

## 74F240 • 74F241 • 74F244

### Octal Buffers/Line Drivers with 3-STATE Outputs

#### General Description

The 74F240, 74F241 and 74F244 are octal buffers and line drivers designed to be employed as memory and address drivers, clock drivers and bus-oriented transmitters/receivers which provide improved PC and board density.

#### Features

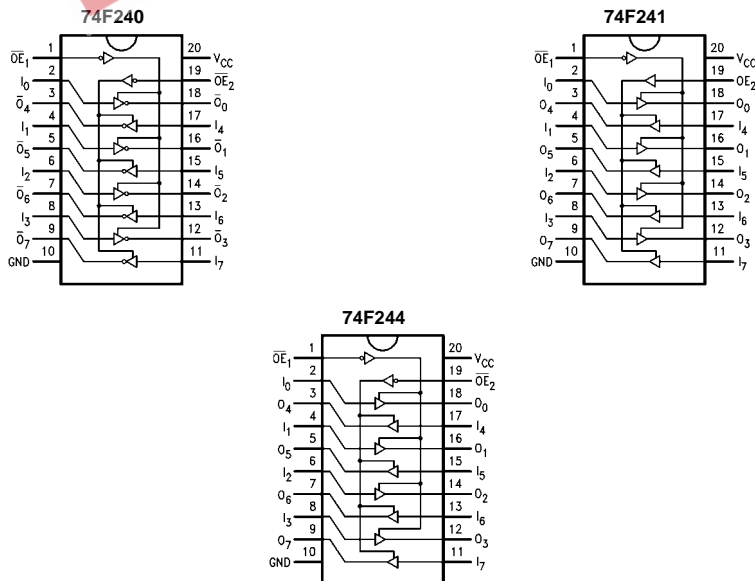
- 3-STATE outputs drive bus lines or buffer memory address registers
- Outputs sink 64 mA (48 mA mil)
- 12 mA source current
- Input clamp diodes limit high-speed termination effects

#### Ordering Code:

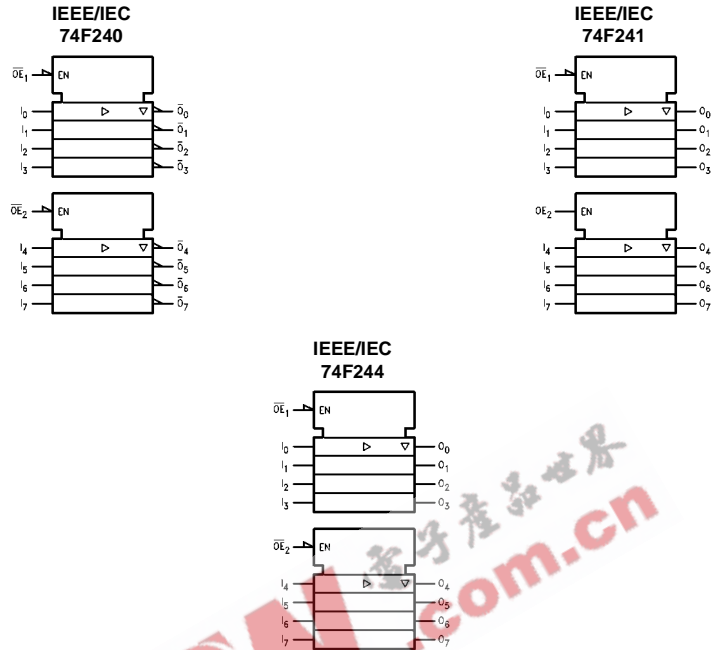
| Order Code         | Package Number | Package Description  |
|--------------------|----------------|--|
| 74F240SC (Note 1)  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74F240SJ (Note 1)  | M20D           | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide              |
| 74F240PC           | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide     |
| 74F241SC           | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74F241PC           | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide     |
| 74F244SC (Note 1)  | M20B           | 20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide |
| 74F244SJ (Note 1)  | M20D           | 20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide              |
| 74F244MSA (Note 1) | MSA20          | 20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide      |
| 74F244PC           | N20A           | 20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide     |

**Note 1:** Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

#### Connection Diagrams



### Logic Symbols



### Unit Loading/Fan Out

| Pin Names  | Description                               | U.L.<br>HIGH/LOW   | Input $I_{IH}/I_{IL}$<br>Output $I_{OH}/I_{OL}$ |
|--|---|--------------------|---|
| $\overline{OE}_1, \overline{OE}_2$               | 3-STATE Output Enable Input (Active LOW)  | 1.0/1.667          | 20 $\mu$ A/-1 mA                                |
| $OE_2$   | 3-STATE Output Enable Input (Active HIGH) | 1.0/1.667          | 20 $\mu$ A/-1 mA                                |
| $I_0$ - $I_7$                                    | Inputs (74F240)                           | 1.0/1.667 (Note 2) | 20 $\mu$ A/-1 mA                                |
| $I_0$ - $I_7$                                    | Inputs (74F241, 74F244)                   | 1.0/2.667 (Note 2) | 20 $\mu$ A/-1.6 mA                              |
| $\overline{O}_0$ - $\overline{O}_7, O_0$ - $O_7$ | Outputs                                   | 600/106.6 (80)     | -12 mA/64 mA (48 mA)                            |

Note 2: Worst-case 74F240 enabled; 74F241, 74F244 disabled

### Truth Tables

74F240

| $\overline{OE}_1$ | $D_{1n}$ | $O_{1n}$ | $\overline{OE}_2$ | $D_{2n}$ | $O_{2n}$ |
|-------------------|----------|----------|-------------------|----------|----------|
| H                 | X        | Z        | H                 | X        | Z        |
| L                 | H        | L        | L                 | H        | L        |
| L                 | L        | H        | L                 | L        | H        |

74F244

| $\overline{OE}_1$ | $D_{1n}$ | $O_{1n}$ | $\overline{OE}_2$ | $D_{2n}$ | $O_{2n}$ |
|-------------------|----------|----------|-------------------|----------|----------|
| H                 | X        | Z        | H                 | X        | Z        |
| L                 | H        | H        | L                 | H        | H        |
| L                 | L        | L        | L                 | L        | L        |

74F241

| $\overline{OE}_1$ | $D_{1n}$ | $O_{1n}$ | $OE_2$ | $D_{2n}$ | $O_{2n}$ |
|-------------------|----------|----------|--------|----------|----------|
| H                 | X        | Z        | L      | X        | Z        |
| L                 | H        | H        | H      | H        | H        |
| L                 | L        | L        | H      | L        | L        |

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

**Absolute Maximum Ratings** (Note 3)

|  |                                      |
|--|--------------------------------------|
| Storage Temperature  | -65°C to +150°C                      |
| Ambient Temperature under Bias   | -55°C to +125°C                      |
| Junction Temperature under Bias  | -55°C to +150°C                      |
| V <sub>CC</sub> Pin Potential to Ground Pin                            | -0.5V to +7.0V                       |
| Input Voltage (Note 4)   | -0.5V to +7.0V                       |
| Input Current (Note 4)   | -30 mA to +5.0 mA                    |
| Voltage Applied to Output<br>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<br>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 | 0°C to +70°C   |
| Supply Voltage               | +4.5V to +5.5V |

**Note 3:** 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 4:** Either voltage limit or current limit is sufficient to protect inputs.

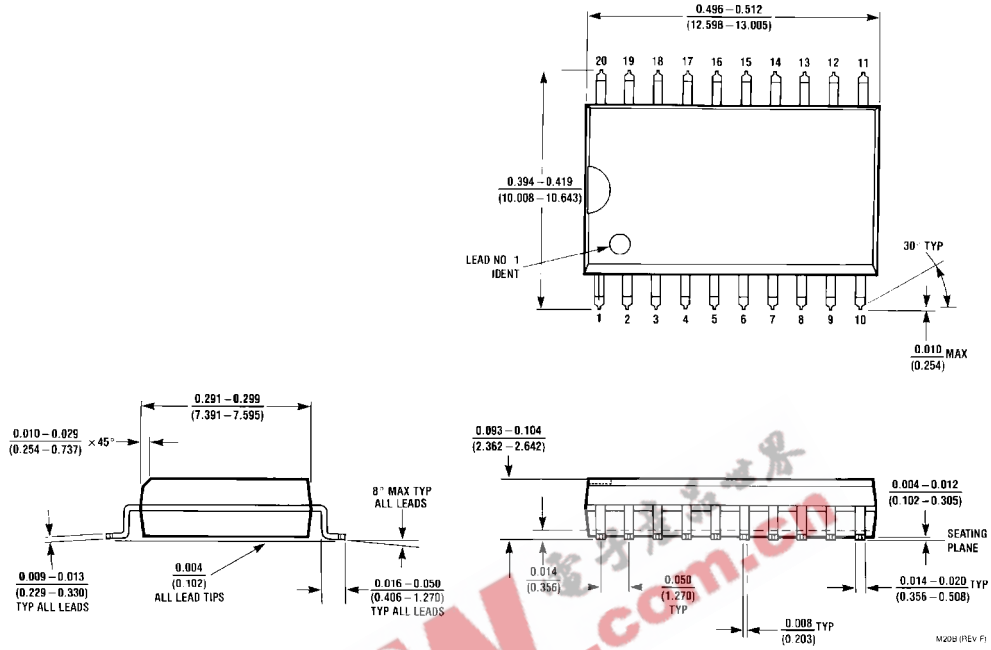
**DC Electrical Characteristics**

| Symbol           | Parameter                             | Min                 | Typ | Max          | Units | V <sub>CC</sub> | Conditions   |
|------------------|---------------------------------------|---------------------|-----|--------------|-------|-----------------|--|
| 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                   | 10% V <sub>CC</sub> | 2.4 |              | V     | Min             | I <sub>OH</sub> = -3 mA  |
|                  |                                       | 10% V <sub>CC</sub> | 2.0 |              | V     | Min             | I <sub>OH</sub> = -15 mA   |
|                  |                                       | 5% V <sub>CC</sub>  | 2.7 |              | V     | Min             | I <sub>OH</sub> = -3 mA  |
| V <sub>OL</sub>  | Output LOW Voltage                    | 10% V <sub>CC</sub> |     | 0.55         | V     | Min             | I <sub>OL</sub> = 64 mA  |
| I <sub>IH</sub>  | Input HIGH Current                    |                     |     | 5.0          | μA    | Max             | V <sub>IN</sub> = 2.7V   |
| I <sub>BVI</sub> | Input HIGH Current Breakdown Test     |                     |     | 7.0          | μA    | Max             | V <sub>IN</sub> = 7.0V   |
| I <sub>CEX</sub> | Output HIGH Leakage Current           |                     |     | 50           | μA    | Max             | V <sub>OUT</sub> = V <sub>CC</sub>   |
| V <sub>ID</sub>  | Input Leakage Test                    | 4.75                |     |              | V     | 0.0             | I <sub>ID</sub> = 1.9 μA<br>All Other Pins Grounded  |
| I <sub>OD</sub>  | Output Leakage Circuit Current        |                     |     | 3.75         | μA    | 0.0             | V <sub>IOD</sub> = 150 mV<br>All Other Pins Grounded   |
| I <sub>IL</sub>  | Input LOW Current                     |                     |     | -1.0<br>-1.6 | mA    | Max             | V <sub>IN</sub> = 0.5V ( $\overline{OE}_1, \overline{OE}_2, OE_2, D_n$ 74F240)<br>V <sub>IN</sub> = 0.5V (D <sub>n</sub> (74F241, 74F244)) |
| I <sub>OZH</sub> | Output Leakage Current                |                     |     | 50           | μA    | Max             | V <sub>OUT</sub> = 2.7V  |
| I <sub>OZL</sub> | Output Leakage Current                |                     |     | -50          | 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>ZZ</sub>  | Bus Drainage Test                     |                     |     | 500          | μA    | 0.0V            | V <sub>OUT</sub> = 5.25V   |
| I <sub>CCH</sub> | Power Supply Current (74F240)         |                     | 19  | 29           | mA    | Max             | V <sub>O</sub> = HIGH  |
| I <sub>CCL</sub> | Power Supply Current (74F240)         |                     | 50  | 75           | mA    | Max             | V <sub>O</sub> = LOW   |
| I <sub>CCZ</sub> | Power Supply Current (74F240)         |                     | 42  | 63           | mA    | Max             | V <sub>O</sub> = HIGH Z  |
| I <sub>CCH</sub> | Power Supply Current (74F241, 74F244) |                     | 40  | 60           | mA    | Max             | V <sub>O</sub> = HIGH  |
| I <sub>CCL</sub> | Power Supply Current (74F241, 74F244) |                     | 60  | 90           | mA    | Max             | V <sub>O</sub> = LOW   |
| I <sub>CCZ</sub> | Power Supply Current (74F241, 74F244) |                     | 60  | 90           | mA    | Max             | V <sub>O</sub> = HIGH Z  |

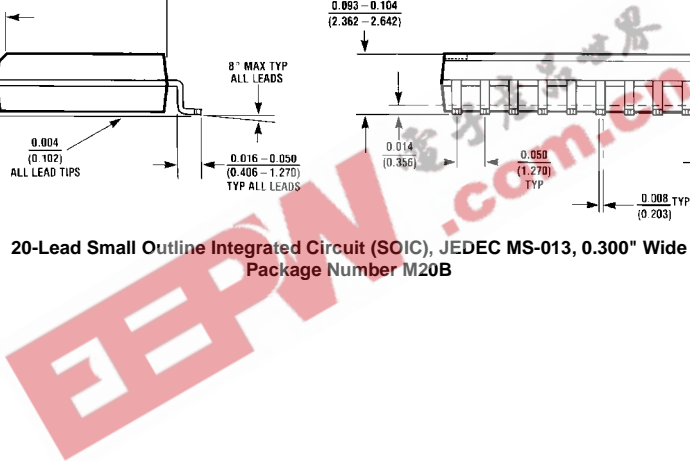
| AC Electrical Characteristics |   |   |     |     |  |      |   |      |       |
|-------------------------------|---|---|-----|-----|--|------|---|------|-------|
| Symbol                        | Parameter                               | T <sub>A</sub> = +25°C<br>V <sub>CC</sub> = +5.0V<br>C <sub>L</sub> = 50 pF |     |     | T <sub>A</sub> = -55°C to +125°C<br>V <sub>CC</sub> = 5.0V<br>C <sub>L</sub> = 50 pF |      | T <sub>A</sub> = 0°C to +70°C<br>V <sub>CC</sub> = 5.0V<br>C <sub>L</sub> = 50 pF |      | Units |
|                               |   | Min   | Typ | Max | Min  | Max  | Min   | Max  |       |
| t <sub>PLH</sub>              | Propagation Delay                       | 3.0   | 5.1 | 7.0 | 3.0  | 9.0  | 3.0   | 8.0  | ns    |
| t <sub>PHL</sub>              | Data to Output (74F240)                 | 2.0   | 3.5 | 4.7 | 2.0  | 6.0  | 2.0   | 5.7  |       |
| t <sub>PZH</sub>              | Output Enable Time (74F240)             | 2.0   | 3.5 | 4.7 | 2.0  | 6.5  | 2.0   | 5.7  | ns    |
| t <sub>PZL</sub>              |   | 4.0   | 6.9 | 9.0 | 4.0  | 10.5 | 4.0   | 10.0 |       |
| t <sub>PHZ</sub>              | Output Disable Time (74F240)            | 2.0   | 4.0 | 5.3 | 2.0  | 6.5  | 2.0   | 6.3  | ns    |
| t <sub>PLZ</sub>              |   | 2.0   | 6.0 | 8.0 | 2.0  | 12.5 | 2.0   | 9.5  |       |
| t <sub>PLH</sub>              | Propagation Delay                       | 2.5   | 4.0 | 5.2 | 2.0  | 6.5  | 2.5   | 6.2  | ns    |
| t <sub>PHL</sub>              | Data to Output (74F241, 74F244)         | 2.5   | 4.0 | 5.2 | 2.0  | 7.0  | 2.5   | 6.5  |       |
| t <sub>PZH</sub>              | Output Enable Time<br>(74F241, 74F244)  | 2.0   | 4.3 | 5.7 | 2.0  | 7.0  | 2.0   | 6.7  | ns    |
| t <sub>PZL</sub>              |   | 2.0   | 5.4 | 7.0 | 2.0  | 8.5  | 2.0   | 8.0  |       |
| t <sub>PHZ</sub>              | Output Disable Time<br>(74F241, 74F244) | 2.0   | 4.5 | 6.0 | 2.0  | 7.0  | 2.0   | 7.0  | ns    |
| t <sub>PLZ</sub>              |   | 2.0   | 4.5 | 6.0 | 2.0  | 7.5  | 2.0   | 7.0  |       |

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



**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide  
Package Number M20B**



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



LAND PATTERN RECOMMENDATION

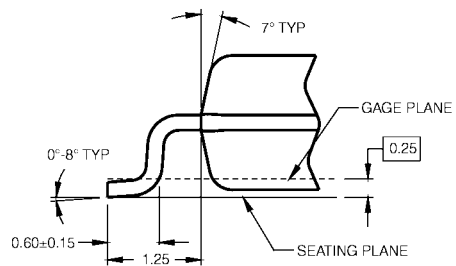


DIMENSIONS ARE IN MILLIMETERS

NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1996.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

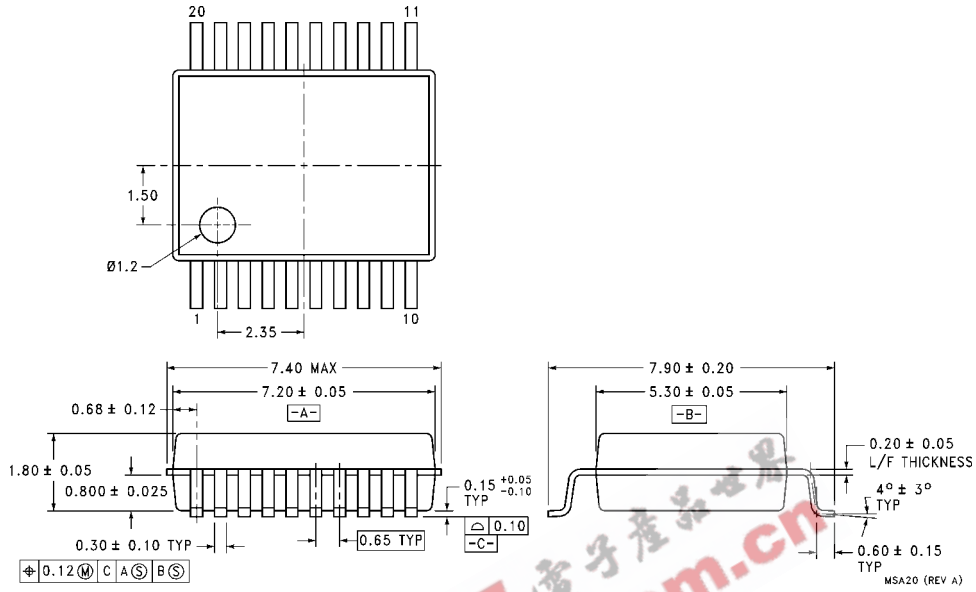
M20DRevB1



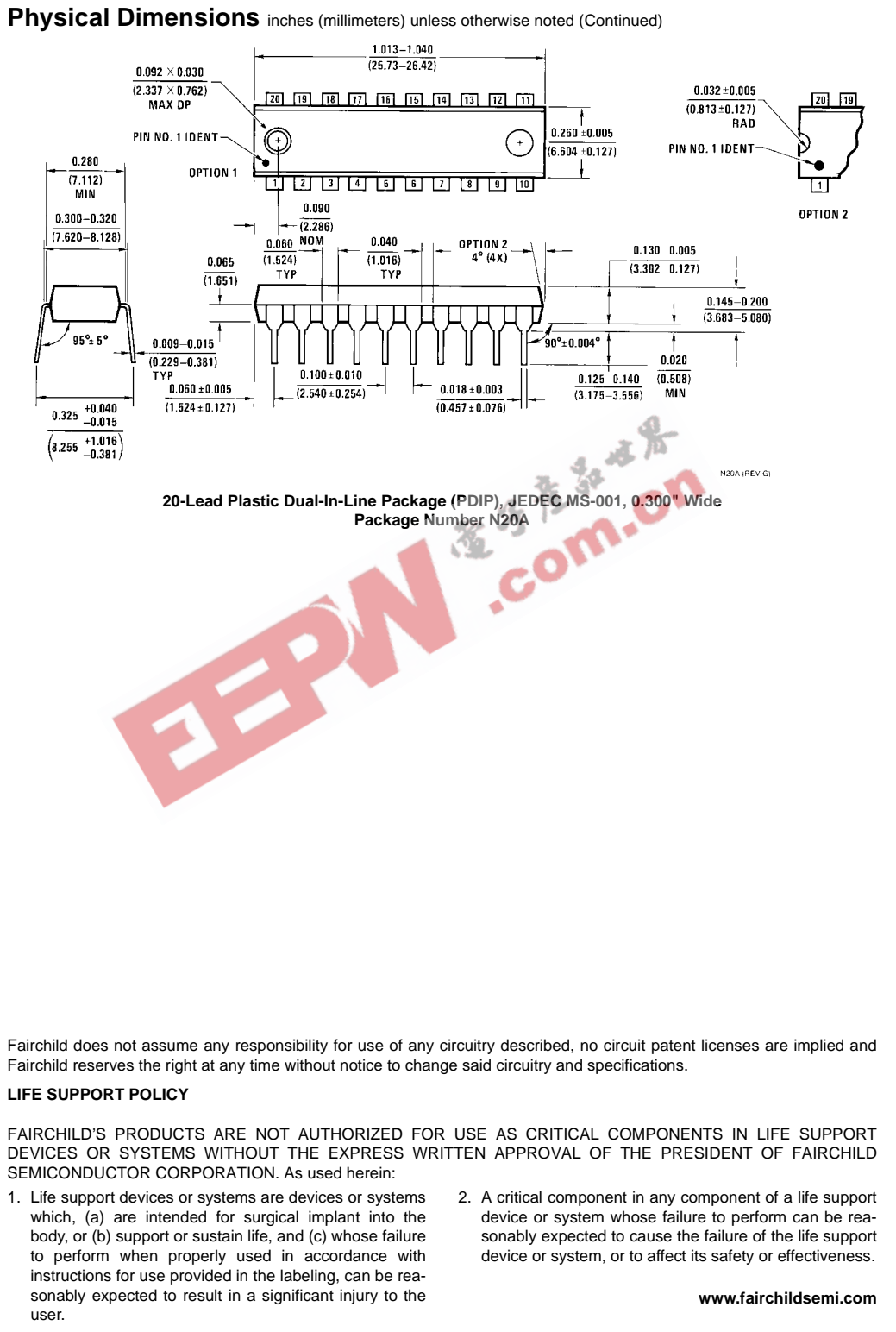
DETAIL A

**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
Package Number M20D**

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



**20-Lead Shrink Small Outline Package (SSOP), JEDEC MO-150, 5.3mm Wide**  
**Package Number MSA20**



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