



# 54F/74F2620 • 54F/74F2623 Inverting Octal Bus Transceiver with 25Ω Series Resistors in the Outputs

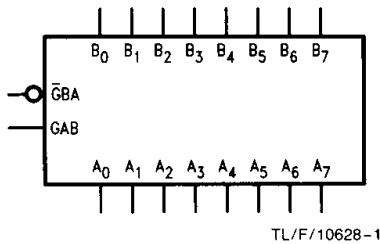
## General Description

These devices are octal bus transceivers designed for asynchronous two-way data flow between the A and B busses. These devices are functionally equivalent to the 'F620 and 'F623. The 25Ω series resistors in the outputs reduce ringing and eliminate the need for external resistors. Both busses are capable of sinking 12 mA, sourcing 15 mA, and have TRI-STATE outputs. Dual enable pins (GAB,  $\bar{G}BA$ ) allow data transmission from the A bus to the B bus or from the B bus to the A bus. The 'F2620 is an inverting option of the 'F2623.

## Features

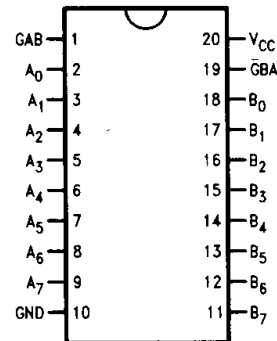
- 25Ω series resistors in the outputs eliminate the need for external resistors.
- Designed for asynchronous two-way data flow between busses
- Outputs sink 12 mA and source 15 mA
- Dual enable inputs control direction of data flow
- Guaranteed 4000V minimum ESD protection
- 'F2620 is an inverting option of the 'F2623

## Logic Symbol



## Connection Diagrams

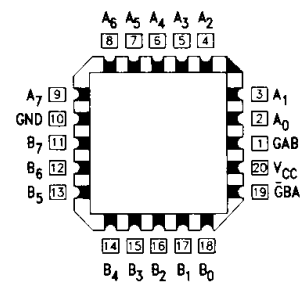
Pin Assignment for  
DIP, SOIC and Flatpak



## Unit Loading/Fan Out

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$\bar{G}BA, GAB$	Enable Inputs	1.0/1.0	20 $\mu A$ / -0.6 mA
$A_0-A_7$	A Inputs or TRI-STATE Outputs	3.5/0.667	70 $\mu A$ / -0.4 mA -15 mA/12 mA
$B_0-B_7$	B Inputs or TRI-STATE Outputs	3.5/0.667	70 $\mu A$ / -0.4 mA -15 mA/12 mA

Pin Assignment  
for LCC



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## Functional Description

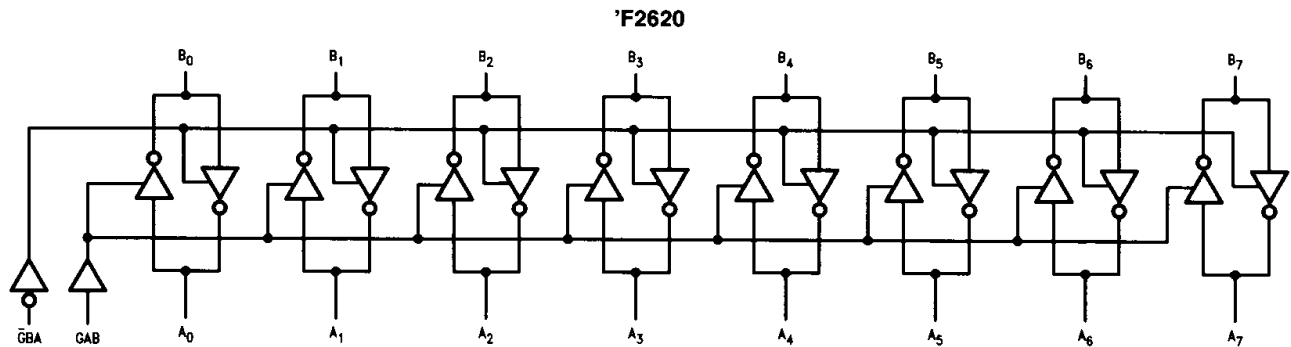
The enable inputs GAB and  $\overline{\text{GBA}}$  control whether data is transmitted from the A bus to the B bus or from the B bus to the A bus. If both  $\overline{\text{GBA}}$  and GAB are disabled ( $\overline{\text{GBA}}$  HIGH and GAB low), the outputs are in the high impedance state and data is stored at the A and B busses. When  $\overline{\text{GBA}}$  is active (LOW), B data is sent to the A bus. When GAB is active (HIGH), data from the A bus is sent to the B bus. If both enable inputs are active ( $\overline{\text{GBA}}$  LOW and GAB HIGH) B data is sent to the A bus while A data is sent to the B bus.

Function Table

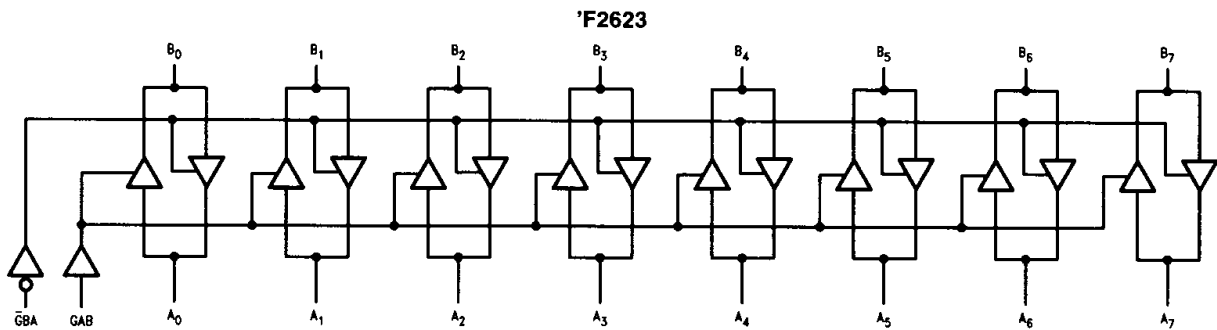
Enable Inputs		Operation	
$\overline{\text{GBA}}$	GAB	'F2620	'F2623
L	L	$\overline{\text{B}}$ Data to A Bus	B Data to A Bus
H	H	$\overline{\text{A}}$ Data to B Bus	A Data to B Bus
H	L	Z	Z
L	H	$\overline{\text{B}}$ Data to A Bus, $\overline{\text{A}}$ Data to B Bus	B Data to A Bus, A Data to B Bus

H = HIGH Voltage Level  
L = LOW Voltage Level  
Z = High Impedance

## 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.



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## 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
V <sub>CC</sub> 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

**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.

Voltage Applied to Output in HIGH State (with V <sub>CC</sub> = 0V)	-0.5V to V <sub>CC</sub>
Standard Output	-0.5V to +5.5V
TRI-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	-55°C to +125°C
Military	0°C to +70°C
Commercial	
Supply Voltage	+4.5V to +5.5V
Military	+4.5V to +5.5V
Commercial	

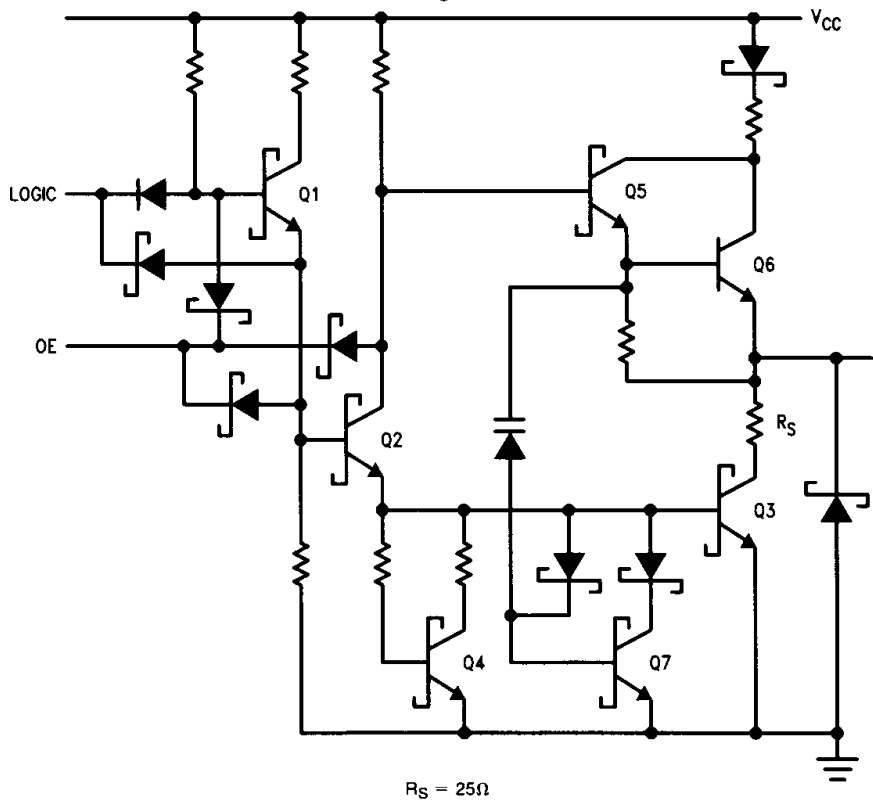
## DC Electrical Characteristics

Symbol	Parameter	54F/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 (Non I/O Pins)	
V <sub>OH</sub>	Output HIGH Voltage	54F 10% V <sub>CC</sub>	2.0		V	Min	I <sub>OH</sub> = -12 mA (A <sub>n</sub> , B <sub>n</sub> ) I <sub>OH</sub> = -15 mA (A <sub>n</sub> , B <sub>n</sub> )	
		74F 10% V <sub>CC</sub>	2.0					
V <sub>OL</sub>	Output LOW Voltage			0.5	V	Min	I <sub>OL</sub> = 1.0 mA (A <sub>n</sub> , B <sub>n</sub> ) I <sub>OL</sub> = 12 mA (A <sub>n</sub> , B <sub>n</sub> )	
				0.75				
I <sub>IH</sub>	Input HIGH Current	54F		20.0	μA	Max	V <sub>IN</sub> = 2.7V (Non I/O Pins)	
		74F		5.0				
I <sub>BVI</sub>	Input HIGH Current Breakdown Test	54F		100	μA	Max	V <sub>IN</sub> = 7.0V (Non I/O Pins)	
		74F		7.0				
I <sub>BVIT</sub>	Input HIGH Current Breakdown Test (I/O)	54F		1.0	mA	Max	V <sub>IN</sub> = 5.5V (A <sub>n</sub> , B <sub>n</sub> )	
		74F		0.5				
I <sub>CEX</sub>	Output HIGH Leakage Current	54F		250	μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>	
		74F		50				
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 Current	74F		3.75	μA	0.0	V <sub>IOD</sub> = 150 mV All Other Pins Grounded	
I <sub>IL</sub>	Input LOW Current			-0.6	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 (A <sub>n</sub> , B <sub>n</sub> )	
I <sub>IL</sub> + I <sub>OZL</sub>	Output Leakage Current			-650	μA	Max	V <sub>OUT</sub> = 0.5V (A <sub>n</sub> , B <sub>n</sub> )	
I <sub>OS</sub>	Output Short-Circuit Current			-100	-225	mA	Max	V <sub>OUT</sub> = 0V
I <sub>ZZ</sub>	Bus Drainage Test				500	μA	0.0V	V <sub>OUT</sub> = 5.25V
I <sub>CCH</sub>	Power Supply Current ('F2620)				82	mA	Max	V <sub>O</sub> = HIGH, V <sub>IN</sub> = 0.2V
I <sub>CCL</sub>	Power Supply Current ('F2620)				82	mA	Max	V <sub>O</sub> = LOW
I <sub>CCZ</sub>	Power Supply Current ('F2620)				95	mA	Max	V <sub>O</sub> = HIGH Z
I <sub>CCH</sub>	Power Supply Current ('F2623)				82	mA	Max	V <sub>O</sub> = HIGH
I <sub>CCL</sub>	Power Supply Current ('F2623)				82	mA	Max	V <sub>O</sub> = LOW, V <sub>IN</sub> = 0.2V
I <sub>CCZ</sub>	Power Supply Current ('F2623)				95	mA	Max	V <sub>O</sub> = HIGH Z

## AC Electrical Characteristics

Symbol	Parameter	74F			54F		74F		Units
		$T_A = +25^\circ\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A, V_{CC} = \text{Mil}$ $C_L = 50\text{ pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$		
		Min	Typ	Max	Min	Max	Min	Max	
$t_{PLH}$ $t_{PHL}$	Propagation Delay A Input to B Output ('F2620)	2.5 3.0		7.5 8.0			2.0 3.0	8.0 8.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay B Input to A Output ('F2620)	2.5 3.0		7.5 8.0			2.0 3.0	8.0 8.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay A Input to B Output ('F2623)	1.5 2.5		6.5 7.5			1.5 2.5	7.5 8.0	ns
$t_{PLH}$ $t_{PHL}$	Propagation Delay B Input to A Output ('F2623)	1.5 2.5		6.5 7.5			1.5 2.5	7.5 8.0	ns
$t_{pZH}$ $t_{pZL}$	Enable Time $\bar{G}BA$ Input to A Output	2.0 2.5		7.0 8.0			2.0 2.0	8.0 8.5	ns
$t_{pHZ}$ $t_{pLZ}$	Disable Time $\bar{G}BA$ Input to A Output	1.5 1.0		6.5 5.5			1.5 1.0	7.5 5.5	
$t_{pZH}$ $t_{pZL}$	Enable Time GAB Input to B Output ('F2620)	2.0 3.0		7.5 8.0			2.0 2.0	8.5 8.5	ns
$t_{pHZ}$ $t_{pLZ}$	Disable Time GAB Input to B Output ('F2620)	2.5 2.0		8.0 7.5			2.0 2.0	9.0 8.0	
$t_{pZH}$ $t_{pZL}$	Enable Time GAB Input to B Output ('F2623)	2.0 2.5		7.5 8.0			2.0 2.0	8.5 8.5	ns
$t_{pHZ}$ $t_{pLZ}$	Disable Time GAB Input to B Output ('F2623)	2.0 2.0		8.0 8.0			2.0 2.0	9.0 8.0	

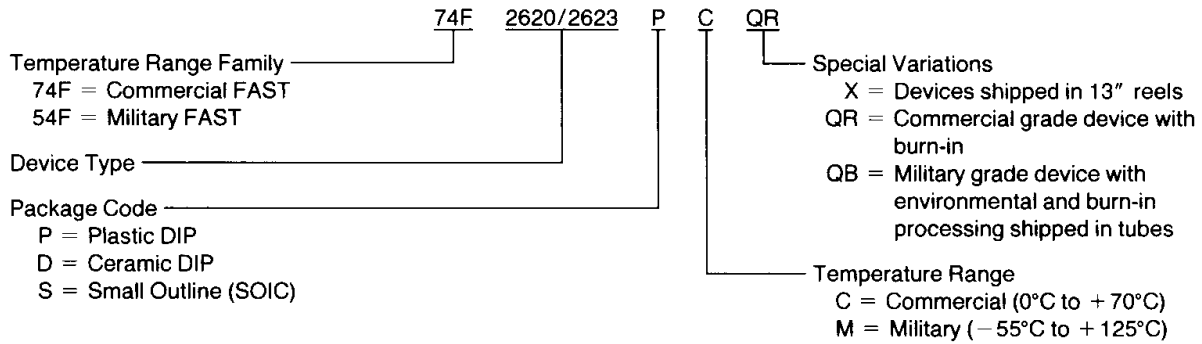
Basic FAST Circuit Showing Series Resistor Placement



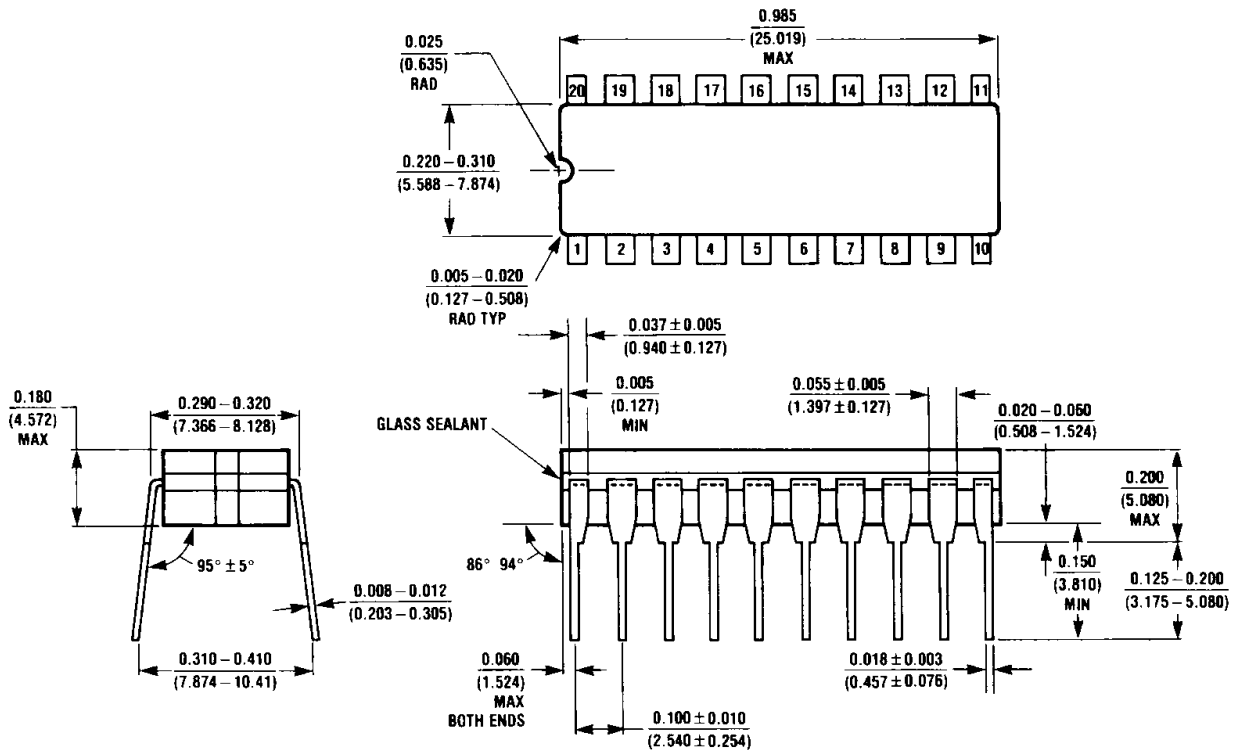
TL/F/10628-6

# 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:



# Physical Dimensions inches (millimeters)

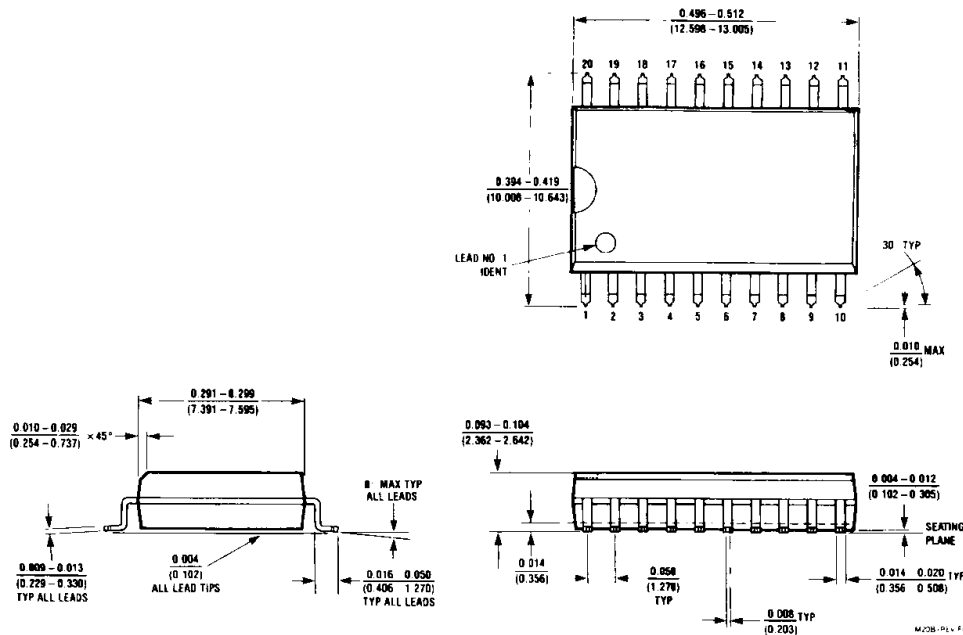


**20-Lead Ceramic Dual-In-Line Package (D)  
NS Package Number J20A**

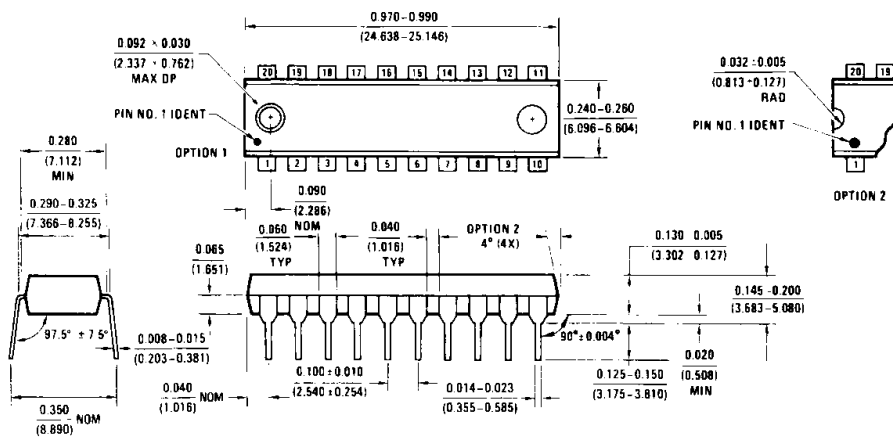
J20A (REV M)

Physical Dimensions inches (millimeters) (Continued)

Lit. # 114658



20-Lead Small Outline Integrated Circuit (S)  
NS Package Number M20B



20-Lead Plastic Dual-In-Line Package (P)  
NS Package Number N20B

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