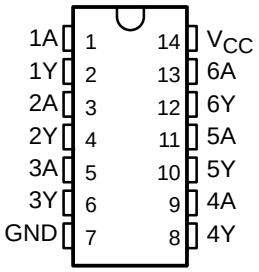
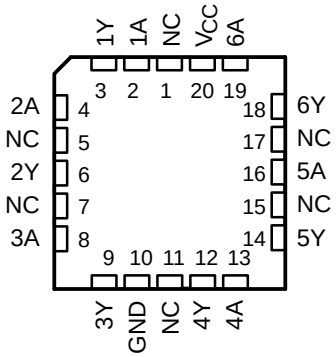
- **Converts TTL Voltage Levels to MOS Levels**
- **High Sink-Current Capability**
- **Input Clamping Diodes Simplify System Design**
- **Open-Collector Driver for Indicator Lamps and Relays**
- **Package Options Include "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

**SN54LS06, SN54LS16 . . . J PACKAGE**
**SN74LS06, SN74LS16 . . . D OR N PACKAGE**
**(T0P VIEW)**




**SN54LS06, SN54LS16 . . . FK PACKAGE**
**(T0P VIEW)**




NC – No internal connection

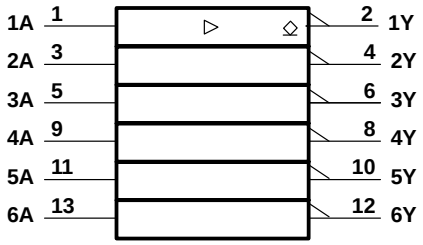
## description

These monolithic hex inverter buffers/drivers feature high-voltage open-collector outputs to interface with high-level circuits (such as MOS), or for driving high-current loads, and are also characterized for use as inverter buffers for driving TTL inputs. The ′LS06 has a rated output voltage of 30 V and the ′LS16 has a rated output voltage of 15 V. The maximum sink current for the SN54LS06 and SN54LS16 is 30 mA and the SN74LS06 and SN74LS16 is 40 mA.

These circuits are compatible with most TTL families. Inputs are diode-clamped to minimize transmission-effects, which simplifies design. Typical power dissipation is 175 mW and average propagation delay time is 8 ns.

The SN54LS06 and SN54LS16 are characterized over the full military temperature range of –55°C to 125°C. The SN74LS06 and SN74LS16 are characterized for operation from 0°C to 70°C.

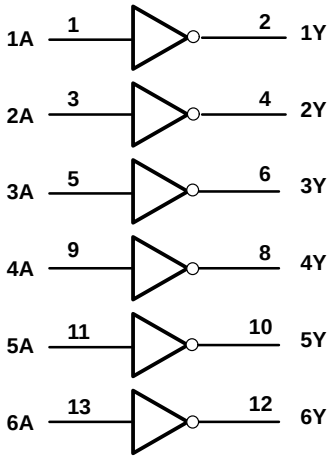
## logic symbol†




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

Pin numbers shown are for D, J, and N packages.

## logic diagram (positive logic)

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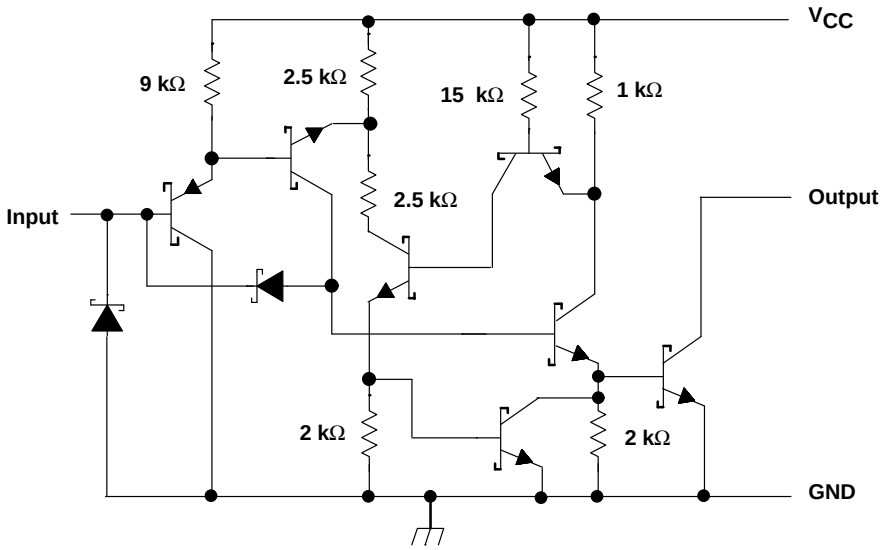
## schematic (each gate)




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

Supply voltage, $V_{CC}$ . . . . . 7 V
Input voltage, $V_I$ (see Note 1) . . . . . 5.5 V
Output voltage, $V_O$ (see Notes 1 and 2): SN54LS06, SN74LS06 . . . . . 30 V
SN54LS16, SN74LS16 . . . . . 15 V
Operating free-air temperature range: SN54LS06, SN54LS16 . . . . . −55°C to 125°C
SN74LS06, SN74LS16 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. This are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. Voltage values are with respect to network ground terminal.
2. This is the maximum voltage that should be applied to any output when it is in the off state.

## recommended operating conditions

| | | | SN54LS06 SN54LS16 | | | SN74LS06 SN74LS16 | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | NOM | MAX | MIN | NOM | MAX | |
| $V_{CC}$ | Supply voltage | | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| $V_{IH}$ | High-level input voltage | | 2 | | | 2 | | | V |
| $V_{IL}$ | Low-level input voltage | | | | 0.8 | | | 0.8 | V |
| $V_{OH}$ | High-level output voltage | ’LS06 | | | 30 | | | 30 | V |
| | | ’LS16 | | | 15 | | | 15 | |
| $I_{OL}$ | Low-level output current | | | | 30 | | | 40 | mA |
| $T_A$ | Operating free-air temperature | | −55 | | 125 | 0 | | 70 | °C |

PRODUCT PREVIEW

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

| PARAMETER | TEST CONDITIONS† | | | SN54LS06 SN54LS16 | | | SN74LS06 SN74LS16 | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP‡ | MAX | MIN | TYP‡ | MAX | |
| $V_{IK}$ | $V_{CC}$ = MIN, | $I_I$ = –12 mA | | | | –1.5 | | | –1.5 | V |
| $I_{OH}$ | $V_{CC}$ = MIN, | $V_{IL}$ = 0.8 V | 'LS06, $V_{OH}$ = 30 V | | | 0.25 | | | 0.25 | mA |
| | | | 'LS16, $V_{OH}$ = 15 V | | | 0.25 | | | 0.25 | |
| $V_{OL}$ | $V_{CC}$ = MIN, | $V_{IH}$ = 2 V | $I_{OL}$ = 16 mA | | 0.25 | 0.4 | | 0.25 | 0.4 | V |
| | | | $I_{OL}$ = 30 mA | | | 0.7 | | | | |
| | | | $I_{OL}$ = 40 mA | | | | | | 0.7 | |
| $I_I$ | $V_{CC}$ = MAX, | $V_I$ = 7 V | | | | 1 | | | 1 | mA |
| $I_{IH}$ | $V_{CC}$ = MAX, | $V_I$ = 2.4 V | | | | 20 | | | 20 | µA |
| $I_{IL}$ | $V_{CC}$ =MAX, | $V_I$ = 0.4 V | | | | –0.2 | | | –0.2 | mA |
| $I_{CCH}$ | $V_{CC}$ = MAX | | | | | 18 | | | 18 | mA |
| $I_{CCL}$ | $V_{CC}$ = MAX | | | | | 60 | | | 60 | mA |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at $V_{CC}$ = 5 V, and $T_A$ = 25°C.

PRODUCT PREVIEW

## switching characteristics, $V_{CC}$ = 5 V, $T_A$ = 25°C (see Note 3)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | A | Y | $R_L$ = 110 Ω, $C_L$ = 15 pF | | 7 | 15 | ns |
| $t_{PHL}$ | | | | | 10 | 20 | |

NOTE 3: Load circuit and voltage waveforms are shown in Section 1 of *TTL Logic Data Book,* 1988.

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