

54F/74F245 Octal Bidirectional Transceiver with TRI-STATE® Outputs

General Description

The 'F245 contains eight non-inverting bidirectional buffers with TRI-STATE outputs and is intended for bus-oriented applications. Current sinking capability is 24 mA (20 mA Mil) at the A ports and 64 mA (48 mA Mil) at the B ports. The Transmit/Receive (T/\bar{R}) input determines the direction of data flow through the bidirectional transceiver. Transmit (active HIGH) enables data from A ports to B ports; Receive (active LOW) enables data from B ports to A ports. The Output Enable input, when HIGH, disables both A and B ports by placing them in a High Z condition.

Features

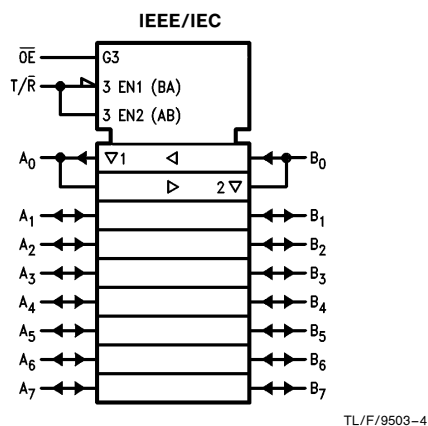
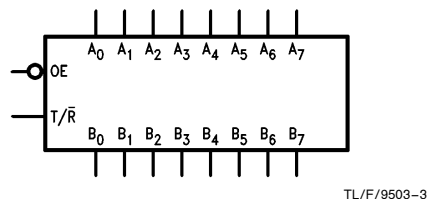
- Non-inverting buffers
- Bidirectional data path
- A outputs sink 24 mA (20 mA Mil)
- B outputs sink 64 mA (48 mA Mil)
- Guaranteed 4000V minimum ESD protection

Commercial	Military	Package Number	Package Description
74F245PC		N20A	20-Lead (0.300" Wide) Molded Dual-In-Line
	54F245DM (Note 2)	J20A	20-Lead Ceramic Dual-In-Line
74F245SC (Note 1)		M20B	20-Lead (0.300" Wide) Molded Small Outline, JEDEC
74F245SJ (Note 1)		M20D	20-Lead (0.300" Wide) Molded Small Outline, EIAJ
74F245MSA (Note 1)		MSA20	20-Lead Molded Shrink Small Outline, EIAJ Type II
	54F245FM (Note 2)	W20A	20-Lead Cerpack
	54F245LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

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

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMOB, FMQB and LMOB.

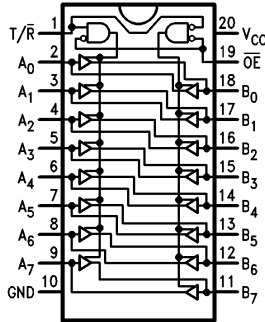
Logic Symbols



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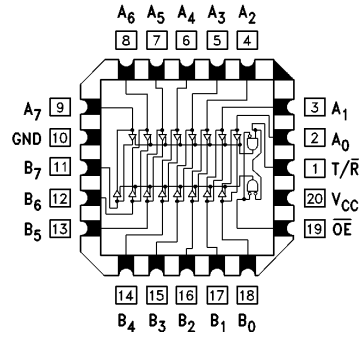
Connection Diagrams

Pin Assignment for
DIP, SOIC, SSOP and Flatpak



TL/F/9503-1

Pin Assignment
for LCC



TL/F/9503-2

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}	Output Enable Input (Active LOW)	1.0/2.0	20 μA / -1.2 mA
T/\overline{R}	Transmit/Receive Input	1.0/2.0	20 μA / -1.2 mA
A_0-A_7	Side A Inputs or TRI-STATE Outputs	3.5/1.083 150/40(38.3)	70 μA / -0.65 mA -3 mA/24 mA (20 mA)
B_0-B_7	Side B Inputs or TRI-STATE Outputs	3.5/1.083 600/106.6(80)	70 μA / -0.65 mA -12 mA/64 mA (48 mA)

Truth Table

Inputs		Output
\overline{OE}	T/\overline{R}	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	High Z State

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

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 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 _{CC}	Conditions
		Min	Typ	Max			
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}	2.4		V	Min	I _{OH} = −3 mA (A _N)
		54F 10% V _{CC}	2.0				I _{OH} = −12 mA (B _N)
		74F 10% V _{CC}	2.4				I _{OH} = −3 mA (A _N)
		74F 10% V _{CC}	2.0				I _{OH} = −15 mA (B _N)
		74F 5% V _{CC}	2.7				I _{OH} = −3 mA (A _N)
V _{OL}	Output LOW Voltage	54F 10% V _{CC}		0.5	V	Min	I _{OL} = 20 mA (A _N)
		54F 10% V _{CC}		0.55			I _{OL} = 48 mA (B _N)
		74F 10% V _{CC}		0.5			I _{OL} = 24 mA (A _N)
		74F 10% V _{CC}		0.55			I _{OL} = 64 mA (B _N)
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 (\overline{OE} , T/ \overline{R})
		74F		7.0			
I _{BVIT}	Input HIGH Current Breakdown (I/O)	54F		1.0	mA	Max	V _{IN} = 5.5 V (A _N , B _N)
		74F		0.5			
I _{CEX}	Output HIGH Leakage Current	54F		250	μA	Max	V _{OUT} = V _{CC} (A _N , B _N)
		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			−1.2	mA	Max	V _{IN} = 0.5V (T/ \overline{R} , \overline{OE})
I _{IH} + I _{OZH}	Output Leakage Current			70	μA	Max	V _{OUT} = 2.7V (A _N , B _N)
I _{IL} + I _{OZL}	Output Leakage Current			−650	μA	Max	V _{OUT} = 0.5V (A _N , B _N)

DC Electrical Characteristics (Continued)

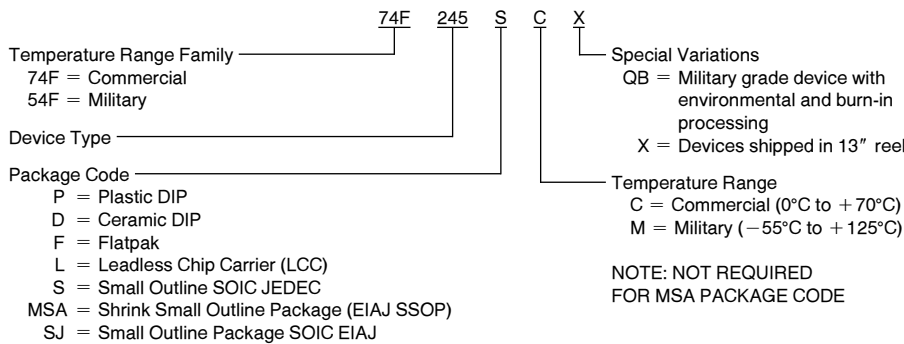
Symbol	Parameter	54F/74F			Units	V _{CC}	Conditions
		Min	Typ	Max			
I _{OS}	Output Short-Circuit Current	−60 −100		−150 −225	mA	Max	V _{OUT} = 0V (A _n) V _{OUT} = 0V (B _n)
I _{ZZ}	Bus Drainage Test			500	μA	0.0V	V _{OUT} = 5.25V(A _n , B _n)
I _{CCH}	Power Supply Current		70	90	mA	Max	V _O = HIGH
I _{CCL}	Power Supply Current		95	120	mA	Max	V _O = LOW
I _{CCZ}	Power Supply Current		85	110	mA	Max	V _O = HIGH Z

AC Electrical Characteristics

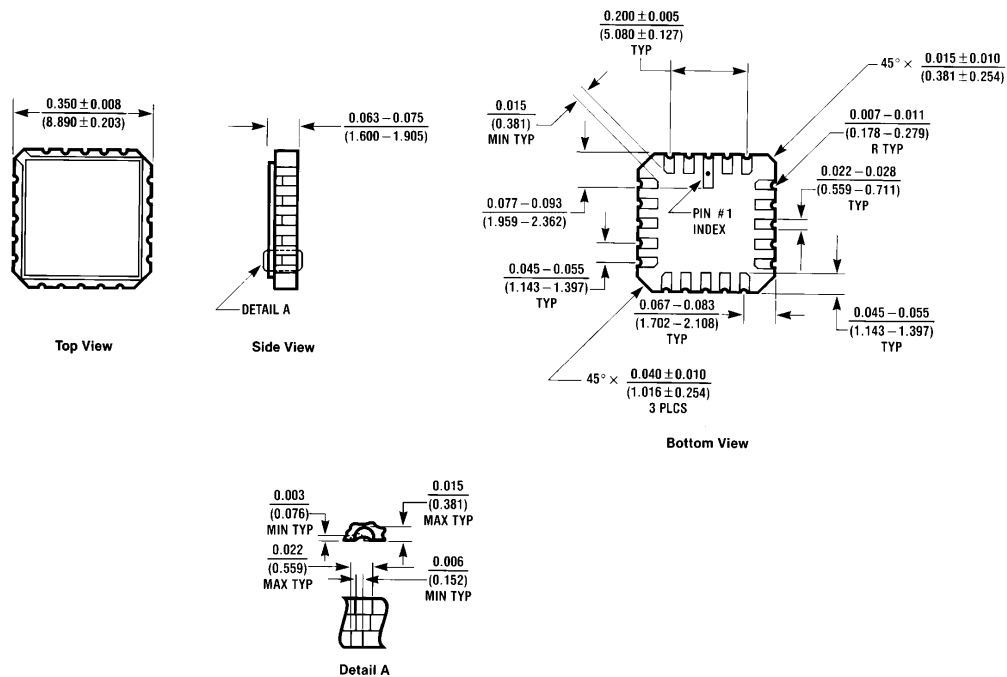
Symbol	Parameter	74F			54F		74F		Units
		T _A = +25°C V _{CC} = +5.0V C _L = 50 pF			T _A , V _{CC} = Mil C _L = 50 pF		T _A , V _{CC} = Com C _L = 50 pF		
		Min	Typ	Max	Min	Max	Min	Max	
t _{PLH}	Propagation Delay	2.5	4.2	6.0	2.0	7.5	2.0	7.0	ns
t _{PHL}	A _n to B _n or B _n to A _n	2.5	4.2	6.0	2.0	7.5	2.0	7.0	
t _{pZH}	Output Enable Time	3.0	5.3	7.0	2.5	9.0	2.5	8.0	ns
t _{pZL}		3.5	6.0	8.0	3.0	10.0	3.0	9.0	
t _{PHZ}	Output Disable Time	2.0	5.0	6.5	2.0	9.0	2.0	7.5	
t _{PLZ}		2.0	5.0	6.5	2.0	10.0	2.0	7.5	

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:

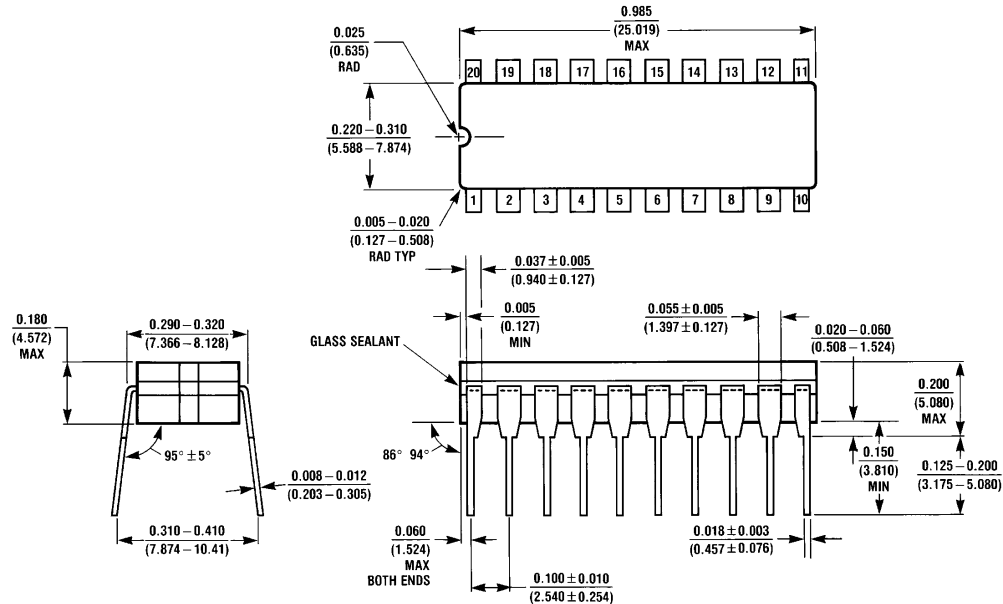


Physical Dimensions inches (millimeters)



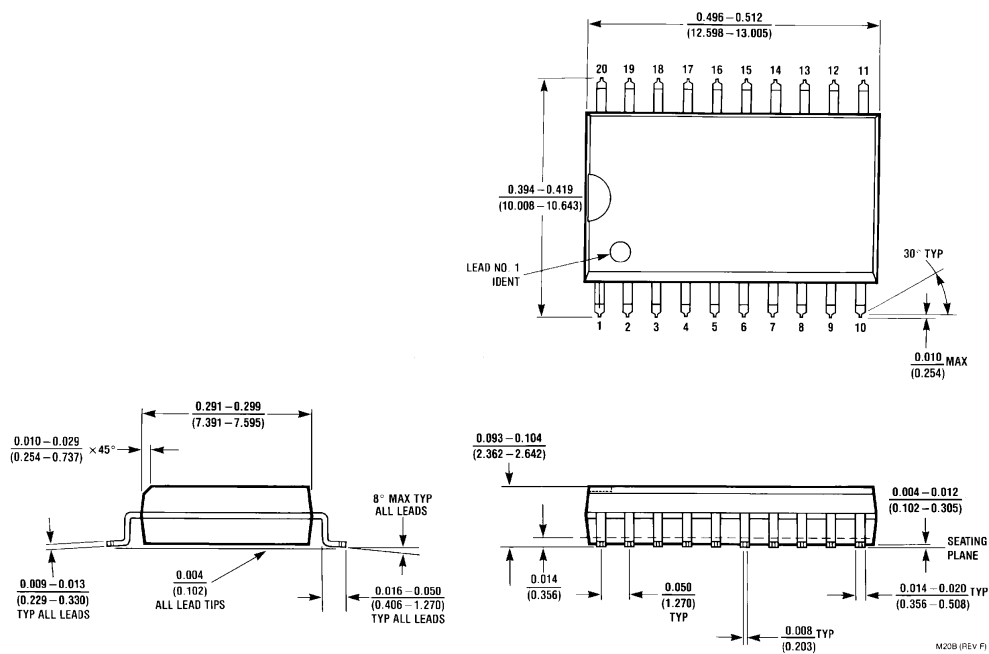
20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

E20A (REV D)

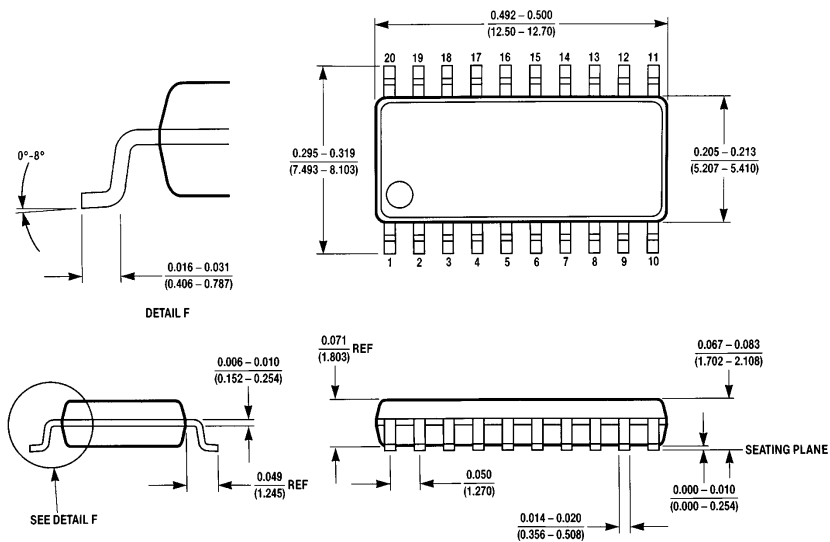


20-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

J20A (REV M)

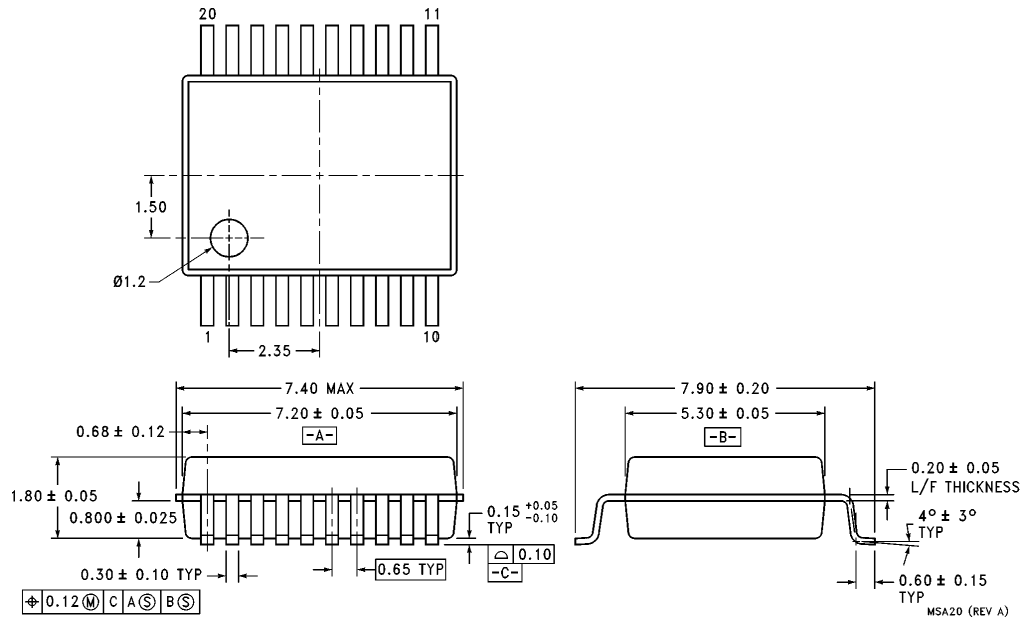
Physical Dimensions inches (millimeters) (Continued)

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

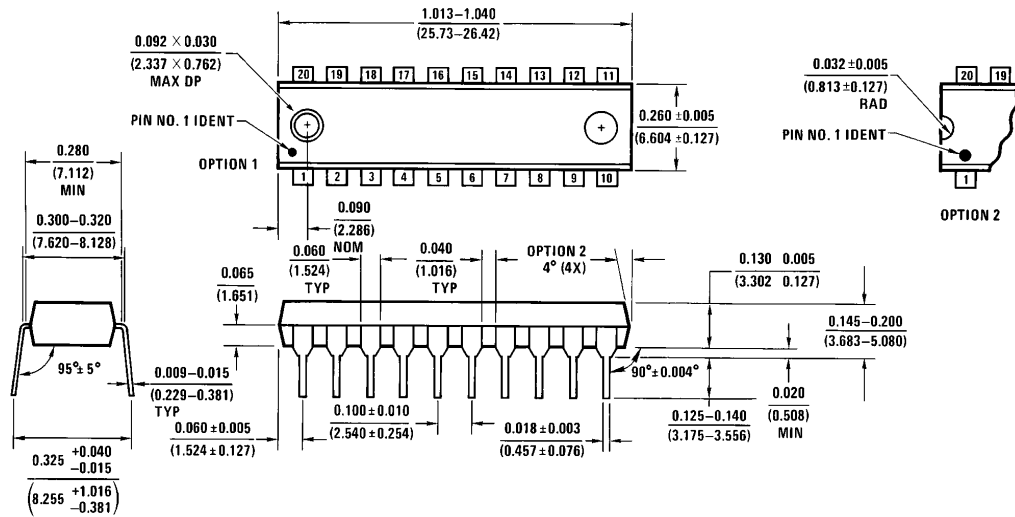


**20-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M20D**

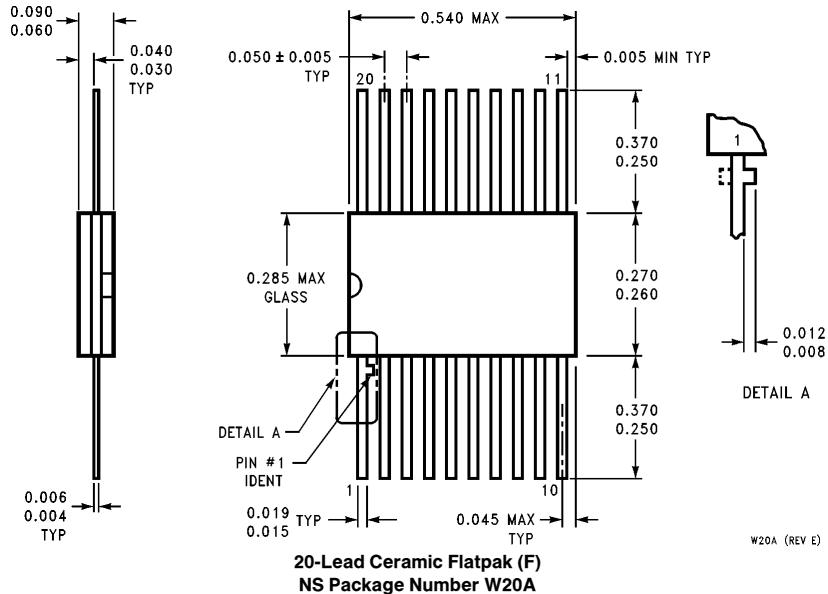
Physical Dimensions inches (millimeters) (Continued)



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



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

Physical Dimensions inches (millimeters) (Continued)**LIFE SUPPORT POLICY**

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