

SN54F540, SN74F540 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

D3215, JANUARY 1989

- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Data Flow-Through Pinout (All Inputs on Opposite Side from Outputs)
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

These octal buffers and line drivers are designed to have the performance of the popular SN54F240/SN74F240 series and, at the same time, offer a pinout with inputs and outputs on opposite sides of the package. This arrangement greatly enhances printed circuit board layout.

The three-state control gate is a 2-input NOR gate so that if either $\bar{G}1$ or $\bar{G}2$ is high, all eight outputs are in the high-impedance state.

The SN54F540 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74F540 is characterized for operation from 0°C to 70°C .

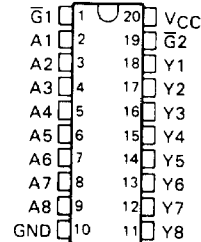
FUNCTION TABLE

| INPUTS | | | OUTPUT |
|------------|------------|---|--------|
| $\bar{G}1$ | $\bar{G}2$ | A | Y |
| L | L | L | H |
| L | L | H | L |
| H | X | X | Z |
| X | H | X | Z |

Z = High Impedance

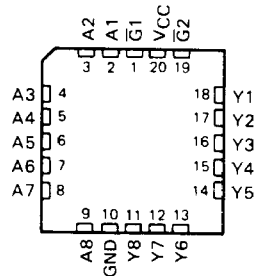
SN54F540 . . . J PACKAGE
SN74F540 . . . DW OR N PACKAGE

(TOP VIEW)



SN54F540 . . . FK PACKAGE

(TOP VIEW)



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Data Sheets

PRODUCT PREVIEW

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TEXAS
INSTRUMENTS

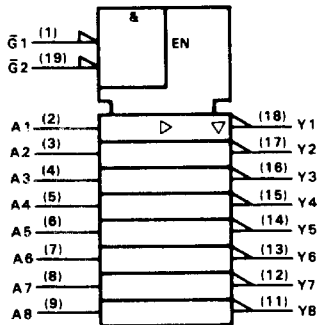
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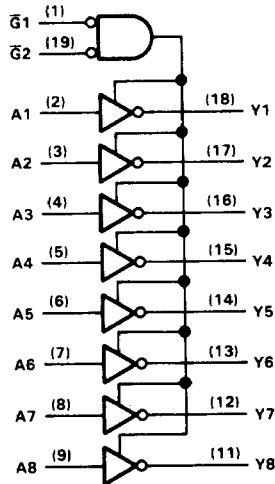
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SN54F540, SN74F540 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

logic symbol†



logic diagram (positive logic)



†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

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Data Sheets

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

| | |
|------------------------------------------------------------------------|--------------------|
| Supply voltage, V_{CC} | -0.5 V to 7 V |
| Input voltage† | -1.2 V to 7 V |
| Input current | -30 mA to 5 mA |
| Voltage applied to any output in the disabled or power-off state | -0.5 V to 5.5 V |
| Voltage applied to any output in the high state | -0.5 V to V_{CC} |
| Current into any output in the low state: SN54F540 | 96 mA |
| SN74F540 | 128 mA |
| Operating free-air temperature range: SN54F540 | -55°C to 125°C |
| SN74F540 | 0°C to 70°C |
| Storage temperature range | -65°C to 150°C |

‡ The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

| | SN54F540 | | | SN74F540 | | | UNIT |
|--------------------------------------|----------|-----|-----|----------|-----|-----|------|
| | MIN | NOM | MAX | MIN | NOM | MAX | |
| V_{CC} Supply voltage | 4.5 | 5 | 5.5 | 4.5 | 5 | 5.5 | V |
| V_{IH} High-level input voltage | 2 | | | 2 | | | V |
| V_{IL} Low-level input voltage | | | 0.8 | | | 0.8 | V |
| I_{IK} Input clamp current | | | -18 | | | -18 | mA |
| I_{OH} High-level output current | | | -12 | | | -15 | mA |
| I_{OL} Low-level output current | | | 48 | | | 64 | mA |
| T_A Operating free-air temperature | -55 | | 125 | 0 | | 70 | °C |

PRODUCT PREVIEW

SN54F540, SN74F540 OCTAL BUFFERS AND LINE DRIVERS WITH 3-STATE OUTPUTS

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | | SN54F540 | | | SN74F540 | | | UNIT |
|-------------------|-----------------------------|---------------------------|----------|------|------|----------|------|------|---------------|
| | | | MIN | TYP† | MAX | MIN | TYP† | MAX | |
| V_{IK} | $V_{CC} = 4.5 \text{ V}$, | $I_I = -18 \text{ mA}$ | | | -1.2 | | | -1.2 | V |
| V_{OH} | $V_{CC} = 4.5 \text{ V}$ | $I_{OH} = -3 \text{ mA}$ | 2.4 | 3.3 | | 2.4 | 3.3 | | V |
| | | $I_{OH} = -12 \text{ mA}$ | 2 | 3.2 | | | | | |
| | | $I_{OH} = -15 \text{ mA}$ | | | | 2 | 3.1 | | |
| V_{OL} | $V_{CC} = 4.75 \text{ V}$, | $I_{OH} = -3 \text{ mA}$ | | | | 2.7 | | | V |
| | | $I_{OL} = 48 \text{ mA}$ | | 0.38 | 0.55 | | | | |
| | $V_{CC} = 4.5 \text{ V}$ | $I_{OL} = 64 \text{ mA}$ | | | | | 0.42 | 0.55 | |
| I_{OZH} | $V_{CC} = 5.5 \text{ V}$, | $V_O = 2.7 \text{ V}$ | | | 50 | | | 50 | μA |
| I_{OZL} | $V_{CC} = 5.5 \text{ V}$, | $V_O = 0.5 \text{ V}$ | | | -50 | | | -50 | μA |
| I_I | $V_{CC} = 5.5 \text{ V}$, | $V_I = 7 \text{ V}$ | | | 0.1 | | | 0.1 | mA |
| I_{IH} | $V_{CC} = 5.5 \text{ V}$, | $V_I = 2.7 \text{ V}$ | | | 20 | | | 20 | μA |
| I_{IL} | $V_{CC} = 5.5 \text{ V}$, | $V_I = 0.5 \text{ V}$ | | | -0.6 | | | -0.6 | mA |
| I_{OS}^\ddagger | $V_{CC} = 5.5 \text{ V}$, | $V_O = 0$ | -100 | | -225 | -100 | | -225 | mA |
| I_{CC} | $V_{CC} = 5.5 \text{ V}$ | Outputs high | 59 | 75 | | 59 | 75 | | mA |
| | | Outputs low | 12 | 20 | | 12 | 20 | | |
| | | Outputs disabled | 35 | 45 | | 35 | 45 | | |

switching characteristics (see Note 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC} = 5 \text{ V}$, $C_L = 50 \text{ pF}$, $R_1 = 500 \Omega$, $R_2 = 500 \Omega$, $T_A = 25^\circ\text{C}$ | | | $V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $C_L = 50 \text{ pF}$, $R_1 = 500 \Omega$, $R_2 = 500 \Omega$, $T_A = \text{MIN to MAX}^\S$ | | | UNIT | |
|-----------|--------------|-------------|---------------------------------------------------------------------------------------------------------------------------------|-----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|------|-----|
| | | | 'F540 | | | SN54F540 | | SN74F540 | | |
| | | | MIN | TYP | MAX | MIN | MAX | MIN | | MAX |
| t_{PLH} | Data (Any A) | Y | 1 | 2.6 | 5 | 1 | 6 | 1 | 5.5 | ns |
| t_{PHL} | | | 1 | 1.6 | 4 | 1 | 4.5 | 1 | 4 | |
| t_{PZH} | \bar{G} | Y | 1.7 | 4.5 | 8 | 1.7 | 9 | 1.7 | 8.5 | ns |
| t_{PZL} | | | 2.7 | 5.4 | 10 | 2.7 | 11 | 2.7 | 10.5 | |
| t_{PHZ} | \bar{G} | Y | 1 | 3 | 6 | 1 | 7 | 1 | 6.5 | ns |
| t_{PLZ} | | | 1 | 2.1 | 5.6 | 1 | 7.5 | 1 | 6 | |

† All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

‡ Not more than one output should be shorted at a time and the duration of the short circuit should not exceed one second.

§ For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

NOTE 1: Load circuits and waveforms are shown in Section 1.