

## 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

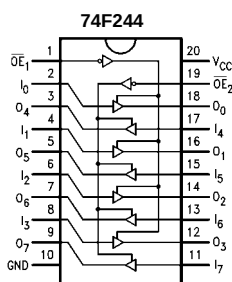
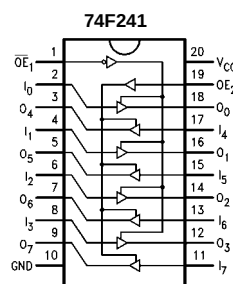
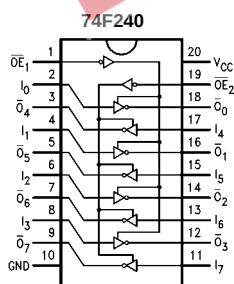
- 3-STATE outputs drive bus lines or buffer memory address registers
- Outputs sink 64 mA (48 mA mil)
- 12 mA source current
- Input clamp diodes limit high-speed termination effects

#### Ordering Code:

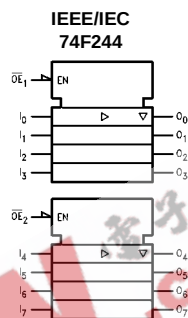
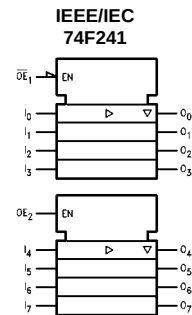
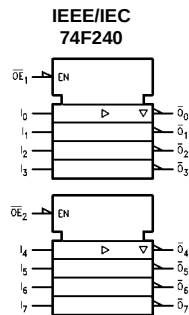
| Order Code         | Package Number | Package Description                                                        |
|--------------------|----------------|----------------------------------------------------------------------------|
| 74F240SC (Note 1)  | M20B           | 20-Lead Small Outline Integrated 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        |

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        |

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        |

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**

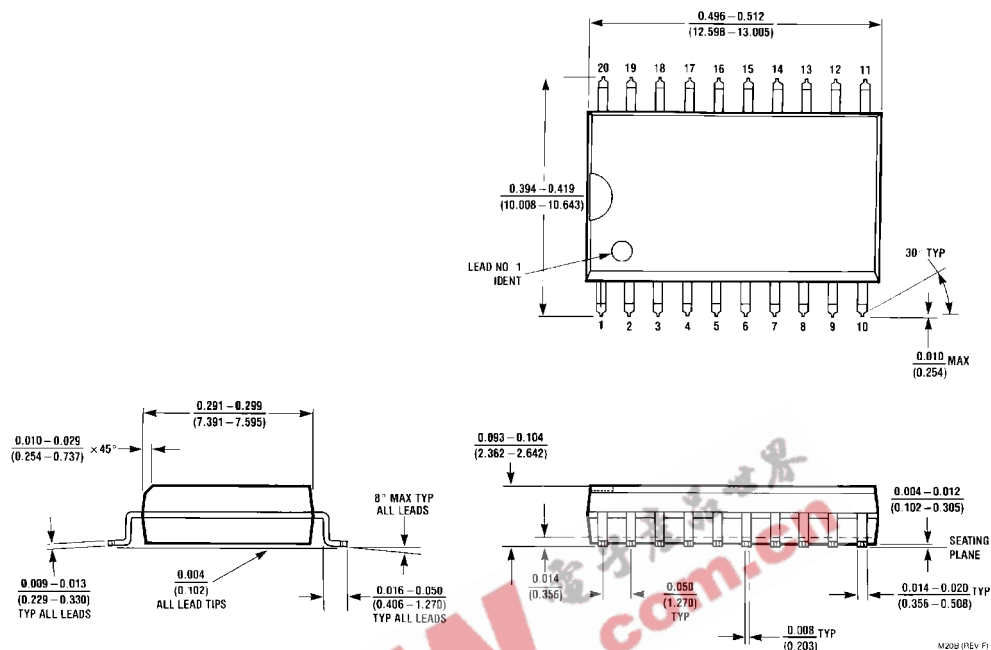
| Symbol           | Parameter                             | Min                 | Typ | Max          | Units | V <sub>CC</sub> | Conditions                                                                                                                         |
|------------------|---------------------------------------|---------------------|-----|--------------|-------|-----------------|------------------------------------------------------------------------------------------------------------------------------------|
| 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 ( $D_n$ 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  |       |
| t <sub>PLZ</sub> |                                 | 2.0                                                                         | 6.0 | 8.0 | 2.0                                                                                  | 12.5 | 2.0                                                                               | 9.5  | ns    |
| t <sub>PLH</sub> | Propagation Delay               | 2.5                                                                         | 4.0 | 5.2 | 2.0                                                                                  | 6.5  | 2.5                                                                               | 6.2  |       |
| t <sub>PHL</sub> | Data to Output (74F241, 74F244) | 2.5                                                                         | 4.0 | 5.2 | 2.0                                                                                  | 7.0  | 2.5                                                                               | 6.5  | ns    |
| t <sub>PZH</sub> | Output Enable Time              | 2.0                                                                         | 4.3 | 5.7 | 2.0                                                                                  | 7.0  | 2.0                                                                               | 6.7  |       |
| t <sub>PZL</sub> | (74F241, 74F244)                | 2.0                                                                         | 5.4 | 7.0 | 2.0                                                                                  | 8.5  | 2.0                                                                               | 8.0  |       |
| t <sub>PHZ</sub> | Output Disable Time             | 2.0                                                                         | 4.5 | 6.0 | 2.0                                                                                  | 7.0  | 2.0                                                                               | 7.0  |       |
| t <sub>PLZ</sub> | (74F241, 74F244)                | 2.0                                                                         | 4.5 | 6.0 | 2.0                                                                                  | 7.5  | 2.0                                                                               | 7.0  |       |

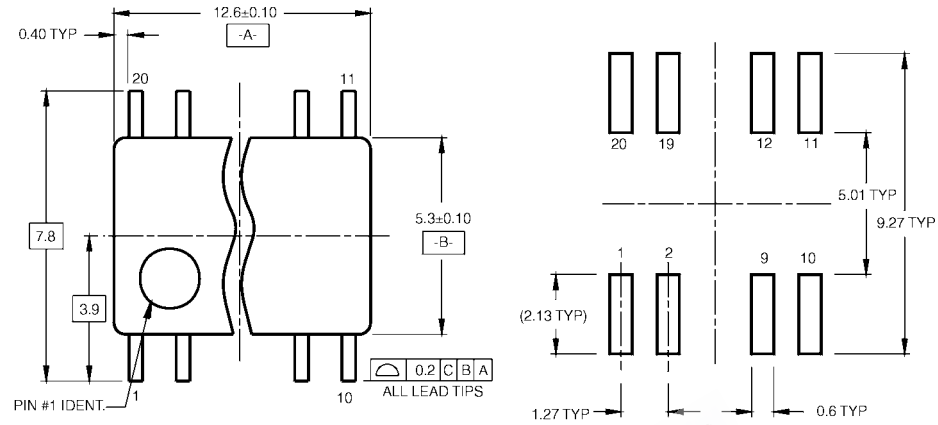
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**Physical Dimensions** inches (millimeters) unless otherwise noted

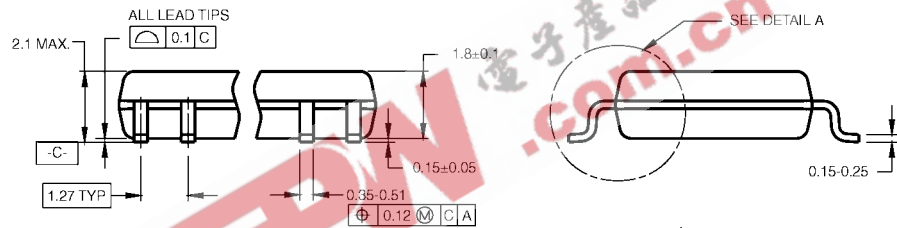


**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide  
Package Number M20B**

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



## LAND PATTERN RECOMMENDATION

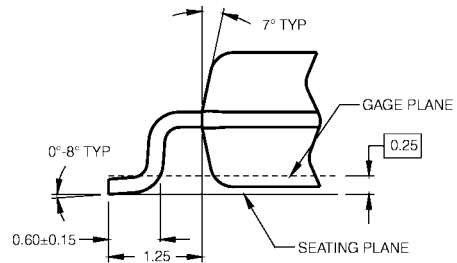


DIMENSIONS ARE IN MILLIMETERS

### NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

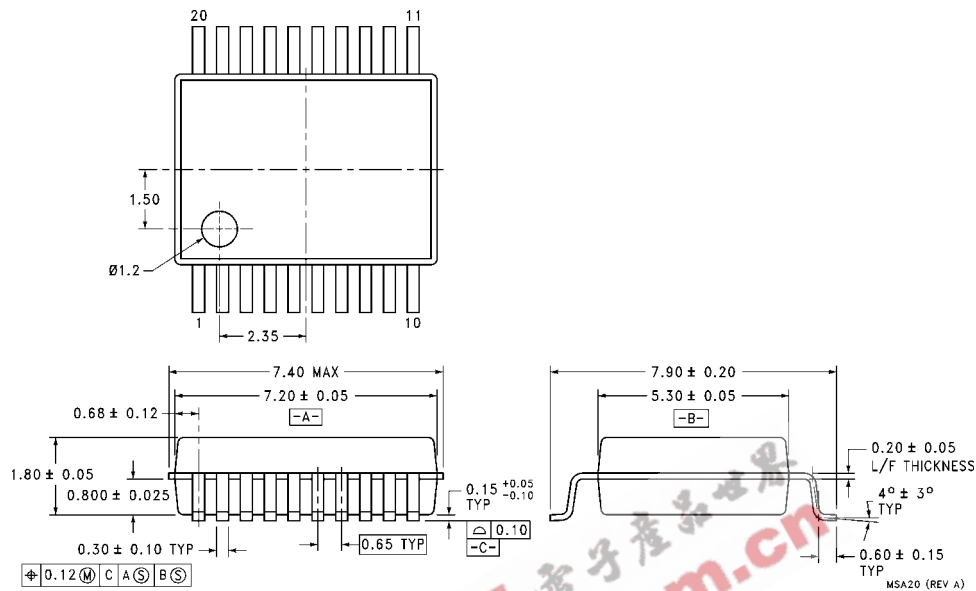
M20DRevB1



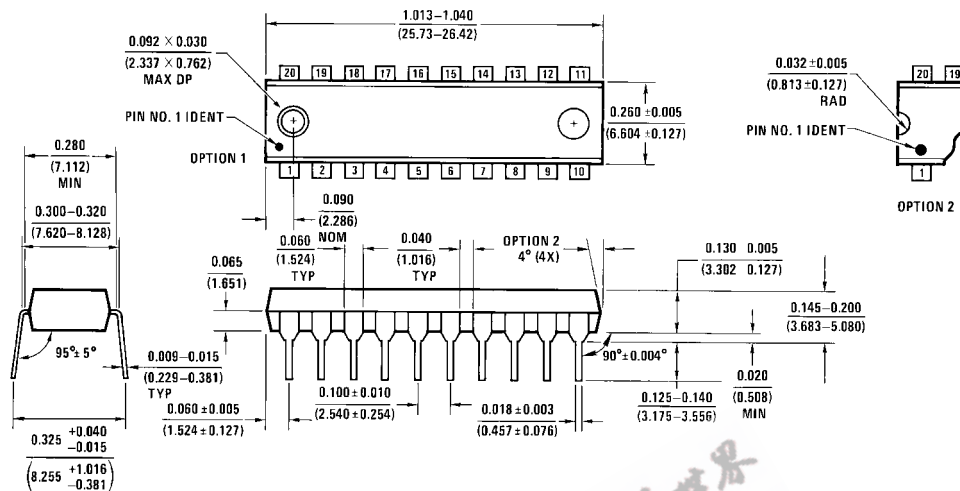
## DETAIL A

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**

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

**20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide**  
**Package Number N20A**

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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