

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

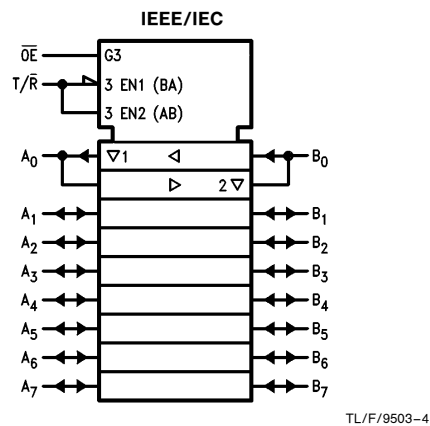
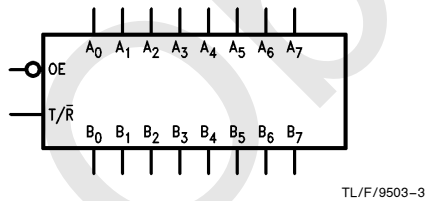
- Non-inverting buffers
- Bidirectional data path
- A outputs sink 24 mA (20 mA Mil)
- B outputs sink 64 mA (48 mA Mil)
- Guaranteed 4000V minimum ESD protection

| 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 = DMQB, FMQB and LMQB.

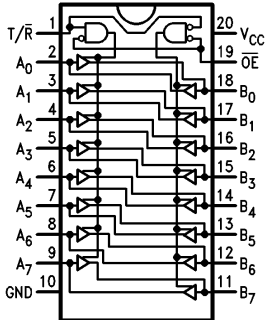
Logic Symbols



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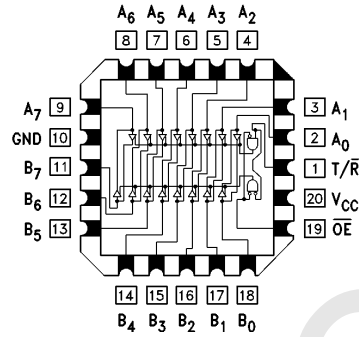
Connection Diagrams

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 μ A/ -1.2 mA |
| T/ \overline{R} | Transmit/Receive Input | 1.0/2.0 | 20 μ A/ -1.2 mA |
| A ₀ -A ₇ | Side A Inputs or TRI-STATE Outputs | 3.5/1.083 | 70 μ A/ -0.65 mA |
| B ₀ -B ₇ | Side B Inputs or TRI-STATE Outputs | 3.5/1.083 | 70 μ A/ -0.65 mA |
| | | 600/106.6(80) | -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 | | | | V | | Recognized as a LOW Signal |
| V _{CD} | Input Clamp Diode Voltage | | | | 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) I _{OH} = -12 mA (B _n) |
| | | 54F 10% V _{CC} | 2.0 | | | | |
| | | 74F 10% V _{CC} | 2.4 | | | | |
| | | 74F 10% V _{CC} | 2.0 | | | | |
| | | 74F 5% V _{CC} | 2.7 | | | | |
| V _{OL} | Output LOW Voltage | 54F 10% V _{CC} | | 0.5 | V | Min | I _{OL} = 20 mA (A _n) I _{OL} = 48 mA (B _n) I _{OL} = 24 mA (A _n) I _{OL} = 64 mA (B _n) |
| | | 54F 10% V _{CC} | | 0.55 | | | |
| | | 74F 10% V _{CC} | | 0.5 | | | |
| | | 74F 10% V _{CC} | | 0.55 | | | |
| 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)

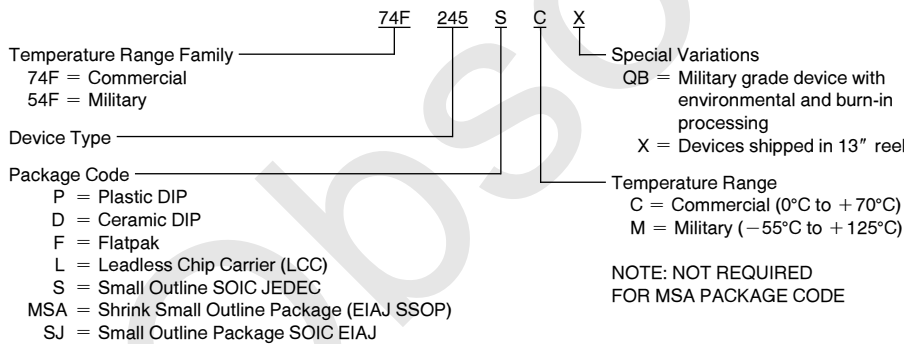
| Symbol | Parameter | 54F/74F | | | Units | V _{CC} | Conditions |
|------------------|------------------------------|-------------|-----|--------------|-------|-----------------|--|
| | | Min | Typ | Max | | | |
| I _{OS} | Output Short-Circuit Current | -60 -100 | | -150 -225 | mA | Max | V _{OUT} = 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

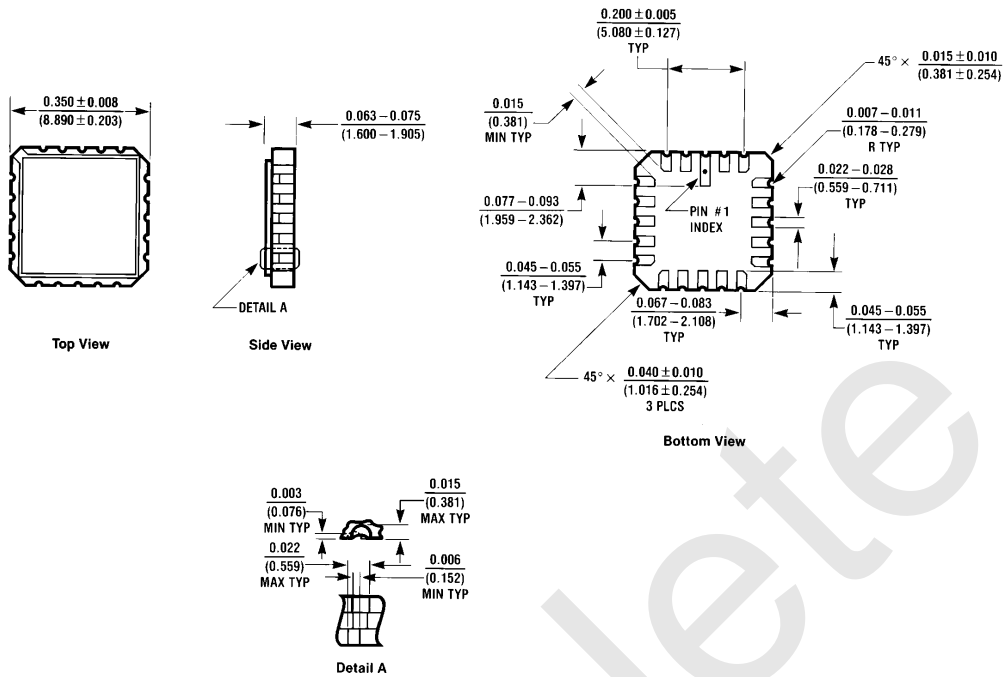
| Symbol | Parameter | 74F | | | 54F | | 74F | | Units |
|------------------|--|---|-----|-----|--|------|--|-----|-------|
| | | T _A = +25°C V _{CC} = +5.0V C _L = 50 pF | | | T _A , V _{CC} = Mil C _L = 50 pF | | T _A , V _{CC} = Com C _L = 50 pF | | |
| | | Min | Typ | Max | Min | Max | Min | Max | |
| 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 | ns |
| 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:

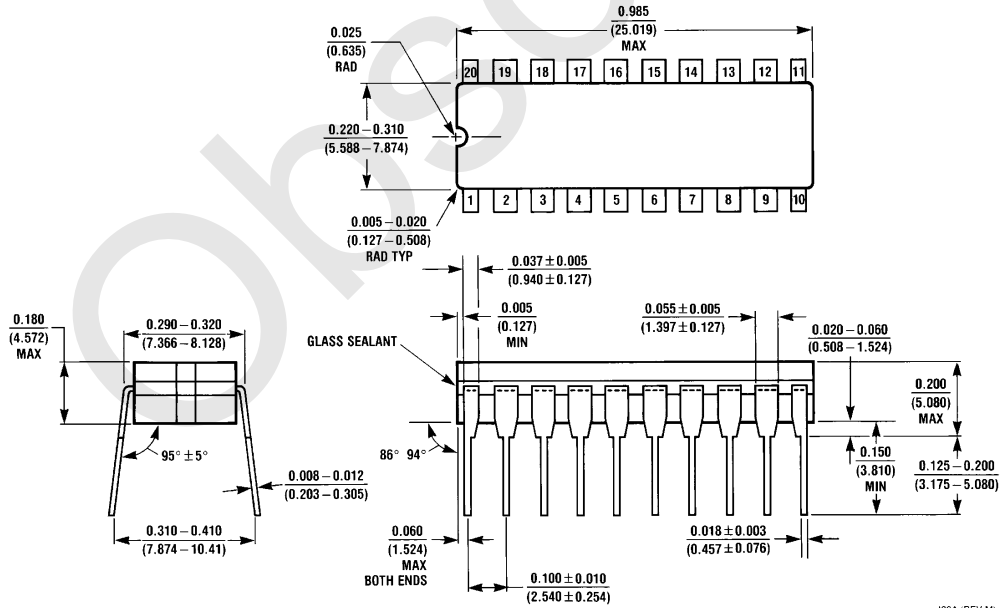


Physical Dimensions inches (millimeters)



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

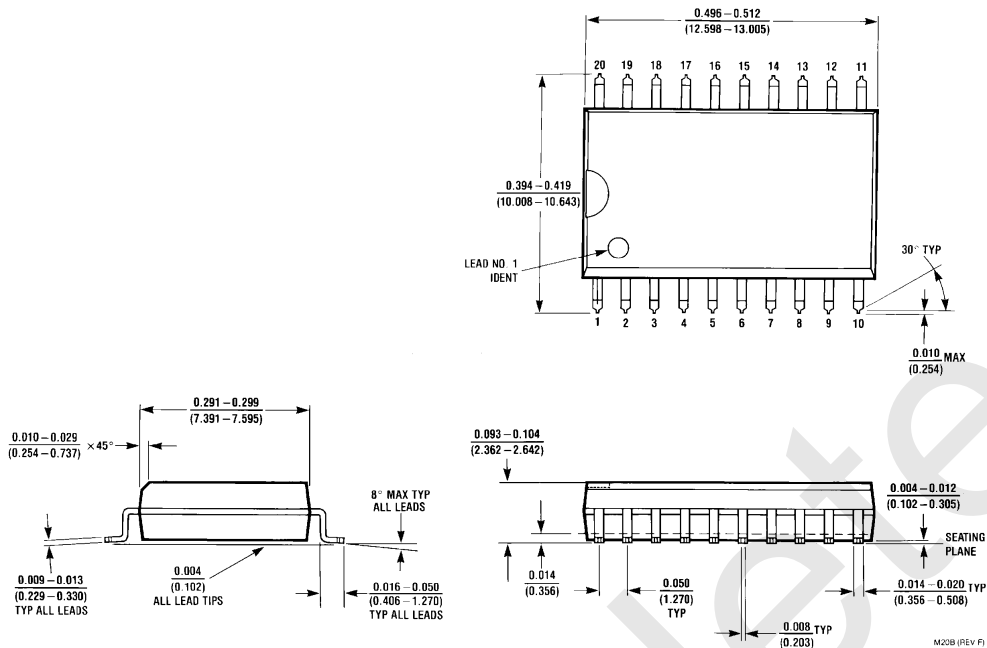
E20A (REV D)



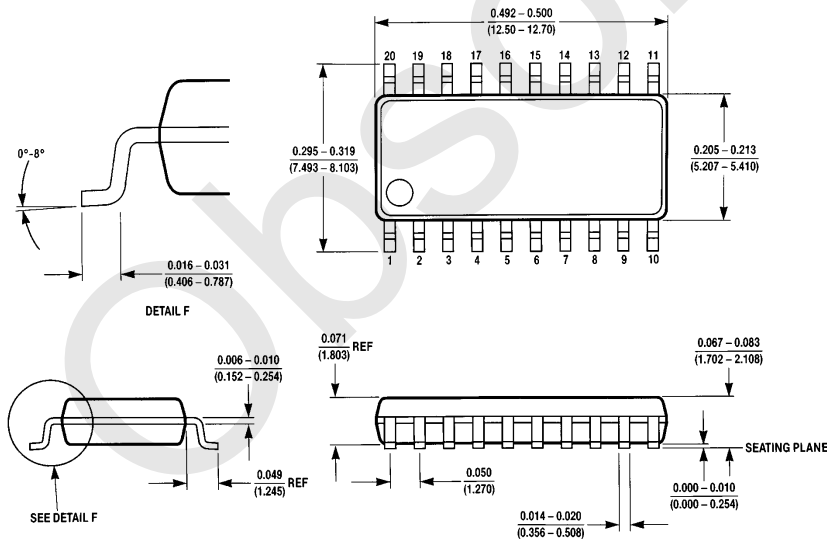
20-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J20A

J20A (REV M)

Physical Dimensions inches (millimeters) (Continued)

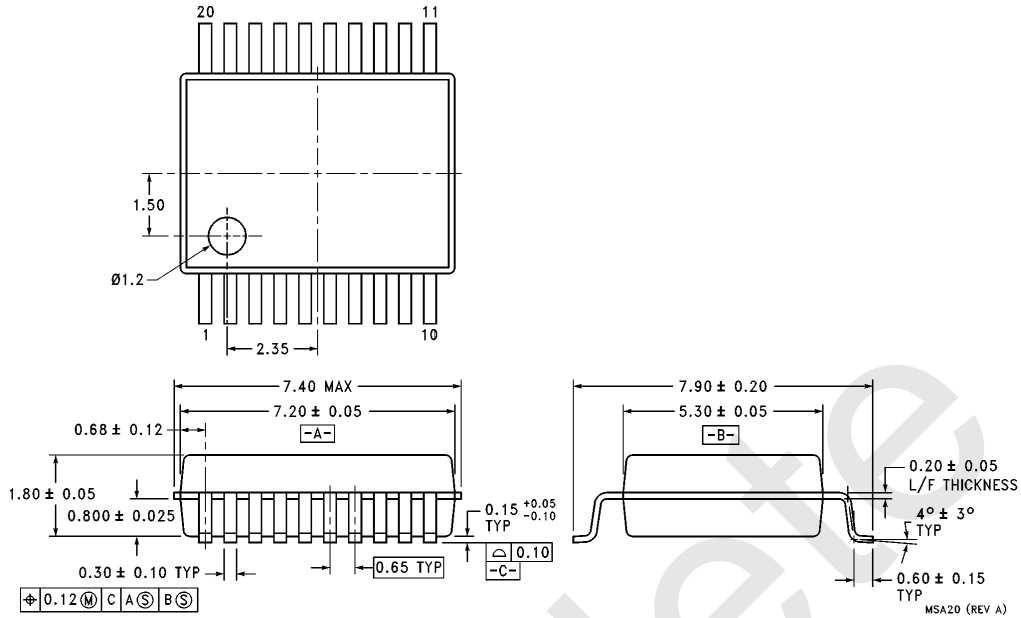


**20-Lead (0.300" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M20B**

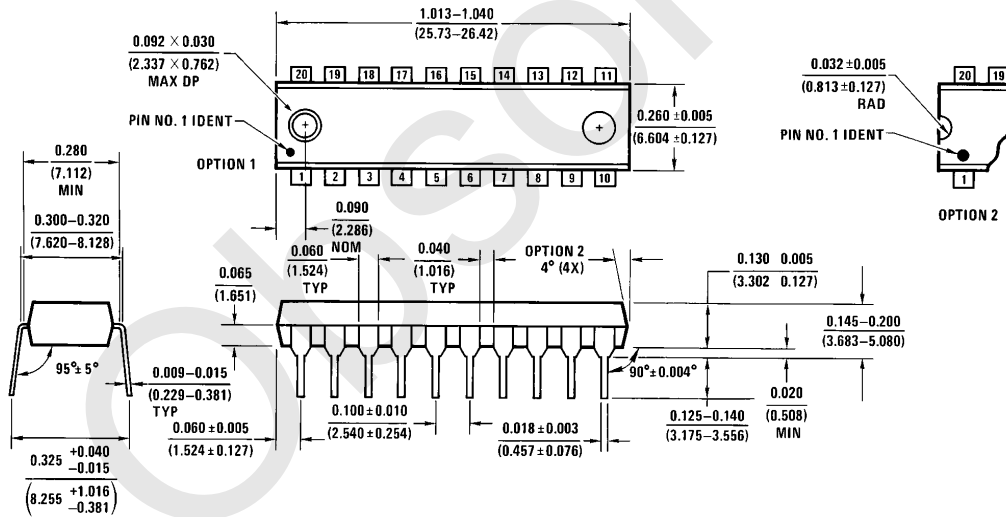


**20-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M20D**

Physical Dimensions inches (millimeters) (Continued)

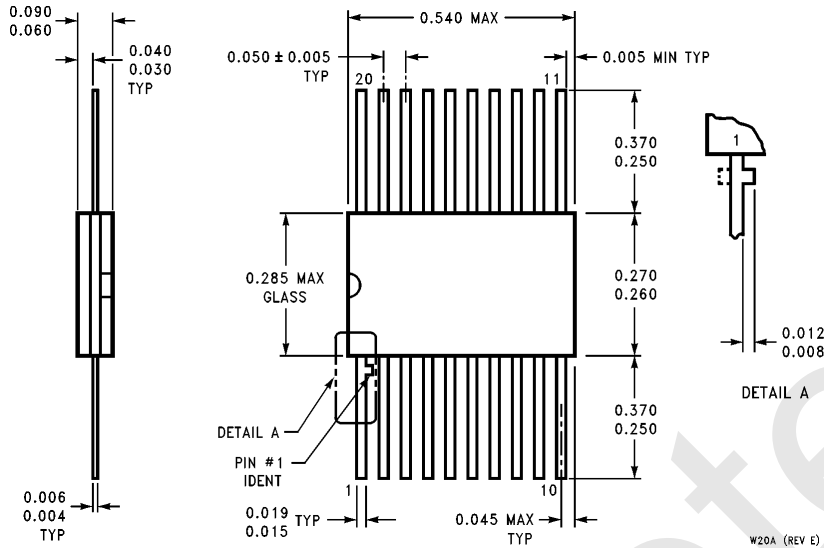


20-Lead Molded Shrink Small Outline Package, EIAJ, Type II (MSA)
NS Package Number MSA20



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

Physical Dimensions inches (millimeters) (Continued)



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