

## 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  $U/\bar{D}$  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

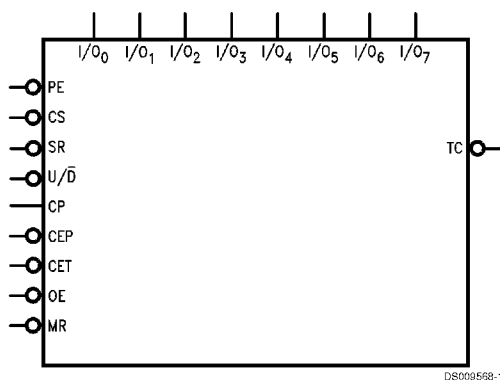
- Multiplexed 3-STATE I/O ports
- Built-in lookahead carry capability
- Count frequency 100 MHz typical
- Supply current 75 mA typical
- Guaranteed 4000V minimum ESD protection

### Ordering Code:

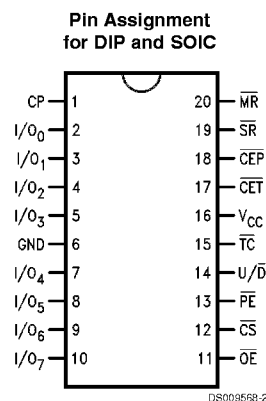
Commercial	Package Number	Package Description
74F579PC	N20A	20-Lead (0.300" Wide) Molded Dual-In-Line
74F579SC (Note 1)	M20B	20-Lead (0.300" Wide) Molded Small Outline, JEDEC
74F579SJ (Note 1)	M20D	20-Lead (0.300" Wide) Molded Small Outline, EIAJ

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

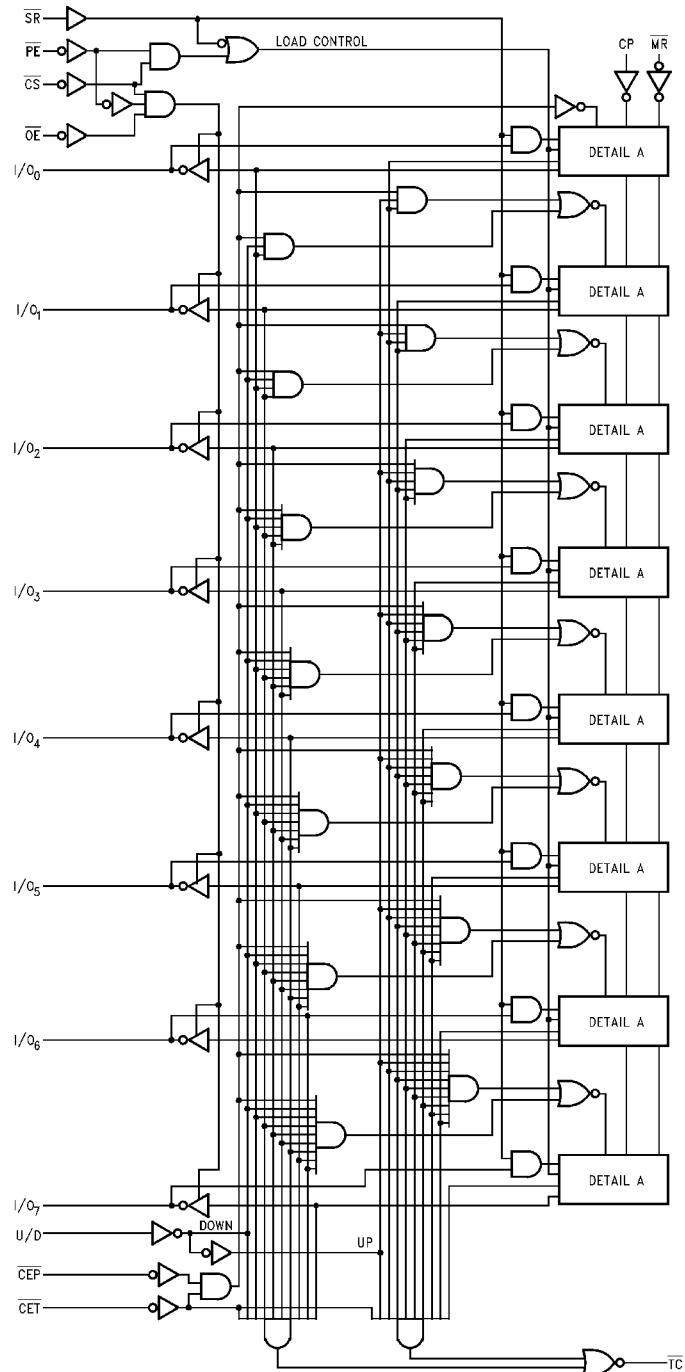
### Logic Symbol



### Connection Diagram



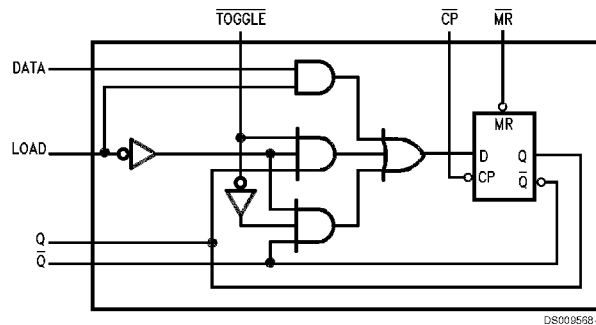
# Logic Diagram



DS000568-5

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

## Logic Diagram (Continued)



V<sub>CC</sub> = Pin 16  
 GND = Pin 6  
 ( ) = Pin Numbers

Detail A

## Unit Loading/Fan Out

Pin Names	Description	74F	
		U.L. HIGH/LOW	Input I <sub>IH</sub> /I <sub>IL</sub> Output I <sub>OH</sub> /I <sub>OL</sub>
I/O <sub>0</sub> –I/O <sub>7</sub>	Data Inputs or 3-STATE Outputs	3.5/0.333 75/15	70 μA/–0.2 mA –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

## Unit Loading/Fan Out (Continued)

### 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 <sub>a</sub> to I/O <sub>h</sub> in High Z ( $\overline{PE}$ Disabled)
X	X	L	H	X	X	X	H	X	I/O <sub>a</sub> to I/O <sub>h</sub> 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	↘	Hold
H	H	(Not LL)		X	H	X	X	↘	Hold ( $\overline{TC}$ Held HIGH)
H	H	(Not LL)		L	L	H	X	↘	Count Up
H	H	(Not LL)		L	L	L	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.

## Absolute Maximum Ratings (Note 2)

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 <sub>CC</sub> Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 3)	-0.5V to +7.0V
Input Current (Note 3)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V <sub>CC</sub> = 0V)	
Standard Output	-0.5V to V <sub>CC</sub>
3-STATE Output	-0.5V to +5.5V
Current Applied to Output	

in LOW State (Max) twice the rated I<sub>OL</sub> (mA)  
ESD Last Passing Voltage (Min) 4000V

## Recommended Operating Conditions

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

**Note 2:** 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 3:** Either voltage limit or current limit is sufficient to protect inputs.

## DC Electrical Characteristics

Symbol	Parameter	74F			Units	V <sub>CC</sub>	Conditions
		Min	Typ	Max			
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage	0.8			V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage	-1.2			V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	74F 10% V <sub>CC</sub>	2.4		V	Min	I <sub>OH</sub> = -3 mA
		74F 5% V <sub>CC</sub>	2.7				
V <sub>OL</sub>	Output LOW Voltage	74F 10% V <sub>CC</sub>	0.5		V	Min	I <sub>OL</sub> = 20 mA ( $\overline{TC}$ ), I <sub>OL</sub> = 24 mA (I/O <sub>n</sub> )
		74F 5% V <sub>CC</sub>	0.5				
I <sub>IH</sub>	Input HIGH Current	74F	5.0		μA	Max	V <sub>IN</sub> = 2.7V (Non-I/O Pins)
I <sub>BVI</sub>	Input HIGH Current Breakdown Test	74F	7.0		μA	Max	V <sub>IN</sub> = 7.0V (Non-I/O Pins)
I <sub>BVIT</sub>	Input HIGH Current Breakdown (I/O)	74F	0.5		mA	Max	V <sub>IN</sub> = 5.5V (I/O <sub>n</sub> )
I <sub>CEX</sub>	Output HIGH Leakage Current	74F	50		μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>
V <sub>ID</sub>	Input Leakage Test	74F	4.75		V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Control	3.75			μA	0.0	V <sub>IOD</sub> = 150 mV All Other Pins Grounded
		500					
I <sub>ZZ</sub>	Bus Drainage Test	500			μA	0.0	V <sub>OUT</sub> = 5.25V
I <sub>IL</sub>	Input LOW Current	-0.2			mA	Max	V <sub>IN</sub> = 0.5V (Non-I/O Pins)
I <sub>IH</sub> & I <sub>OZH</sub>	Output Leakage Current	70			μA	Max	V <sub>OUT</sub> = 2.7V (I/O <sub>n</sub> )
I <sub>IL</sub> & I <sub>OZL</sub>	Output Leakage Current	-200			μA	Max	V <sub>OUT</sub> = 0.5V (I/O <sub>n</sub> )
I <sub>OS</sub>	Output Short-Circuit Current	-60	-150		mA	Max	V <sub>OUT</sub> = 0V
I <sub>CCH</sub>	Power Supply Current	70	110		mA	Max	V <sub>O</sub> = HIGH
I <sub>CCL</sub>	Power Supply Current	85	120		mA	Max	V <sub>O</sub> = LOW
I <sub>CCZ</sub>	Power Supply Current	85	125		mA	Max	V <sub>O</sub> = HIGH Z

## AC Electrical Characteristics

Symbol	Parameter	74F			74F		Units
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF			T <sub>A</sub> , V <sub>CC</sub> = Comm C <sub>L</sub> = 50 pF		
		Min	Typ	Max	Min	Max	
f <sub>max</sub>	Maximum Clock Frequency	70	85		80		
t <sub>PLH</sub>	Propagation Delay	3.0	5.0	7.5	3.0	8.0	ns
t <sub>PHL</sub>	CP to I/O <sub>n</sub>	5.0	8.0	11.5	5.0	11.5	
t <sub>PLH</sub>	Propagation Delay	5.0	7.5	11.5	5.0	12.0	ns
t <sub>PHL</sub>	CP to $\overline{TC}$	5.0	7.0	11.5	5.0	12.0	
t <sub>PLH</sub>	Propagation Delay	4.5	7.0	9.0	4.5	10.0	ns
t <sub>PHL</sub>	U/ $\overline{D}$ to $\overline{TC}$	4.5	8.0	9.5	4.5	10.0	
t <sub>PLH</sub>	Propagation Delay	2.5	3.8	6.0	2.5	6.5	ns
t <sub>PHL</sub>	$\overline{CEP}$ or $\overline{CET}$ to $\overline{TC}$	3.5	6.0	8.0	3.5	8.5	
t <sub>PHL</sub>	Propagation Delay	5.0	7.5	10.0	5.0	10.0	ns
t <sub>PHL</sub>	$\overline{MR}$ to I/O <sub>n</sub>						
t <sub>PHL</sub>	Propagation Delay	6.5	10.0	13.0	6.5	13.5	ns
t <sub>PHL</sub>	$\overline{MR}$ to TC						
t <sub>PZH</sub>	Output Enable Time	3.0	5.0	8.5	3.0	9.0	ns
t <sub>PZL</sub>	$\overline{CS}$ or $\overline{PE}$ to I/O	5.5	8.0	10.5	5.5	11.5	
t <sub>PHZ</sub>	Output Disable Time	2.0	5.0	8.5	2.0	9.0	ns
t <sub>PLZ</sub>	$\overline{CS}$ or $\overline{PE}$ to I/O	2.0	4.5	8.0	2.0	8.5	
t <sub>PZH</sub>	Output Enable Time	3.0	5.0	8.0	3.0	8.5	ns
t <sub>PZL</sub>	$\overline{OE}$ to I/O <sub>n</sub>	5.0	8.0	11.0	5.0	12.0	
t <sub>PHZ</sub>	Output Disable Time	2.0	4.0	6.5	2.0	6.5	ns
t <sub>PLZ</sub>	$\overline{OE}$ to I/O <sub>n</sub>	2.0	4.0	6.0	2.0	6.5	

## AC Operating Requirements

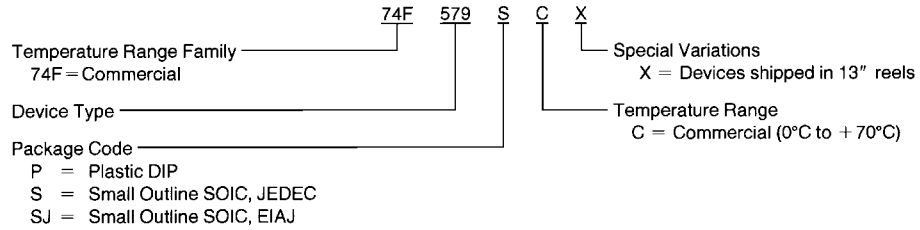
Symbol	Parameter	74F			74F		Units
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V			T <sub>A</sub> , V <sub>CC</sub> = Comm		
		Min	Typ	Max	Min	Max	
t <sub>s</sub> (H)	Setup Time	4.0			4.0		ns
t <sub>s</sub> (L)	I/O <sub>n</sub> to CP	4.0			4.0		
t <sub>h</sub> (H)	Hold Time	0.0			0.0		ns
t <sub>h</sub> (L)	I/O <sub>n</sub> to CP	0.0			0.0		
t <sub>s</sub> (H)	Setup Time	9.5			9.5		ns
t <sub>s</sub> (L)	$\overline{PE}$ , $\overline{CS}$ or $\overline{SR}$ to CP	9.5			9.5		
t <sub>h</sub> (H)	Hold Time	0.0			0.0		ns
t <sub>h</sub> (L)	$\overline{PE}$ , $\overline{CS}$ or $\overline{SR}$ to CP	0.0			0.0		
t <sub>s</sub> (H)	Setup Time	6.5			6.5		ns
t <sub>s</sub> (L)	$\overline{CET}$ or $\overline{CEP}$ to CP	9.5			9.5		
t <sub>h</sub> (H)	Hold Time	0.0			0.0		ns
t <sub>h</sub> (L)	$\overline{CET}$ or $\overline{CEP}$ to CP	0.0			0.0		
t <sub>s</sub> (H)	Setup Time	9.0			9.5		ns
t <sub>s</sub> (L)	U/ $\overline{D}$ to CP	9.0			9.5		
t <sub>h</sub> (H)	Hold Time	0.0			0.0		ns
t <sub>h</sub> (L)	U/ $\overline{D}$ to CP	0.0			0.0		

## AC Operating Requirements (Continued)

Symbol	Parameter	74F			74F		Units
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V			T <sub>A</sub> , V <sub>CC</sub> = Comm		
		Min	Typ	Max	Min	Max	
t <sub>w</sub> (H)	Clock Pulse Width	4.5			4.5		ns
t <sub>w</sub> (L)	High or Low	4.5			4.5		
t <sub>w</sub> (L)	$\overline{\text{MR}}$ Pulse Width	3.0			3.0		ns
t <sub>rec</sub>	Recovery Time $\overline{\text{MR}}$ to CP	4.0			4.0		ns

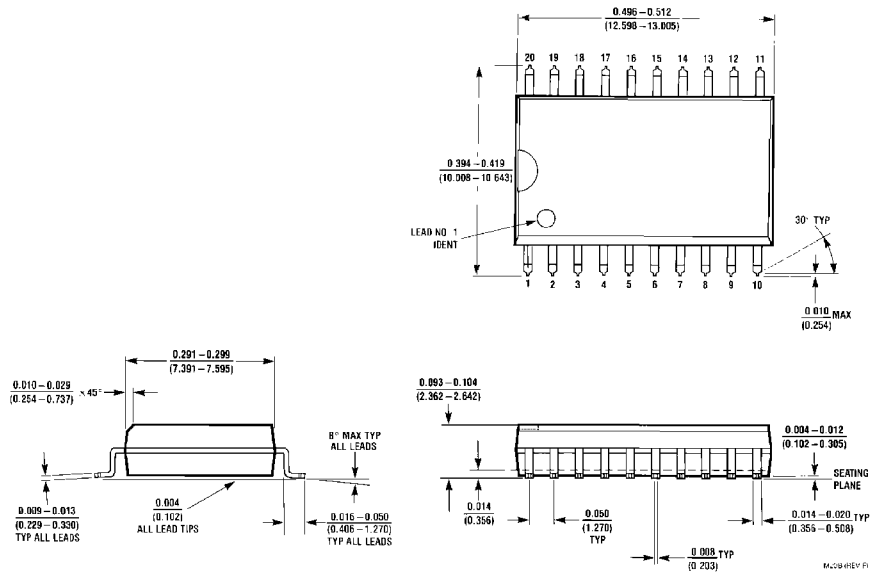
## Ordering Information

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



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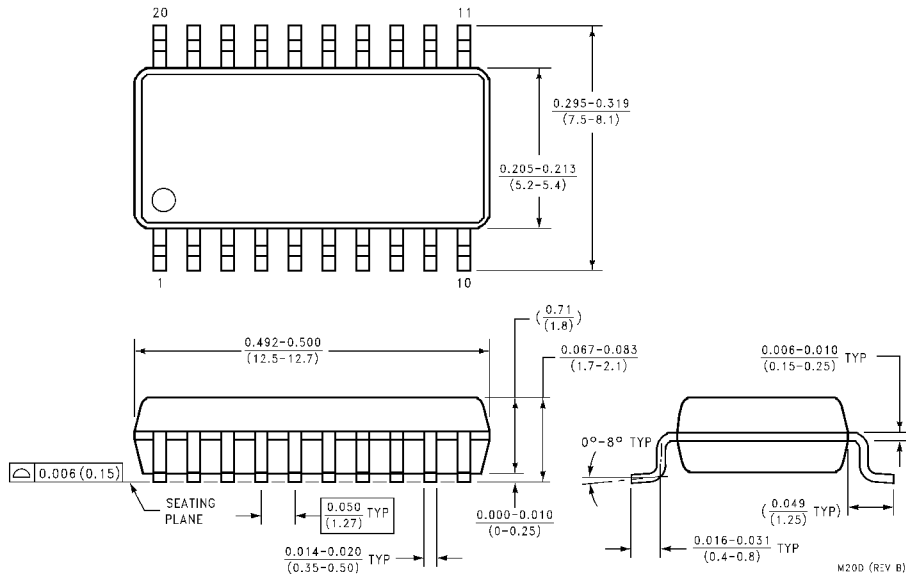
## Physical Dimensions inches (millimeters) unless otherwise noted



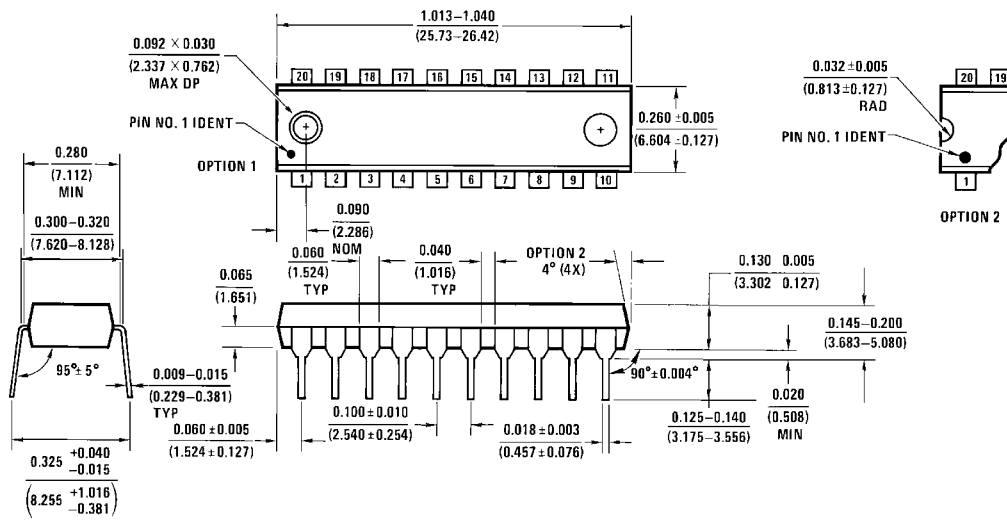
20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC (S)  
 Package Number M20B



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



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



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

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