

- TTL Compatible
- Propagation Delay Time . . . 15 ns Typ
- Very Low Output Impedance with High Drive Capability
- 40-mA Sink and Source Capability
- Gating Control to Allow Either Single-Ended or Differential Operation
- Three-State Outputs for Party-Line (Data-Bus) Operation

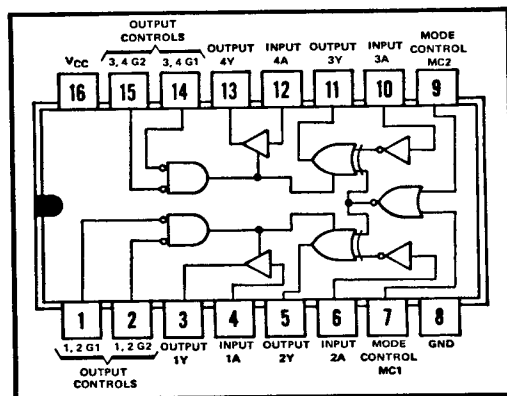
## description

The DS7831, DS7832, DS8831, and DS8832 can be used as either quadruple single-ended line drivers or as dual differential line drivers. This multi-mode operation and simple logic control make these devices especially useful for party-line or bus-organized systems. The DS7831 and DS8831 have output clamp diodes to  $V_{CC}$ ; the DS7832 and DS8832 do not.

For one of these circuits to operate as four independent single-ended line drivers, both mode-control pins must be low. In this mode, no signal inversion takes place between inputs and outputs. To operate as a dual differential line driver, at least one of the mode control inputs must be high. Inputs 1A and 2A should be connected together as should 3A and 4A. Then signals applied to the inputs will appear noninverted at 1Y and 4Y and inverted at 2Y and 3Y, provided the output control pins are low.

While enabled, these outputs provide good drive capability for capacitive loads, and fast transitions from both low-to-high levels and high-to-low levels.

DS7831, DS7832.....J PACKAGE  
DS8831, DS8832.....J OR N PACKAGE  
(TOP VIEW)



Taking either of the associated output controls high disables the outputs. When disabled, these three-state outputs neither load nor drive a line and hundreds of these devices may be connected to a common bus line. Only one output should be enabled at a time.

The DS7831 and DS7832 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The DS8831 and DS8832 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE

| OUTPUT CONTROLS |    | MODE CONTROLS |     | DATA INPUT | OUTPUT | DATA INPUT | OUTPUT |
|-----------------|----|---------------|-----|------------|--------|------------|--------|
| G1              | G2 | MC1           | MC2 | 1A/4A      | 1Y/4Y  | 2A/3A      | 2Y/3Y  |
| L               | L  | L             | L   | H          | H      | H          | H      |
| L               | L  | L             | L   | L          | L      | L          | L      |
| L               | L  | X             | H   | H          | H      | H          | L      |
| L               | L  | H             | X   | L          | L      | L          | H      |
| H               | X  | X             | X   | X          | Z      | X          | Z      |
| X               | H  | X             | X   | X          | Z      | X          | Z      |

H = high level, L = low level, X = irrelevant, Z = high impedance (off)

# TYPES DS7831, DS7832, DS8831, DS8832

## LINE DRIVERS WITH 3-STATE OUTPUTS

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

|                                                                                              |                |
|----------------------------------------------------------------------------------------------|----------------|
| Supply voltage, $V_{CC}$ (see Note 1)                                                        | 7 V            |
| Input voltage                                                                                | 5.5 V          |
| Continuous total dissipation at (or below) 25°C free-air temperature (see Note 2): J package | 1025 mW        |
| N package                                                                                    | 1150 mW        |
| Operating free-air temperature range: DS78'                                                  | -55°C to 125°C |
| DS88'                                                                                        | 0°C to 70°C    |
| Storage temperature range                                                                    | -65°C to 150°C |
| Lead temperature 1/16 inch from case for 60 seconds: J package                               | 300°C          |
| Lead temperature 1/16 inch from case for 10 seconds: N package                               | 260°C          |

NOTES: 1. Voltage values are with respect to network ground terminal.

2. For operation above 25°C free-air temperature, refer to Dissipation Derating Curves in the Thermal Information section, which starts on page 21. In the J package, DS7831 and DS7832 chips are alloy-mounted; DS8831 and DS8832 chips are glass-mounted.

### recommended operating conditions

|                                       | DS78' |     |     | DS88' |     |      | UNIT |
|---------------------------------------|-------|-----|-----|-------|-----|------|------|
|                                       | MIN   | NOM | MAX | MIN   | NOM | MAX  |      |
| Supply voltage, $V_{CC}$              | 4.5   | 5   | 5.5 | 4.75  | 5   | 5.25 | V    |
| Output voltage, $V_O$                 |       |     | 5.5 |       |     | 5.5  | V    |
| High-level output current, $I_{OH}$   |       |     | -40 |       |     | -40  | mA   |
| Low-level output current, $I_{OL}$    |       |     | 40  |       |     | 40   | mA   |
| Operating free-air temperature, $T_A$ | -55   |     | 125 | 0     |     | 70   | °C   |

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

| PARAMETER                                                | TEST CONDITIONS†                                                          |  | MIN  | TYP‡ | MAX            | UNIT          |
|----------------------------------------------------------|---------------------------------------------------------------------------|--|------|------|----------------|---------------|
| $V_{IH}$ High-level input voltage                        |                                                                           |  | 2    |      |                | V             |
| $V_{IL}$ Low-level input voltage                         |                                                                           |  |      |      | 0.8            | V             |
| $V_{IK}$ Input clamp voltage                             | $V_{CC} = \text{MIN}$ , $I_I = -12 \text{ mA}$                            |  |      | -1   | -1.5           | V             |
| $V_{OH}$ High-level output voltage                       | $V_{CC} = \text{MIN}$ , $I_{OH} = -2 \text{ mA}$ DS7831,DS7832            |  | 2.4  | 3.1  |                | V             |
|                                                          | $V_{IH} = 2 \text{ V}$ , $I_{OH} = -5.2 \text{ mA}$ DS8831,DS8832         |  | 2.4  | 3.0  |                |               |
|                                                          | $V_{IL} = 0.8 \text{ V}$ , $I_{OH} = -40 \text{ mA}$                      |  | 1.8  | 2.5  |                |               |
| $V_{OL}$ Low-level output voltage                        | $V_{CC} = \text{MIN}$ , $V_{IH} = 2 \text{ V}$ , $I_{OL} = 32 \text{ mA}$ |  | 0.26 |      | 0.4            | V             |
|                                                          | $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 40 \text{ mA}$                       |  | 0.3  |      | 0.5            |               |
| $V_{OK}$ Output clamp voltage                            | $V_{CC} = 5 \text{ V}$ , $I_O = -12 \text{ mA}$                           |  |      |      | -1.5           | V             |
|                                                          | $T_A = 25^\circ\text{C}$ , $I_O = 12 \text{ mA}$ DS7831,DS8831            |  |      |      | $V_{CC} + 1.5$ |               |
| $I_{OZ}$ Off-state (high-impedance-state) output current | $V_{CC} = \text{MAX}$ , $T_A = 25^\circ\text{C}$ , $V_O = 2.4 \text{ V}$  |  |      |      | 40             | $\mu\text{A}$ |
|                                                          | $V_O = 0.4 \text{ V}$                                                     |  |      |      | -40            |               |
| $I_I$ Input current at maximum input voltage             | $V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$                             |  |      |      | 1              | mA            |
| $I_{IH}$ High-level input current                        | $V_{CC} = \text{MAX}$ , $V_I = 2.4 \text{ V}$                             |  |      |      | 40             | $\mu\text{A}$ |
| $I_{IL}$ Low-level input current                         | $V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$                             |  |      | -1   | -1.6           | mA            |
| $I_{OS}$ Short-circuit output current§                   | $V_{CC} = \text{MAX}$ , $V_O = 0$ , $T_A = \text{MAX}$                    |  | -40  | -70  | -120           | mA            |
| $I_{CC}$ Supply current                                  | $V_{CC} = \text{MAX}$                                                     |  |      | 50   | 90             | mA            |

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

§ Only one output should be shorted at a time.

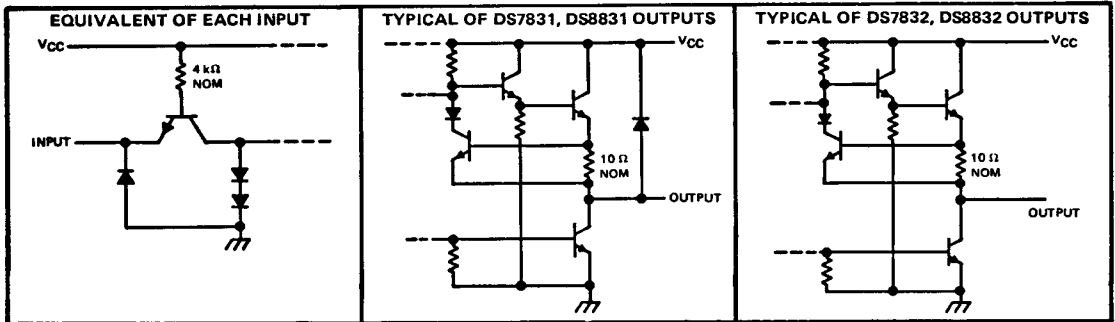
# TYPES DS7831, DS7832, DS8831, DS8832 LINE DRIVERS WITH 3-STATE OUTPUTS

switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER† | FROM     | TO                         | TEST CONDITIONS                         | MIN | TYP | MAX | UNIT |
|------------|----------|----------------------------|-----------------------------------------|-----|-----|-----|------|
| $t_{PLH}$  | 2A or 3A | 2Y or 3Y<br>(noninverting) | Mode controls low,                      |     | 10  | 25  | ns   |
| $t_{PHL}$  |          |                            | See Figure 11                           |     | 12  | 25  |      |
| $t_{PLH}$  |          |                            | Mode controls high,                     |     | 12  | 25  |      |
| $t_{PHL}$  | 2A or 3A | 2Y or 3Y<br>(inverting)    | See Figure 11                           |     | 15  | 25  | ns   |
| $t_{PLH}$  |          |                            |                                         |     | 9   | 25  |      |
| $t_{PHL}$  |          |                            |                                         |     | 11  | 25  |      |
| $t_{PZH}$  | G1 or G2 | Any Y                      | $C_L = 50\text{ pF}$ ,<br>See Figure 13 |     | 12  | 22  | ns   |
| $t_{PZL}$  |          |                            |                                         |     | 14  | 27  |      |
| $t_{PHZ}$  |          |                            | $C_L = 5\text{ pF}$ ,<br>See Figure 13  |     | 6   | 12  |      |
| $t_{PLZ}$  | G1 or G2 | Any Y                      |                                         |     | 15  | 22  | ns   |
|            |          |                            |                                         |     |     |     |      |
|            |          |                            |                                         |     |     |     |      |

†  $t_{PLH}$  = Propagation delay time, low-to-high-level output  
 $t_{PHL}$  = Propagation delay time, high-to-low-level output  
 $t_{PZH}$  = Output enable time to high level  
 $t_{PZL}$  = Output enable time to low level  
 $t_{PHZ}$  = Output disable time from high level  
 $t_{PLZ}$  = Output disable time from low level

## schematics of inputs and outputs



## TYPICAL CHARACTERISTICS

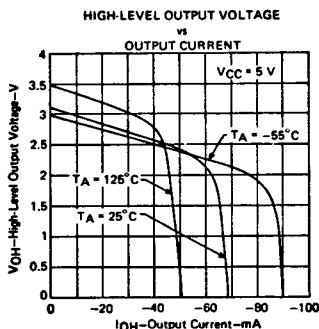


FIGURE 1

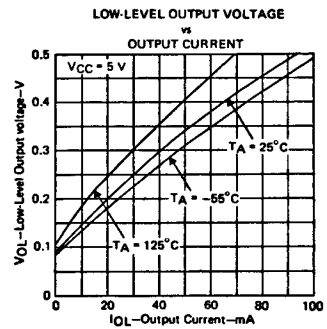


FIGURE 2

# TYPES DS7831, DS7832, DS8831, DS8832 LINE DRIVERS WITH 3-STATE OUTPUTS

## TYPICAL CHARACTERISTICS†

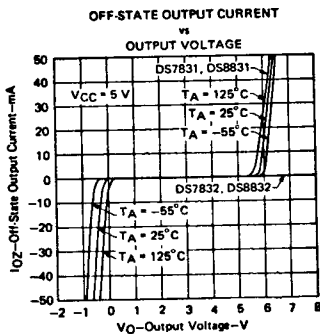


FIGURE 3

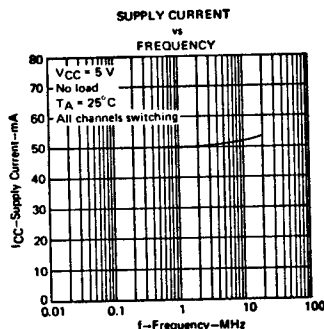


FIGURE 4

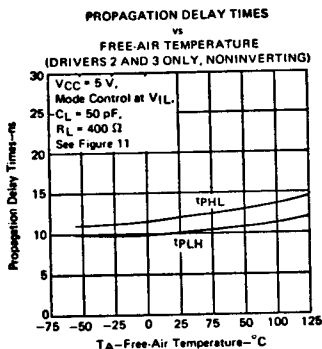


FIGURE 5

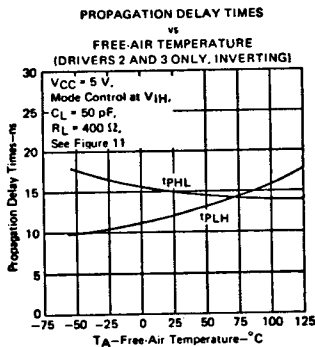


FIGURE 6

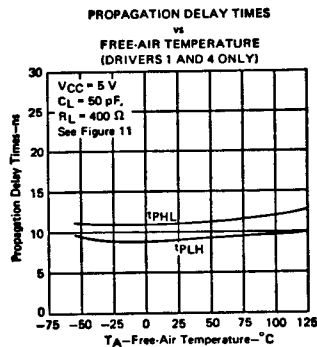


FIGURE 7

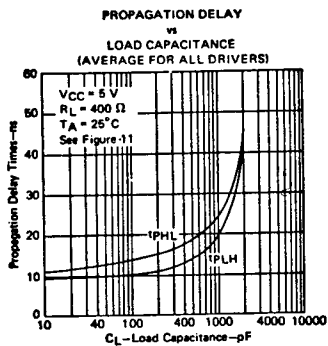


FIGURE 8

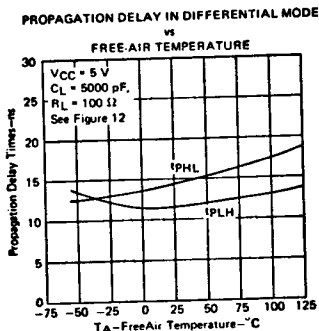


FIGURE 9

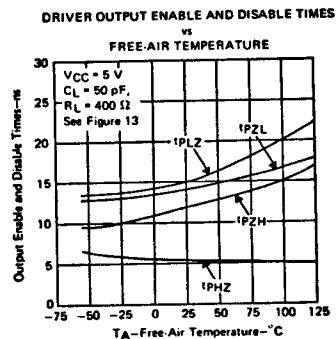


FIGURE 10

† Data for free-air temperature below 0°C and above 70°C are applicable to DS7831 and DS7832 circuits only.



# TYPES DS7831, DS7832, DS8831, DS8832 LINE DRIVERS WITH 3-STATE OUTPUTS

## TYPICAL APPLICATION DATA

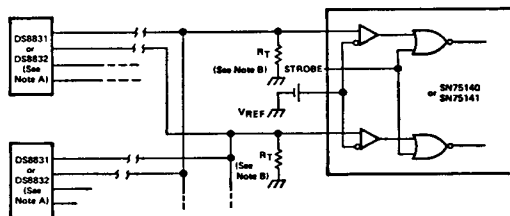


FIGURE 14—PARTY-LINE OPERATION UTILIZING THE SINGLE-ENDED CAPABILITY OF THE DEVICE

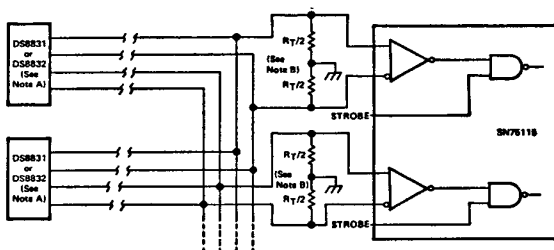


FIGURE 15—PARTY-LINE OPERATION UTILIZING THE DIFFERENTIAL CAPABILITY OF THE DEVICE

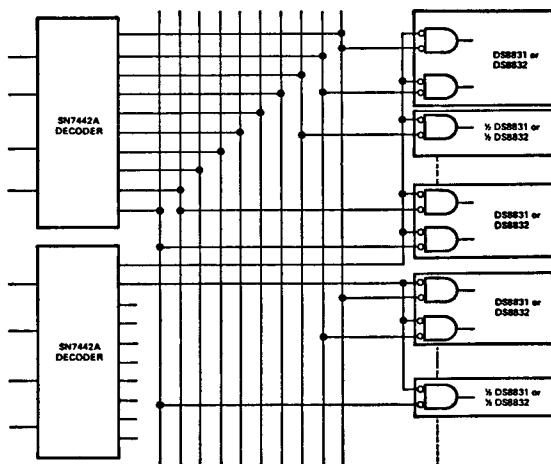


FIGURE 16—USING TWO 4-LINE-TO-10-LINE DECODERS TO CONTROL 100 DRIVER OUTPUTS

NOTES: A. One device may be driving onto the bus lines, and all other devices should be in the high-impedance state.  
B. The value of  $R_T$  should be approximately equal to the characteristic impedance of the transmission line.