T-52-07

# 74FR9240
# 9-Bit Buffer/Line Driver with TRI-STATE® Outputs



## General Description

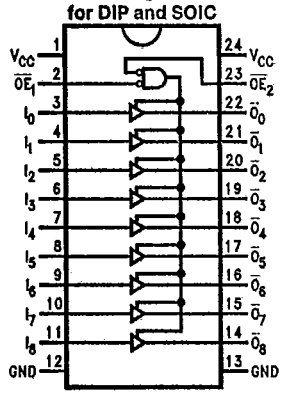
The 'FR9240 is an inverting 9-bit buffer and line driver designed to be employed as memory and address driver, clock driver and bus oriented transmitter or receiver.

## Features

- TRI-STATE outputs drive bus lines or buffer memory address registers
- Outputs sink 64 mA and source 15 mA
- Guaranteed multiple output switching, 250 pF delay and pin-to-pin skew
- Guaranteed 4000V minimum ESD protection
- 9-bit architecture for systems carrying parity

## Connection Diagram

Pin Assignment for DIP and SOIC




TL/F/10912–1

## Pin Description

| Pin Names | Description |
|---|---|
| $\overline{OE}_1$, $\overline{OE}_2$ | Output Enable Input (Active Low) |
| $I_0$–$I_8$ | Inputs |
| $\overline{O}_0$–$\overline{O}_8$ | Outputs |

## Truth Table

| $\overline{OE}_1$ | $\overline{OE}_2$ | $I_n$ | $\overline{O}_n$ |
|---|---|---|---|
| H | X | X | Z |
| X | H | X | Z |
| L | L | H | L |
| L | L | L | H |

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

9000-2693

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## Absolute Maximum Ratings (Note 1)

| | |
|---|---|
| Storage Temperature | −65°C to +150°C |
| Ambient Temperature under Bias | −55°C to +125°C |
| Junction Temperature under Bias | |
| 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 | |
| Commercial | 0°C to +70°C |
| Supply Voltage | |
| Commercial | +4.5V to +5.5V |

## DC Electrical Characteristics

| Symbol | Parameter | 74FR | | | Units | $V_{CC}$ | Conditions |
|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | | | |
| $V_{IH}$ | Input High Voltage | 2.0 | | | V | | Recognized High Signal |
| $V_{IL}$ | Input Low Voltage | | | 0.8 | V | | Recognized Low Signal |
| $V_{CD}$ | Input Clamp Diode Voltage | | | −1.2 | V | Min | $I_{IN}$ = −18 mA |
| $V_{OH}$ | Output High Voltage | 2.4 | | | V | Min | $I_{OH}$ = −3 mA |
| | | 2.0 | | | V | Min | $I_{OH}$ = −15 mA |
| $V_{OL}$ | Output Low Voltage | | | 0.55 | V | Min | $I_{OL}$ = 64 mA |
| $I_{IH}$ | Input High Current | | | 5 | μA | Max | $V_{IN}$ = 2.7V |
| $I_{BVI}$ | Input High Current Breakdown Test | | | 7 | μA | Max | $V_{IN}$ = 7.0V |
| $I_{IL}$ | Input Low Currrent | | | −150 | μA | Max | $V_{IN}$ = 0.5V |
| $V_{ID}$ | Input Leakage Test | 4.75 | | | V | 0.0 | $I_{ID}$ = 1.9 μA, All Other Pins Grounded |
| $I_{OD}$ | Output Circuit Leakage Current | | | 3.75 | μA | 0.0 | $V_{IOD}$ = 150 mV, All Other Pins Grounded |
| $I_{OZH}$ | Output Leakage Current | | | 20 | μA | Max | $V_{OUT}$ = 2.7V |
| $I_{OZL}$ | Output Leakage Current | | | −20 | μA | Max | $V_{OUT}$ = 0.5V |
| $I_{OS}$ | Output Short-Circuit Current | −100 | | −225 | mA | Max | $V_{OUT}$ = 0.0V |
| $I_{CEX}$ | Output High Leakage Current | | | 50 | μA | Max | $V_{OUT}$ = $V_{CC}$ |
| $I_{ZZ}$ | Bus Drainage Test | | | 100 | μA | 0.0 | $V_{OUT}$ = 5.25V |
| $I_{CCH}$ | Power Supply Current | | 9 | 13 | mA | Max | All Outputs High |
| $I_{CCL}$ | Power Supply Current | | 37 | 45 | mA | Max | All Outputs Low |
| $I_{CCZ}$ | Power Supply Current | | 31 | 38 | mA | Max | Outputs TRI-STATE |
| $C_{IN}$ | Input Capacitance | | 8.0 | | pF | 5.0 | |

## AC Electrical Characteristics

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| Symbol | Parameter | 74FR $T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF | | | 74FR $T_A = Comm$, $V_{CC} = Comm$, $C_L = 50$ pF | | Units |
|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay | 1.0 | 3.3 | 4.5 | 1.0 | 4.5 | ns |
| $t_{PHL}$ | $A_n$ to $B_n$ or $B_n$ to $A_n$ | 1.0 | 2.9 | 4.5 | 1.0 | 4.5 | |
| $t_{PZH}$ | Output Enable Time | 2.6 | 4.0 | 6.6 | 2.6 | 6.6 | ns |
| $t_{PZL}$ | | 2.6 | 6.3 | 6.6 | 2.6 | 6.6 | |
| $t_{PHZ}$ | Output Enable Time | 1.7 | 3.3 | 6.2 | 1.7 | 6.2 | ns |
| $t_{PLZ}$ | | 1.7 | 2.9 | 6.2 | 1.7 | 6.2 | |

## Extended AC Characteristics

| Symbol | Parameter | 74FR $T_A = Comm$, $V_{CC} = Comm$, $C_L = 50$ pF, Eight Outputs Switching (Note 2) | | 74FR $T_A = Comm$, $V_{CC} = Comm$, $C_L = 250$ pF (Note 3) | | Units |
|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | |
| $t_{PLH}$ | Propagation Delay | 1.0 | 6.0 | 2.3 | 8.3 | ns |
| $t_{PHL}$ | $A_n$ to $B_n$ or $B_n$ to $A_n$ | 1.0 | 6.0 | 2.3 | 8.3 | |
| $t_{PZH}$ | Output Enable Time | 2.6 | 7.2 | | | ns |
| $t_{PZL}$ | | 2.6 | 7.2 | | | |
| $t_{PHZ}$ | Output Disable Time | 1.7 | 6.6 | | | ns |
| $t_{PLZ}$ | | 1.7 | 6.6 | | | |
| $t_{OSHL}$ (Note 1) | Pin to Pin Skew for HL Transitions | | 2.0 | | | ns |
| $t_{OSLH}$ (Note 1) | Pin to Pin Skew for LH Transitions | | 1.1 | | | ns |
| $t_{OST}$ (Note 1) | Pin to Pin Skew for HL/LH Transitions | | 3.0 | | | ns |

**Note 1:** Skew is defined as the absolute value of the difference between the actual propagation delays for any two outputs of the same device. The specification applies to any outputs switching high to low, ($t_{OSHL}$), low to high, ($t_{OSLH}$), or high to low and/or low to high, ($t_{OST}$). Specifications guaranteed with all outputs switching in phase.

**Note 2:** This specification is guaranteed but not tested. The limits apply to propagation delays for all paths described switching in phase, i.e., all low-to-high, high-to-low, TRI-STATE-to-high, etc.

**Note 3:** These specifications guaranteed but not tested. The limits represent propagation delays with 250 pF load capacitors in place of the 50 pF load capacitors in the standard AC load. This specification pertains to single output switching only.

## Ordering Information

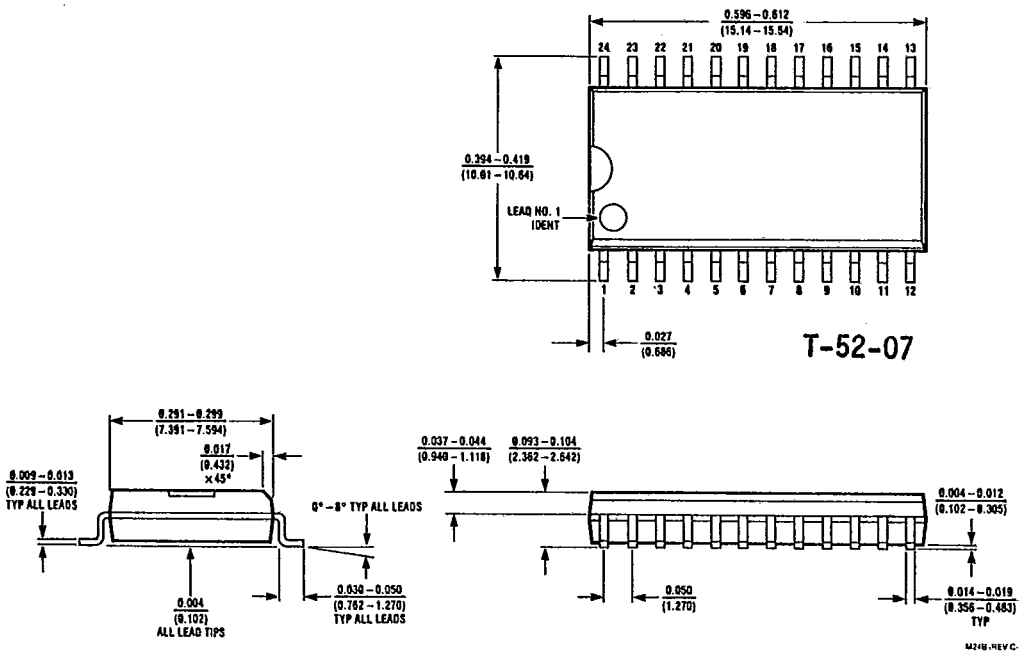
The device number is used to form part of a simplified purchasing code where a package type and temperature range are defined as follows:

74FR 9240 SP C QR

- Temperature Range Family: 74FR = Commercial
- Device Type: 9240
- Package Code: SP = Plastic DIP; S = Small Outline (SOIC)
- Temperature Range: C = Commercial (0°C to +70°C)
- Special Variations: X = Devices shipped in 13" reels; QR = Commercial grade device with burn-in

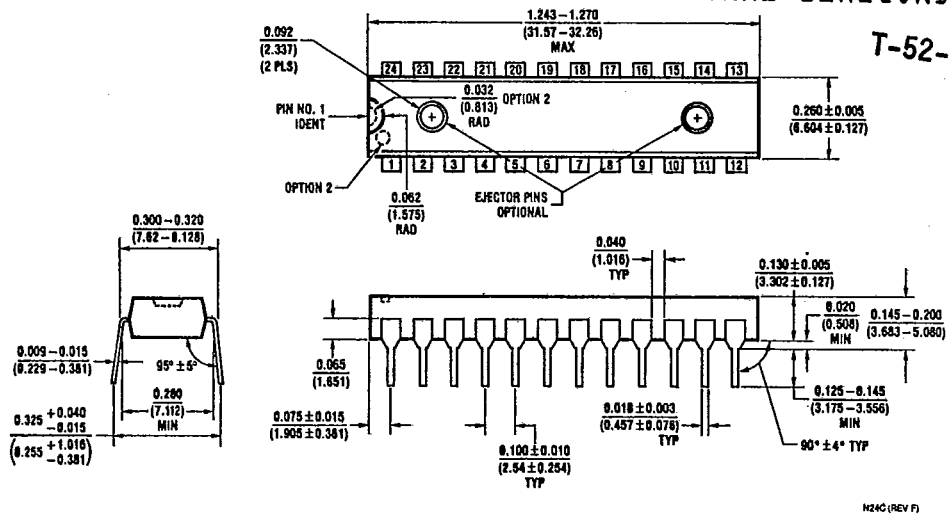
## Physical Dimensions inches (millimeters)






**24-Lead Small Outline Integrated Circuit (S)**
**NS Package Number M24B**

## Physical Dimensions inches (millimeters) (Continued)




**24-Lead Slim (0.300" Wide) Plastic Dual-In-Line Package (SP)**
**NS Package Number N24C**

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