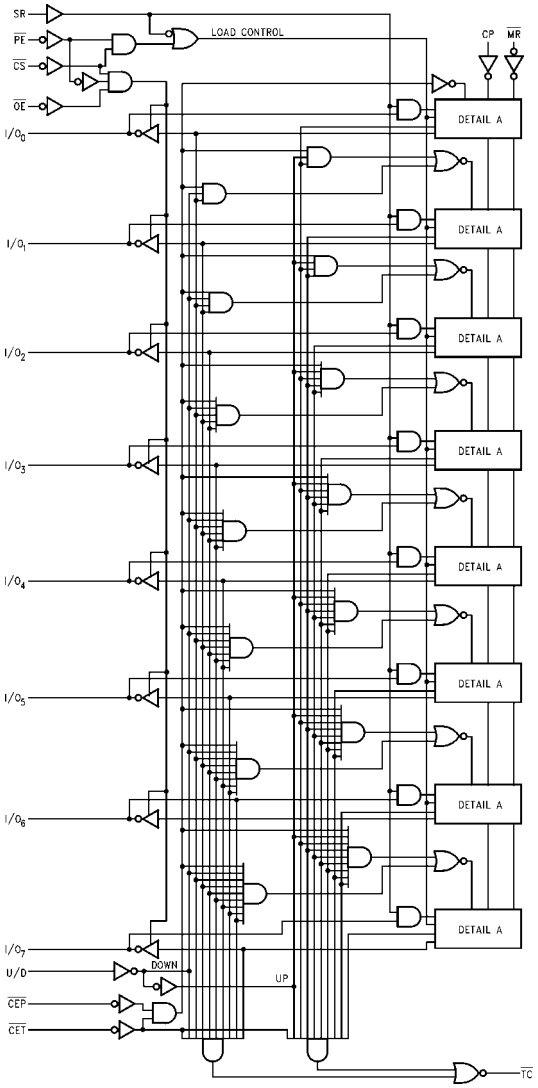
Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
I/O_0–I/O_7	Data Inputs or	3.5/0.333	70 μA/–0.2 mA
	3-STATE Outputs	75/15	–3 mA/24 mA
$\overline{PE}$	Parallel Enable Input (Active LOW)	0.25/0.333	5 μA/–0.2 mA
U/$\overline{D}$	Up-Down Count Control Input	0.25/0.333	5 μA/–0.2 mA
$\overline{MR}$	Master Reset Input (Active LOW)	0.25/0.333	5 μA/–0.2 mA
$\overline{SR}$	Synchronous Reset Input (Active LOW)	0.25/0.333	5 μA/–0.2 mA
$\overline{CEP}$	Count Enable Parallel Input (Active LOW)	0.25/0.333	5 μA/–0.2 mA
$\overline{CET}$	Count Enable Trickle Input (Active LOW)	0.25/0.333	5 μA/–0.2 mA
$\overline{CS}$	Chip Select Input Active (Active LOW)	0.25/0.333	5 μA/–0.2 mA
$\overline{OE}$	Output Enable Input (Active LOW)	0.25/0.333	5 μA/–0.2 mA
CP	Clock Pulse Input (Active Rising Edge)	0.25/0.333	5 μA/–0.2 mA
$\overline{TC}$	Terminal Count Output (Active LOW)	25/12.5	–1 mA/5 mA

Function Table

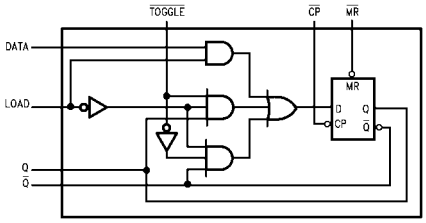
$\overline{MR}$	$\overline{SR}$	$\overline{CS}$	$\overline{PE}$	$\overline{CEP}$	$\overline{CET}$	U/$\overline{D}$	$\overline{OE}$	CP	Function
X	X	H	X	X	X	X	X	X	I/O_a to I/O_h in High Z ($\overline{PE}$ Disabled)
X	X	L	H	X	X	X	H	X	I/O_a to I/O_h in High Z
X	X	L	H	X	X	X	L	X	Flip-Flop Outputs Appear on I/O Lines
L	X	X	X	X	X	X	X	X	Asynchronous Reset for all Flip-Flops
H	L	X	X	X	X	X	X	⌐	Synchronous Reset for all Flip-Flops
H	H	L	L	X	X	X	X	⌐	Parallel Load all Flip-Flops
H	H	(Not LL)	H	X	X	X	X	⌐	Hold
H	H	(Not LL)	X	H	X	X	X	⌐	Hold ($\overline{TC}$ Held HIGH)
H	H	(Not LL)	L	L	H	X	X	⌐	Count Up
H	H	(Not LL)	L	L	L	X	X	⌐	Count Down

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
⌐ = LOW to HIGH Clock Transition
Not LL = $\overline{CS}$ and $\overline{PE}$ should never both be LOW voltage level at the same time.

Logic Diagrams



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



V_{CC} = Pin 16 GND = Pin 6 () = Pin Numbers

Detail A

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)
ESD Last Passing Voltage (Min)	4000V

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}	2.4			V	Min	I_{OH} = −3 mA
		5% V_{CC}	2.7					
V_{OL}	Output LOW Voltage	10% V_{CC}			0.5	V	Min	I_{OL} = 20 mA ($\overline{TC}$), I_{OL} = 24 mA (I/O_n)
		5% V_{CC}			0.5			I_{OL} = 20 mA ($\overline{TC}$), I_{OL} = 24 mA (I/O_n)
I_{IH}	Input HIGH Current				5.0	µA	Max	V_{IN} = 2.7V (Non-I/O Pins)
I_{BVI}	Input HIGH Current Breakdown Test				7.0	µA	Max	V_{IN} = 7.0V (Non-I/O Pins)
I_{BVIT}	Input HIGH Current Breakdown (I/O)				0.5	mA	Max	V_{IN} = 5.5V (I/O_n)
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 Control				3.75	µA	0.0	V_{IOD} = 150 mV All Other Pins Grounded
I_{ZZ}	Bus Drainage Test				500	µA	0.0	V_{OUT} = 5.25V
I_{IL}	Input LOW Current				−0.2	mA	Max	V_{IN} = 0.5V (Non-I/O Pins)
I_{IH} & I_{OZH}	Output Leakage Current				70	µA	Max	V_{OUT} = 2.7V (I/O_n)
I_{IL} & I_{OZL}	Output Leakage Current				−200	µA	Max	V_{OUT} = 0.5V (I/O_n)
I_{OS}	Output Short-Circuit Current		−60		−150	mA	Max	V_{OUT} = 0V
I_{CCH}	Power Supply Current			70	110	mA	Max	V_O = HIGH
I_{CCL}	Power Supply Current			85	120	mA	Max	V_O = LOW
I_{CCZ}	Power Supply Current			85	125	mA	Max	V_O = HIGH Z

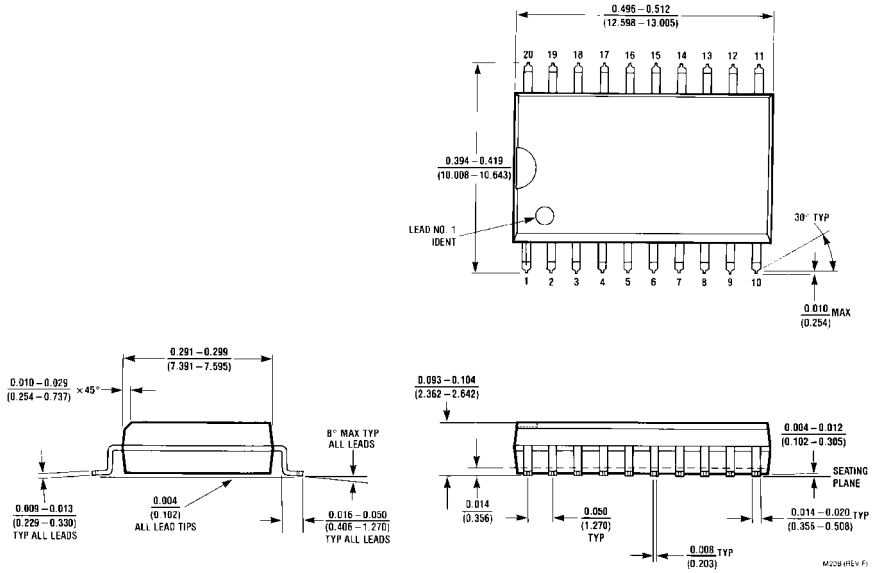
AC Electrical Characteristics

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	70	85		80		
t_{PLH}	Propagation Delay	3.0	5.0	7.5	3.0	8.0	ns
t_{PHL}	CP to I/O_n	5.0	8.0	11.5	5.0	11.5	
t_{PLH}	Propagation Delay	5.0	7.5	11.5	5.0	12.0	ns
t_{PHL}	CP to $\overline{TC}$	5.0	7.0	11.5	5.0	12.0	
t_{PLH}	Propagation Delay	4.5	7.0	9.0	4.5	10.0	ns
t_{PHL}	U/$\overline{D}$ to $\overline{TC}$	4.5	8.0	9.5	4.5	10.0	
t_{PLH}	Propagation Delay	2.5	3.8	6.0	2.5	6.5	ns
t_{PHL}	$\overline{CEP}$ or $\overline{CET}$ to $\overline{TC}$	3.5	6.0	8.0	3.5	8.5	
t_{PHL}	Propagation Delay $\overline{MR}$ to I/O_n	5.0	7.5	10.0	5.0	10.0	ns
t_{PHL}	Propagation Delay $\overline{MR}$ to TC	6.5	10.0	13.0	6.5	13.5	ns
t_{PZH}	Output Enable Time	3.0	5.0	8.5	3.0	9.0	ns
t_{PZL}	$\overline{CS}$ or $\overline{PE}$ to I/O	5.5	8.0	10.5	5.5	11.5	
t_{PHZ}	Output Disable Time	2.0	5.0	8.5	2.0	9.0	ns
t_{PLZ}	$\overline{CS}$ or $\overline{PE}$ to I/O	2.0	4.5	8.0	2.0	8.5	
t_{PZH}	Output Enable Time	3.0	5.0	8.0	3.0	8.5	ns
t_{PZL}	$\overline{OE}$ to I/O_n	5.0	8.0	11.0	5.0	12.0	
t_{PHZ}	Output Disable Time	2.0	4.0	6.5	2.0	6.5	ns
t_{PLZ}	$\overline{OE}$ to I/O_n	2.0	4.0	6.0	2.0	6.5	

AC Operating Requirements

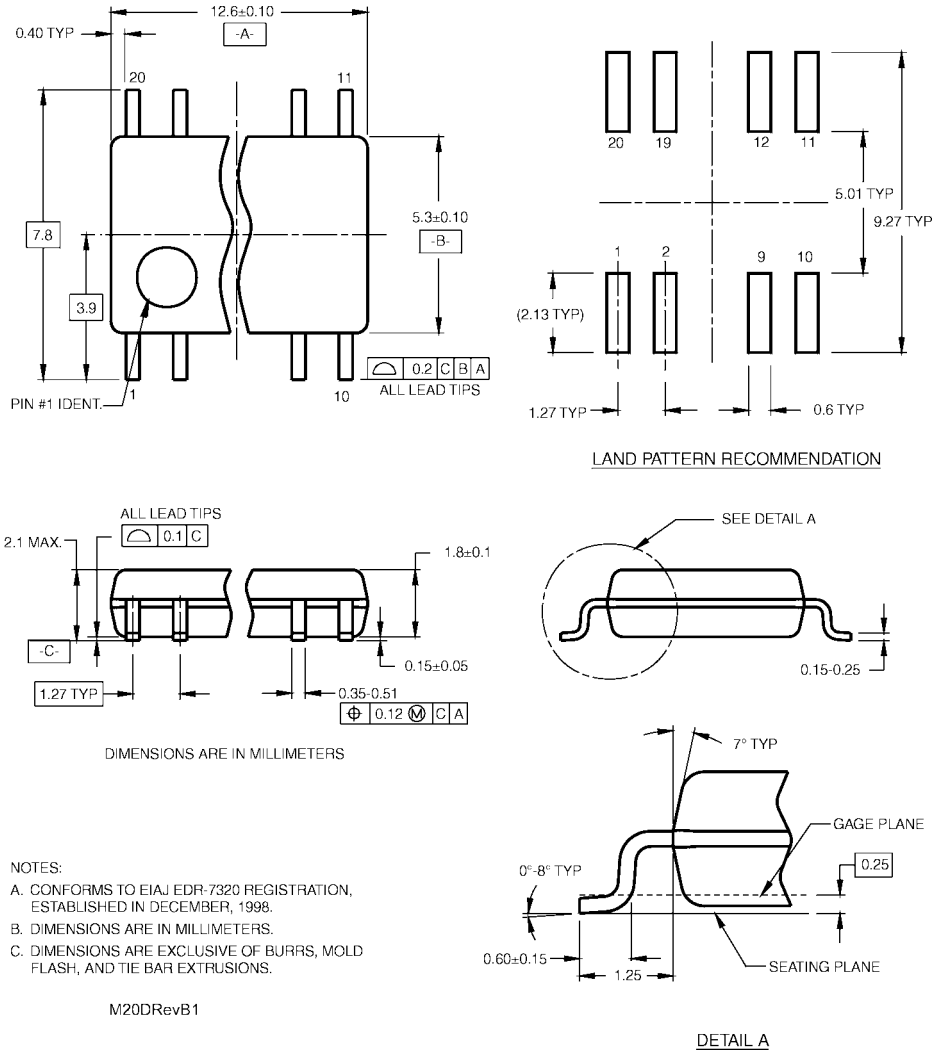
Symbol	Parameter	$T_A = +25°C$, $V_{CC} = +5.0V$			$T_A = 0°C$ to $+70°C$, $V_{CC} = +5.0V$		Units
		Min	Typ	Max	Min	Max	
$t_S(H)$	Setup Time	4.0			4.0		ns
$t_S(L)$	I/O_n to CP	4.0			4.0		
$t_H(H)$	Hold Time	0.0			0.0		ns
$t_H(L)$	I/O_n to CP	0.0			0.0		
$t_S(H)$	Setup Time	9.5			9.5		ns
$t_S(L)$	$\overline{PE}$, $\overline{CS}$ or $\overline{SR}$ to CP	9.5			9.5		
$t_H(H)$	Hold Time	0.0			0.0		ns
$t_H(L)$	$\overline{PE}$, $\overline{CS}$ or $\overline{SR}$ to CP	0.0			0.0		
$t_S(H)$	Setup Time	6.5			6.5		ns
$t_S(L)$	$\overline{CET}$ or $\overline{CEP}$ to CP	9.5			9.5		
$t_H(H)$	Hold Time	0.0			0.0		ns
$t_H(L)$	$\overline{CET}$ or $\overline{CEP}$ to CP	0.0			0.0		
$t_S(H)$	Setup Time	9.0			9.5		ns
$t_S(L)$	U/$\overline{D}$ to CP	9.0			9.5		
$t_H(H)$	Hold Time	0.0			0.0		ns
$t_H(L)$	U/$\overline{D}$ to CP	0.0			0.0		
$t_W(H)$	Clock Pulse Width	4.5			4.5		ns
$t_W(L)$	HIGH or LOW	4.5			4.5		
$t_W(L)$	$\overline{MR}$ Pulse Width	3.0			3.0		ns
t_{REC}	Recovery Time $\overline{MR}$ to CP	4.0			4.0		ns

Physical Dimensions inches (millimeters) unless otherwise noted



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

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



NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

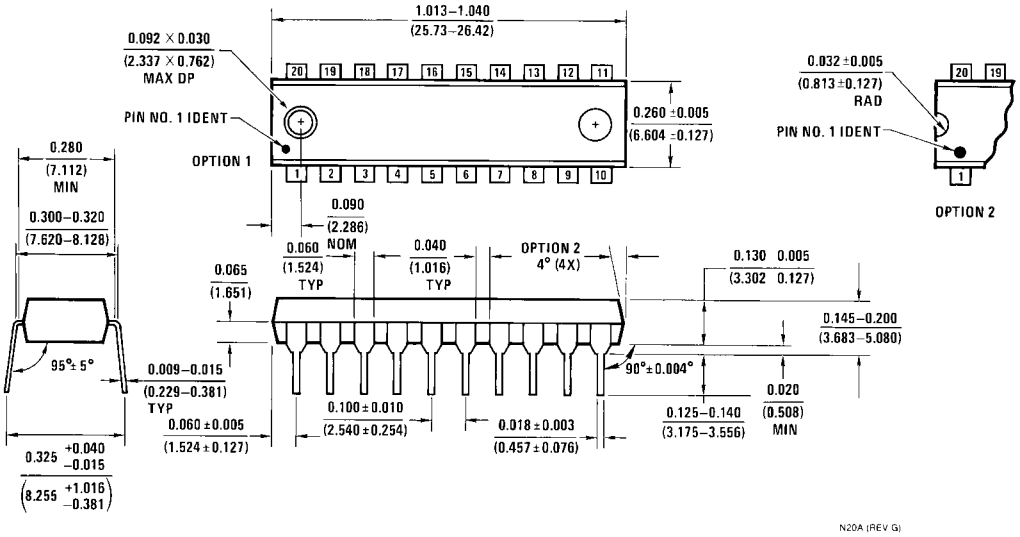
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

20-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