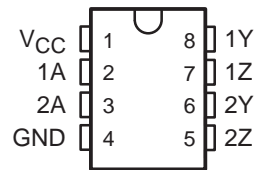


- Meets or Exceeds the Requirements of ANSI Standard EIA/TIA-422-B and ITU Recommendation V.11
- Designed to Operate at 20 Mbaud or Higher
- TTL-and CMOS-Input Compatibility
- Single 5-V Supply Operation
- Output Short-Circuit Protection
- Improved Replacement for the μ A9638

**D OR P PACKAGE
(TOP VIEW)**



description

The SN75ALS191 is a dual, high-speed, differential line driver designed to meet ANSI Standard EIA/TIA-422-B and ITU Recommendation V.11. The inputs are TTL- and CMOS-compatible and have input clamp diodes. Schottky-diode-clamped transistors minimize propagation delay time. This device operates from a single 5-V power supply and is supplied in eight-pin packages.

The SN75ALS191 is characterized for operation from 0°C to 70°C.

**FUNCTION TABLE
(each driver)**

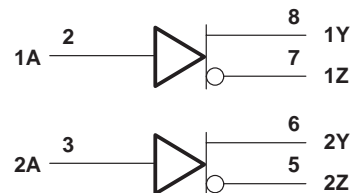
| INPUTS A | OUTPUTS | |
|-------------|---------|---|
| | Y | Z |
| H | H | L |
| L | L | H |

H = high level, L = low level,
Z = high impedance

logic symbol†



logic diagram (positive logic)



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



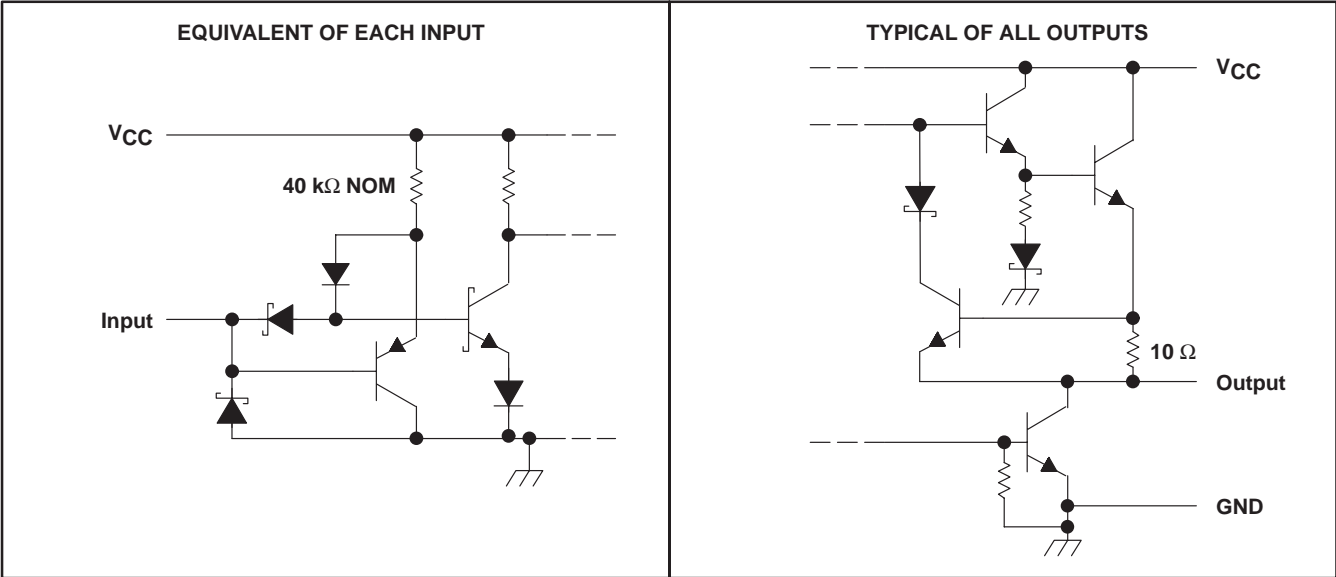
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SN75ALS191

DUAL DIFFERENTIAL LINE DRIVER

SLLS032B – DECEMBER 1987 – REVISED MAY 1995

schematics of inputs and outputs



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

| | |
|--|------------------------------|
| Supply voltage, V_{CC} (see Note 1) | 7 V |
| Input voltage, V_I | 7 V |
| Continuous total dissipation | See Dissipation Rating Table |
| Operating free-air temperature range, T_A | 0°C to 70°C |
| Storage temperature range, T_{stg} | – 65°C to 150°C |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds | 260°C |

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These 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. All voltage values except differential output voltage (V_{OD}) are with respect to network ground terminal.

DISSIPATION RATING TABLE

| PACKAGE | $T_A \leq 25^\circ\text{C}$ POWER RATING | DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$ POWER RATING |
|---------|---|---|--|
| D | 725 mW | 5.8 mW/°C | 464 mW |
| P | 1000 mW | 8.0 mW/°C | 640 mW |

recommended operating conditions

| | MIN | NOM | MAX | UNIT |
|---------------------------------------|------|-----|------|------|
| Supply voltage, V_{CC} | 4.75 | 5 | 5.25 | V |
| High-level input voltage, V_{IH} | 2 | | | V |
| Low-level input voltage, V_{IL} | | | 0.8 | V |
| High-level output current, I_{OH} | | | – 50 | mA |
| Low-level output current, I_{OL} | | | 50 | mA |
| Operating free-air temperature, T_A | 0 | | 70 | °C |

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

| PARAMETER | TEST CONDITIONS | MIN | TYP† | MAX | UNIT |
|---|---|---|--------------------------|-------------|---------------|
| V_{IK} Input clamp voltage | $V_{CC} = 4.75\text{ V}$, $I_I = -18\text{ mA}$ | -1 | -1.2 | | V |
| V_{OH} High-level output voltage | $V_{CC} = 4.75\text{ V}$, $V_{IH} = 2\text{ V}$, $V_{IL} = 0.8\text{ V}$ | $I_{OH} = -10\text{ mA}$ $I_{OH} = -40\text{ mA}$ | 2.5 3.3 | | V |
| V_{OL} Low-level output voltage | $V_{CC} = 4.75\text{ V}$, $V_{IH} = 2\text{ V}$, $I_{OL} = 40\text{ mA}$, $V_{IL} = 0.8\text{ V}$ | | | 0.5 | V |
| $ V_{OD1} $ Differential output voltage | $V_{CC} = 5.25\text{ V}$, $I_O = 0$ | | | $2 V_{OD2}$ | V |
| $ V_{OD2} $ Differential output voltage | | 2 | | | V |
| $\Delta V_{OD} $ Change in magnitude of differential output voltage‡ | $V_{CC} = 4.75\text{ V to } 5.25\text{ V}$, See Figure 1 $R_L = 100\ \Omega$ | | | ± 0.4 | V |
| V_{OC} Common-mode output voltage§ | | | | 3 | V |
| $\Delta V_{OC} $ Change in magnitude of common-mode output voltage‡ | | | | ± 0.4 | V |
| I_O Output current with power off | $V_{CC} = 0$ | $V_O = 6\text{ V}$ $V_O = -0.25\text{ V}$ $V_O = -0.25\text{ V to } 6\text{ V}$ | 0.1 -0.1 ± 100 | 100 -100 | μA |
| I_I Input current | $V_{CC} = 5.25\text{ V}$, $V_I = 5.5\text{ V}$ | | | 50 | μA |
| I_{IH} High-level input current | $V_{CC} = 5.25\text{ V}$, $V_I = 2.7\text{ V}$ | | | 25 | μA |
| I_{IL} Low-level input current | $V_{CC} = 5.25\text{ V}$, $V_I = 0.5\text{ V}$ | | | 200 | μA |
| I_{OS} Short-circuit output current¶ | $V_{CC} = 5.25\text{ V}$, $V_O = 0$ | -50 | | -150 | mA |
| I_{CC} Supply current (all drivers) | $V_{CC} = 5.25\text{ V}$, No load, All inputs at 0 V | | 32 | 40 | mA |

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

‡ $|V_{OD}|$ and $|V_{OC}|$ are the changes in magnitude of V_{OD} and V_{OC} , respectively, that occur when the input is changed from a high level to a low level.

§ In ANSI Standard EIA/TIA-422-B, V_{OC} , which is the average of the two output voltages with respect to ground, is called output offset voltage, V_{OS} .

¶ Only one output at a time should be shorted, and duration of the short circuit should not exceed one second.

switching characteristics over recommended operating free-air temperature range, $V_{CC} = 5\text{ V}$

| PARAMETER | TEST CONDITIONS | MIN | TYP# | MAX | UNIT |
|--|---|-----|------|-----|------|
| $t_d(\text{OD})$ Differential-output delay time | $C_L = 15\text{ pF}$, $R_L = 100\ \Omega$, See Figure 2 | | 3.5 | 7 | ns |
| $t_t(\text{OD})$ Differential-output transition time | | | 3.5 | 7 | ns |
| Skew | | | 1.5 | 4 | ns |

Typical values are at $T_A = 25^\circ\text{C}$.

SN75ALS191

DUAL DIFFERENTIAL LINE DRIVER

SLLS032B – DECEMBER 1987 – REVISED MAY 1995

PARAMETER MEASUREMENT INFORMATION

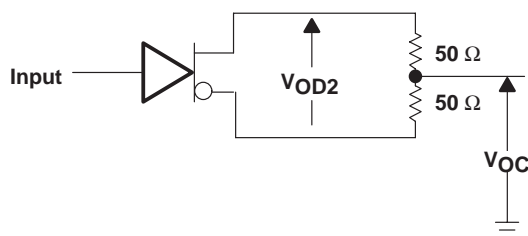
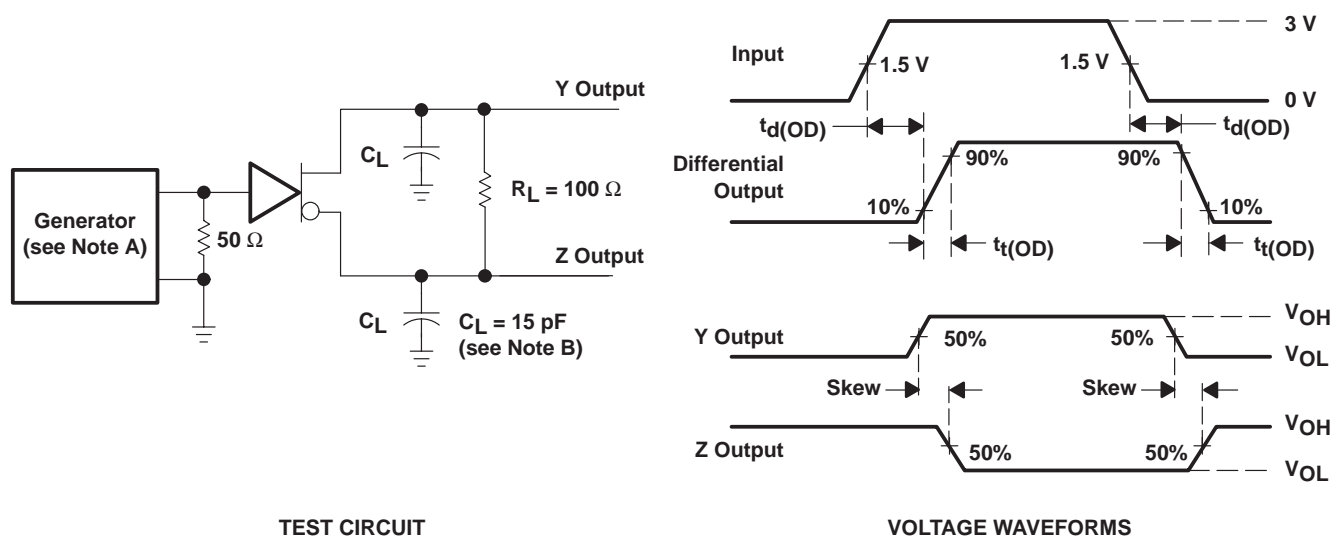


Figure 1. Differential and Common-Mode Output Voltages



NOTES: A. The input pulse generator has the following characteristics: $Z_O = 50 \Omega$, $PRR \leq 500 \text{ kHz}$, $t_W = 100 \text{ ns}$, $t_r = \leq 5 \text{ ns}$.
B. C_L includes probe and jig capacitance.

Figure 2. Test Circuit and Voltage Waveforms

PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| SN75ALS191D | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75ALS191DE4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75ALS191DR | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75ALS191DRE4 | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75ALS191DRG4 | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75ALS191P | ACTIVE | PDIP | P | 8 | 50 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN75ALS191PE4 | ACTIVE | PDIP | P | 8 | 50 | Pb-Free (RoHS) | CU NIPDAU | Level-NC-NC-NC |
| SN75ALS191PSR | ACTIVE | SO | PS | 8 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| SN75ALS191PSRE4 | ACTIVE | SO | PS | 8 | 2000 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBsolete: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Falls within JEDEC MS-001

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D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012 variation AA.

MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



4040063/C 03/03

- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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