

## 54F/74F2244

### Octal Buffer/Line Driver with 25Ω Series Resistors in Outputs

#### General Description

The 'F2244 is an octal buffer/line driver designed to drive the capacitive inputs of MOS memory drivers, address drivers, clock drivers and bus-oriented transmitters/receivers.

The 25Ω series resistors in the outputs reduce ringing and eliminate the need for external resistors.

#### Features

- TRI-STATE® outputs drive bus lines or buffer memory address registers
- 12 mA source current
- 25Ω series resistors in outputs eliminate the need for external resistors.
- Designed to drive the capacitive inputs of MOS devices
- Guaranteed 4000V minimum ESD protection

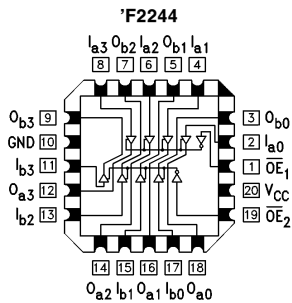
Commercial	Military	Package Number	Package Description
74F2244PC		N20B	20-Lead (0.300" Wide) Molded Dual-In-Line
	54F2244DM (Note 2)	J20A	20-Lead Ceramic Dual-In-Line
74F2244SC (Note 1)		M20B	20-Lead (0.300" Wide) Molded Small Outline JEDEC
74F2244MSA (Note 1)		MSA20	20-Lead Molded Shrink Small Outline EIAJ Type II
	54F2244FM (Note 2)	W20A	20-Lead Cerpak
	54F2244LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

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

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

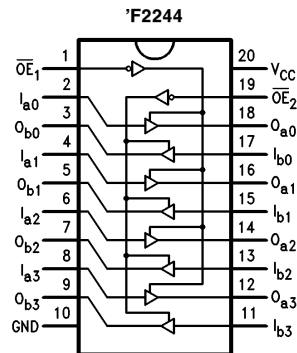
#### Connection Diagrams

Pin Assignment for LCC



TL/F/9499-3

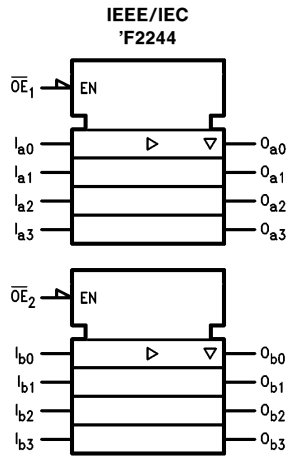
Pin Assignment for DIP, SOIC and SSOP



TL/F/9499-4

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

## Logic Symbol



TL/F/9499-6

## Unit Loading/Fan Out

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$\overline{OE}_1, \overline{OE}_2$	TRI-STATE Output Enable Input (Active LOW)	1.0/1.667	20 $\mu A$ / -1 mA
$OE_2$	TRI-STATE Output Enable Input (Active HIGH)	1.0/1.667	20 $\mu A$ / -1 mA
$I_{an}, I_{bn}$	Inputs	1.0/2.667*	20 $\mu A$ / -1.6 mA
$O_{an}, O_{bn}$	Outputs	750/20	-15 mA / 12 mA

\*Worst-case 'F2244 disabled

## Truth Table

'F2244

$\overline{OE}_1$	$I_{an}$	$O_{an}$	$\overline{OE}_2$	$I_{bn}$	$O_{bn}$
H	X	Z	H	X	Z
L	H	H	L	H	H
L	L	L	L	L	L

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

## 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 <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
Voltage Applied to Output in HIGH State (with V <sub>CC</sub> = 0V)	
Standard Output	-0.5V to V <sub>CC</sub>
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

**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

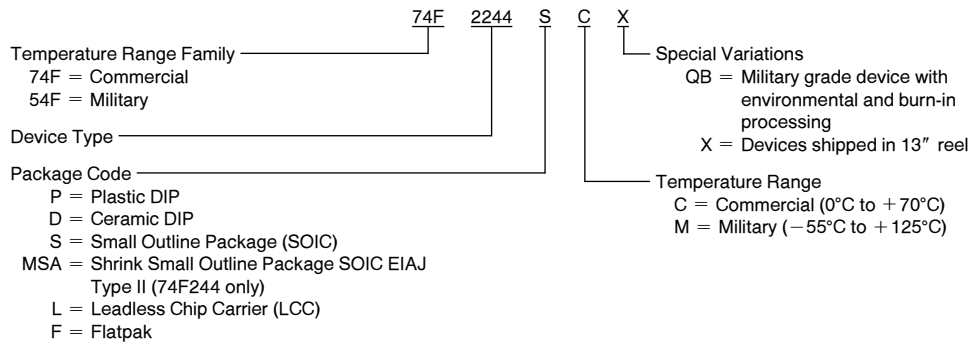
Symbol	Parameter	54F/74F			Units	V <sub>CC</sub>	Conditions
		Min	Typ	Max			
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage	0.8			V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage	-1.2			V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	54F 10% V <sub>CC</sub>	2.4		V	Min	I <sub>OH</sub> = -3 mA
		54F 10% V <sub>CC</sub>	2.0				I <sub>OH</sub> = -12 mA
		74F 10% V <sub>CC</sub>	2.4				I <sub>OH</sub> = -3 mA
		74F 10% V <sub>CC</sub>	2.0				I <sub>OH</sub> = -15 mA
		74F 5% V <sub>CC</sub>	2.7				I <sub>OH</sub> = -3 mA
V <sub>OL</sub>	Output LOW Voltage	0.50 0.75			V	Min	I <sub>OL</sub> = 1 mA I <sub>OL</sub> = 12 mA
I <sub>IH</sub>	Input HIGH Current	54F	20.0		μA	Max	V <sub>IN</sub> = 2.7V
		74F	5.0				
I <sub>BVI</sub>	Input HIGH Current Breakdown Test	54F	100		μA	Max	V <sub>IN</sub> = 7.0V
		74F	7.0				
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				mA	Max	V <sub>IN</sub> = 0.5V ( $\overline{OE}_1, \overline{OE}_2, OE_2$ ) V <sub>IN</sub> = 0.5V (I <sub>n</sub> )
I <sub>OZH</sub>	Output Leakage Current				μA	Max	V <sub>OUT</sub> = 2.7V
I <sub>OZL</sub>	Output Leakage Current				μA	Max	V <sub>OUT</sub> = 0.5V
I <sub>OS</sub>	Output Short-Circuit Current	-100	-225		mA	Max	V <sub>OUT</sub> = 0V
I <sub>CCH</sub>	Power Supply Current	40 60			mA	Max	V <sub>O</sub> = HIGH
I <sub>CCL</sub>	Power Supply Current	60 90			mA	Max	V <sub>O</sub> = LOW
I <sub>CCZ</sub>	Power Supply Current	60 90			mA	Max	V <sub>O</sub> = HIGH Z

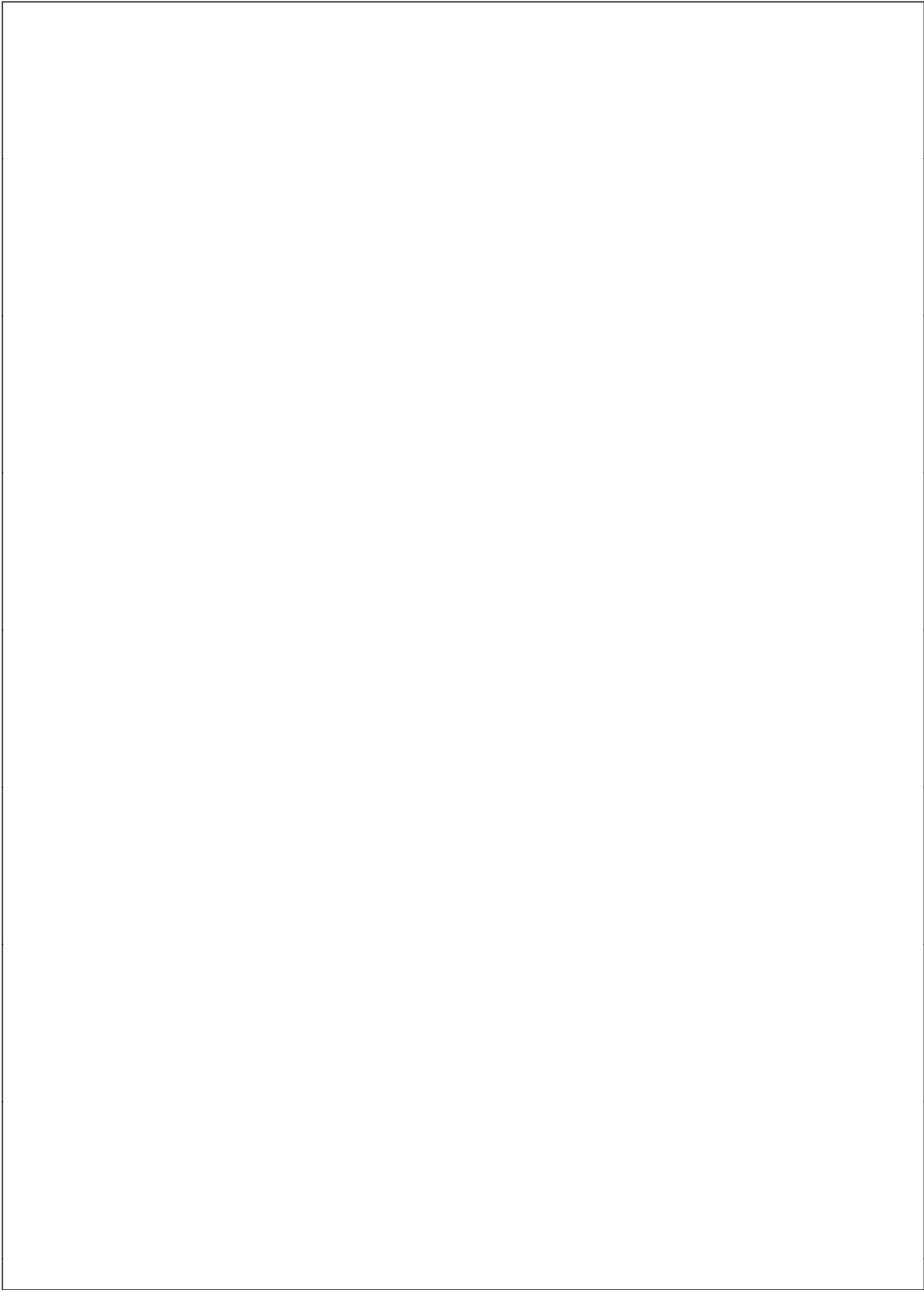
## AC Electrical Characteristics

Symbol	Parameter	74F			54F		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> = Mil C <sub>L</sub> = 50 pF		T <sub>A</sub> , V <sub>CC</sub> = Com C <sub>L</sub> = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	1.5		7.0	2.0	6.5	1.5	7.0	ns
t <sub>PHL</sub>	Data to Output	2.5		8.0	2.0	7.0	2.0	8.0	
t <sub>PZH</sub>	Output Enable Time	1.5		9.0	2.0	7.0	1.0	9.5	ns
t <sub>PZL</sub>		2.5		11.5	2.0	8.5	2.5	12.0	
t <sub>PHZ</sub>	Output Disable Time	1.5		9.0	2.0	7.0	1.0	9.5	ns
t <sub>PLZ</sub>		1.5		8.5	2.0	7.5	1.5	9.5	

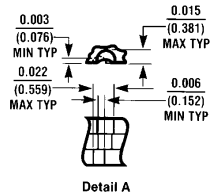
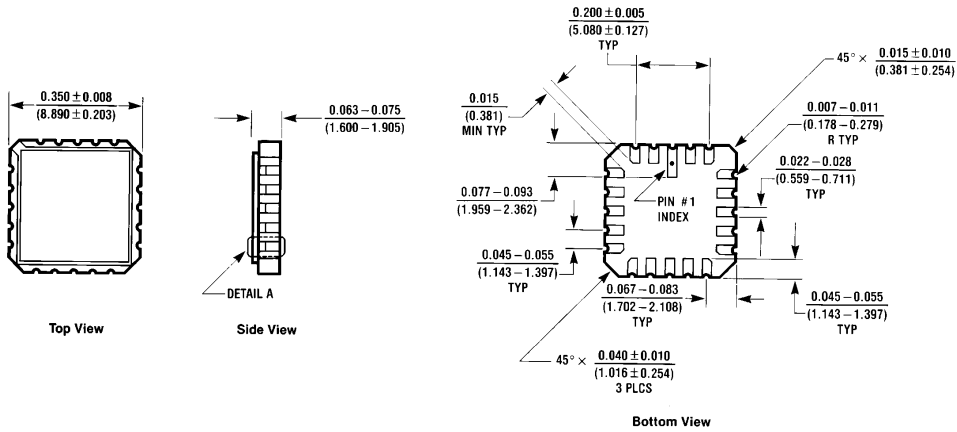
## Ordering Information

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



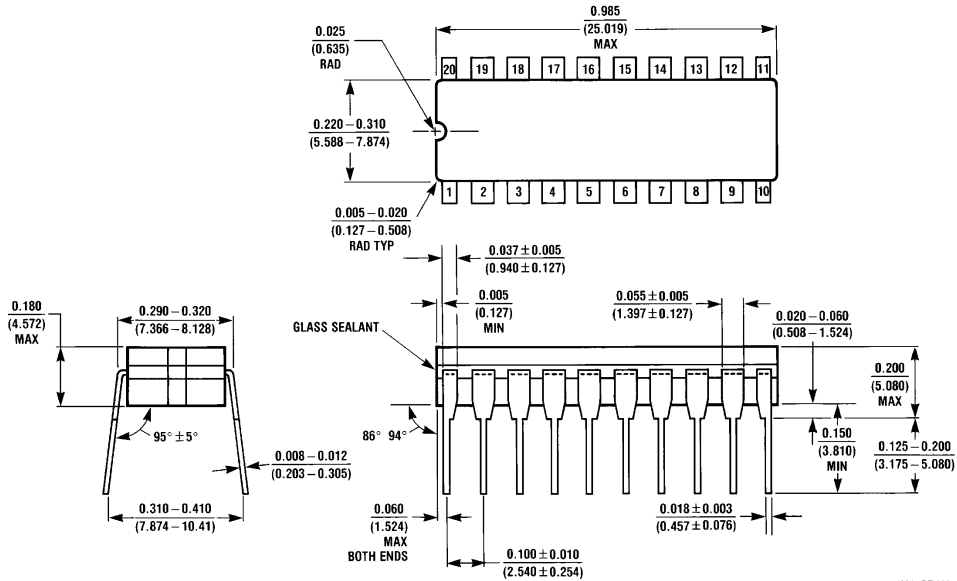


**Physical Dimensions** inches (millimeters)



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

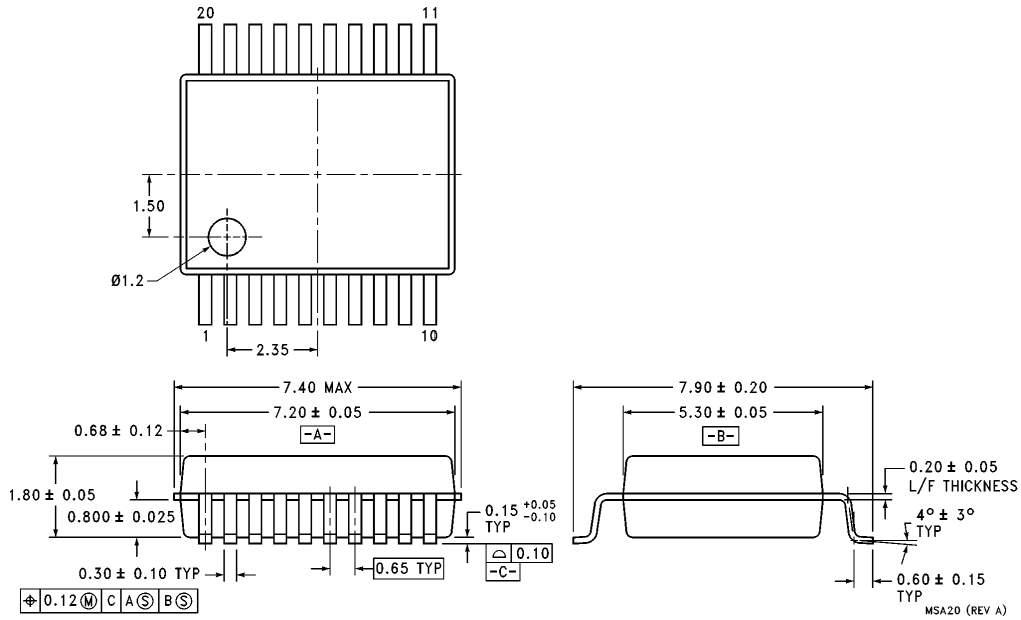
E20A (REV D)



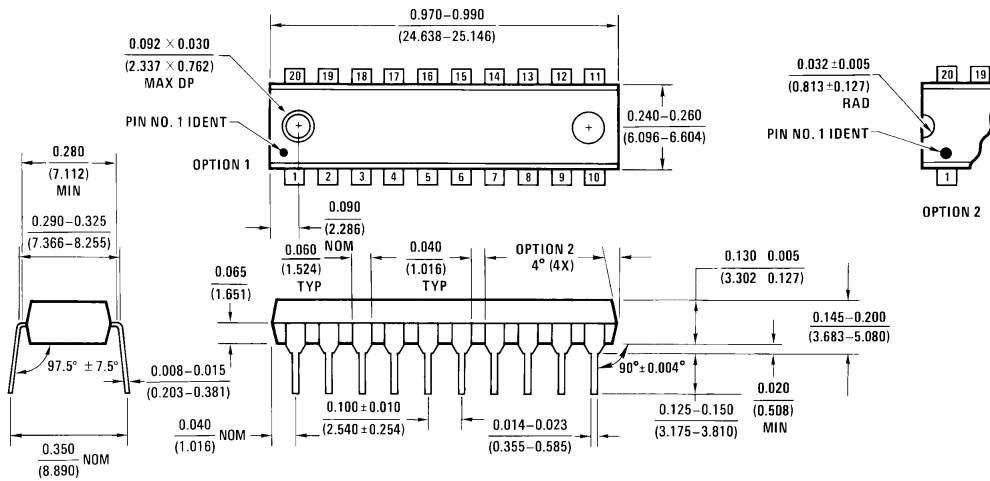
**20-Lead Ceramic Dual-In-Line Package (D)**  
**NS Package Number J20A**

J20A (REV M)

**Physical Dimensions** inches (millimeters) (Continued)

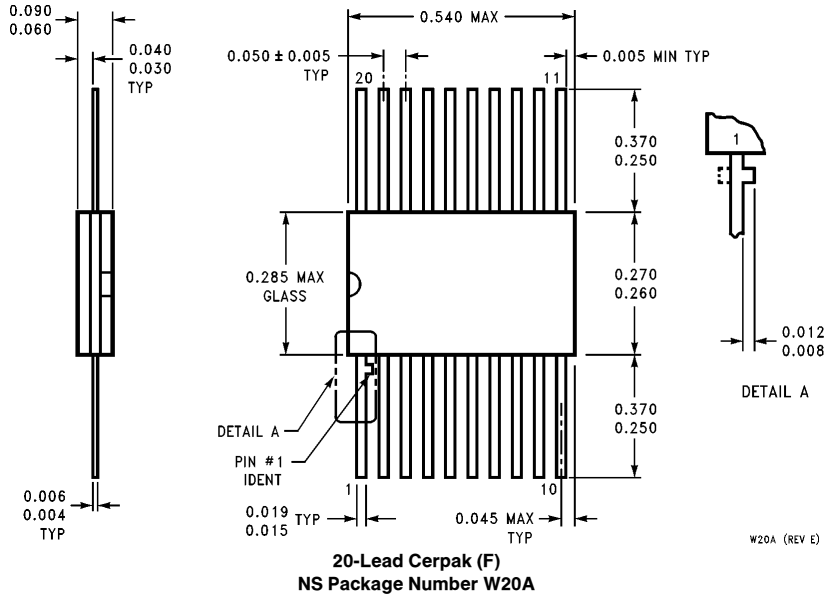


**20-Lead Molded Shrink Small Outline Package, EIAJ Type II (MSA)**  
**NS Package Number MSA20**



**20-Lead (0.300" Wide) Molded Dual-In-Line Package (P)**  
**NS Package Number N20B**

**Physical Dimensions** inches (millimeters) (Continued)



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