



AM26LS31

Quad Line Driver with NAND Enabled Three-State Outputs

The Motorola AM26LS31 is a quad differential line driver intended for digital data transmission over balanced lines. It meets all the requirements of EIA-422 Standard and Federal Standard 1020.

The AM26LS31 provides an enable/disable function common to all four drivers as opposed to the split enables on the MC3487 EIA-422 driver.

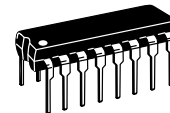
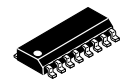
The high impedance output state is assured during power down.

- Full EIA-422 Standard Compliance
- Single +5.0 V Supply
- Meets Full $V_O = 6.0\text{ V}$, $V_{CC} = 0\text{ V}$, $I_O < 100\ \mu\text{A}$ Requirement
- Output Short Circuit Protection
- Complementary Outputs for Balanced Line Operation
- High Output Drive Capability
- Advanced LS Processing
- PNP Inputs for MOS Compatibility

QUAD EIA-422 LINE DRIVER WITH THREE-STATE OUTPUTS

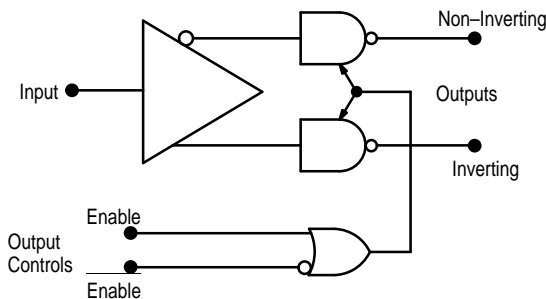
SEMICONDUCTOR TECHNICAL DATA

D SUFFIX
PLASTIC PACKAGE
CASE 751B
(SO-16)

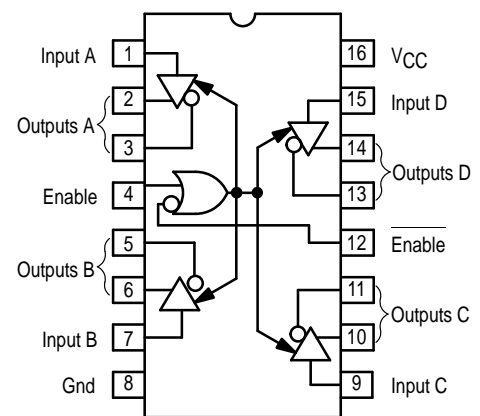


PC SUFFIX
PLASTIC PACKAGE
CASE 648

Representative Block Diagrams



PIN CONNECTIONS



TRUTH TABLE

| Input | Control Inputs (E/E) | Non-Inverting Output | Inverting Output |
|-------|----------------------|----------------------|------------------|
| H | H/L | H | L |
| L | H/L | L | H |
| X | L/H | Z | Z |

L = Low Logic State X = Irrelevant
H = High Logic State Z = Third-State (High Impedance)

ORDERING INFORMATION

| Device | Operating Temperature Range | Package |
|------------|---------------------------------------|-------------|
| AM26LS31PC | $T_A = 0\text{ to }+70^\circ\text{C}$ | Plastic DIP |
| MC26LS31D* | | SO-16 |

* Note that the surface mount MC26LS31D device uses the same die as in the plastic DIP AM26LS31DC device, but with an MC prefix to prevent confusion with the package suffix.

AM26LS31

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------------|-----------|---------------|------|
| Power Supply Voltage | V_{CC} | 8.0 | Vdc |
| Input Voltage | V_I | 5.5 | Vdc |
| Operating Ambient Temperature Range | T_A | 0 to + 70 | °C |
| Operating Junction Temperature Range | T_J | 150 | °C |
| Storage Temperature Range | T_{stg} | - 65 to + 150 | °C |

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, specifications apply $4.75\text{ V} \leq V_{CC} \leq 5.25\text{ V}$ and $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$. Typical values measured at $V_{CC} = 5.0\text{ V}$, and $T_A = 25^\circ\text{C}$.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|-------------------|--------|--------|----------------|---------------|
| Input Voltage – Low Logic State | V_{IL} | – | – | 0.8 | Vdc |
| Input Voltage – High Logic State | V_{IH} | 2.0 | – | – | Vdc |
| Input Current – Low Logic State ($V_{IL} = 0.4\text{ V}$) | I_{IL} | – | – | – 360 | μA |
| Input Current – High Logic State ($V_{IH} = 2.7\text{ V}$) ($V_{IH} = 7.0\text{ V}$) | I_{IH} | – – | – – | + 20 + 100 | μA |
| Input Clamp Voltage ($I_{IK} = - 18\text{ mA}$) | V_{IK} | – | – | – 1.5 | V |
| Output Voltage – Low Logic State ($I_{OL} = 20\text{ mA}$) | V_{OL} | – | – | 0.5 | V |
| Output Voltage – High Logic State ($I_{OH} = -20\text{ mA}$) | V_{OH} | 2.5 | – | – | V |
| Output Short Circuit Current ($V_{IH} = 2.0\text{ V}$) Note 1 | I_{OS} | – 30 | – | – 150 | mA |
| Output Leakage Current – Hi-Z State ($V_{OL} = 0.5\text{ V}$, $V_{IL(E)} = 0.8\text{ V}$, $V_{IH(E)} = 2.0\text{ V}$) ($V_{OH} = 2.5\text{ V}$, $V_{IL(E)} = 0.8\text{ V}$, $V_{IH(E)} = 2.0\text{ V}$) | $I_{O(Z)}$ | – – | – – | – 20 + 20 | μA |
| Output Leakage Current – Power OFF ($V_{OH} = 6.0\text{ V}$, $V_{CC} = 0\text{ V}$) ($V_{OL} = - 0.25\text{ V}$, $V_{CC} = 0\text{ V}$) | $I_{O(off)}$ | – – | – – | + 100 – 100 | μA |
| Output Offset Voltage Difference, Note 2 | $V_{OS} - V_{OS}$ | – | – | ± 0.4 | V |
| Output Differential Voltage, Note 2 | V_{OD} | 2.0 | – | – | V |
| Output Differential Voltage Difference, Note 2 | $ \Delta V_{OD} $ | – | – | ± 0.4 | V |
| Power Supply Current (Output Disabled) Note 3 | I_{CCX} | – | 60 | 80 | mA |

NOTES: 1. Only one output may be shorted at a time.
2. See EIA Specification EIA-422 for exact test conditions.
3. Circuit in three-state condition.

SWITCHING CHARACTERISTICS ($V_{CC} = 5.0\text{ V}$, $T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|--|------------------|------------------|----------------------|------|
| Propagation Delay Times High to Low Output Low to High Output | t_{PHL} t_{PLH} | – – | – – | 20 20 | ns |
| Output Skew | | – | – | 6.0 | ns |
| Propagation Delay – Control to Output ($C_L = 10\text{ pF}$, $R_L = 75\ \Omega$ to Gnd) ($C_L = 10\text{ pF}$, $R_L = 180\ \Omega$ to V_{CC}) ($C_L = 30\text{ pF}$, $R_L = 75\ \Omega$ to Gnd) ($C_L = 30\text{ pF}$, $R_L = 180\ \Omega$ to V_{CC}) | $t_{PHZ(E)}$ $t_{PLZ(E)}$ $t_{PZH(E)}$ $t_{PZL(E)}$ | – – – – | – – – – | 30 35 40 45 | ns |

Figure 1. Three-State Enable Test Circuit and Waveforms

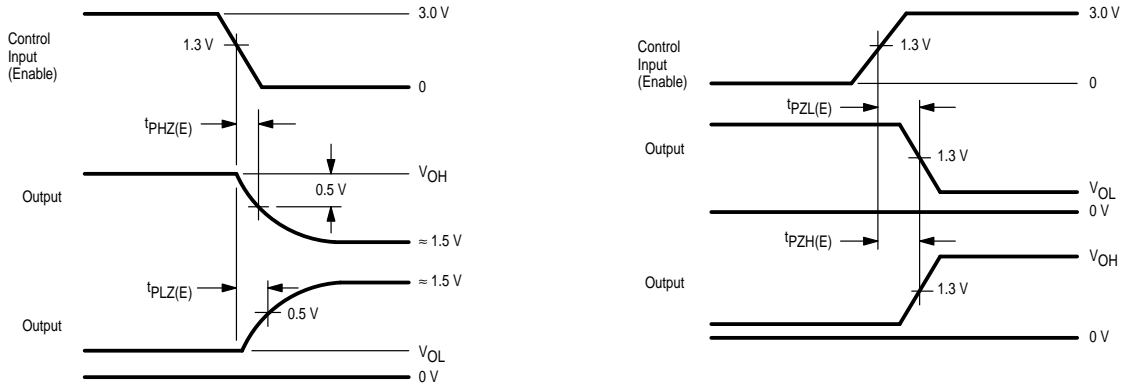
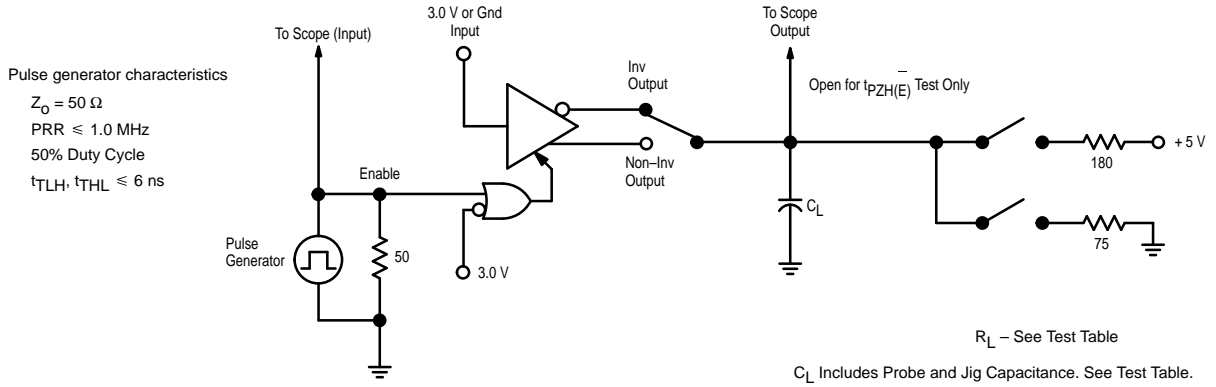
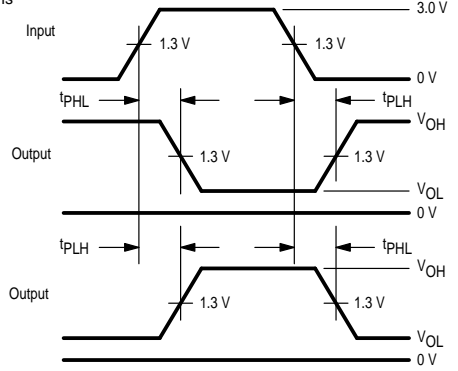
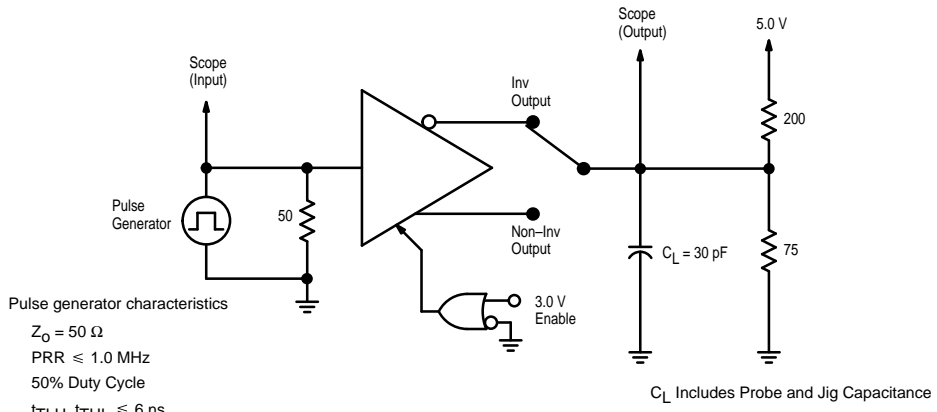


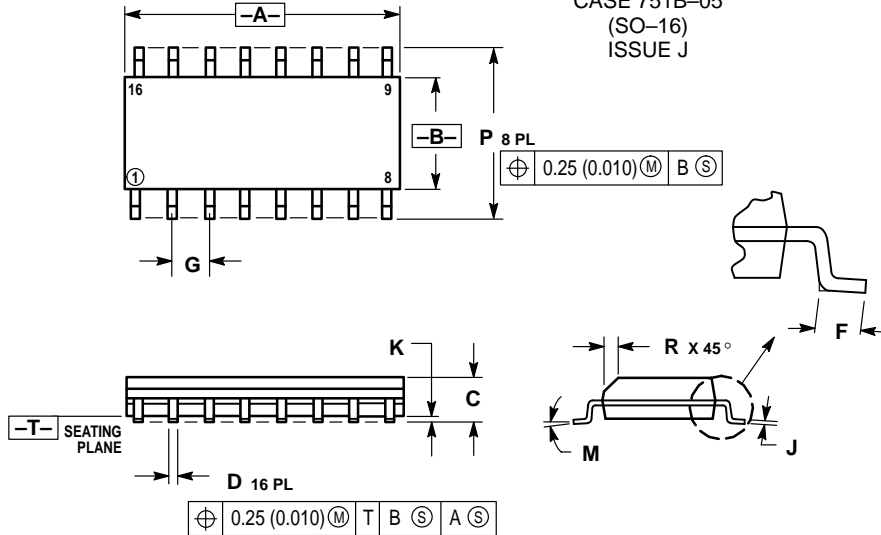
Figure 2. Propagation Delay Times Input to Output Waveforms and Test Circuit



AM26LS31

OUTLINE DIMENSIONS

D SUFFIX PLASTIC PACKAGE CASE 751B-05 (SO-16) ISSUE J

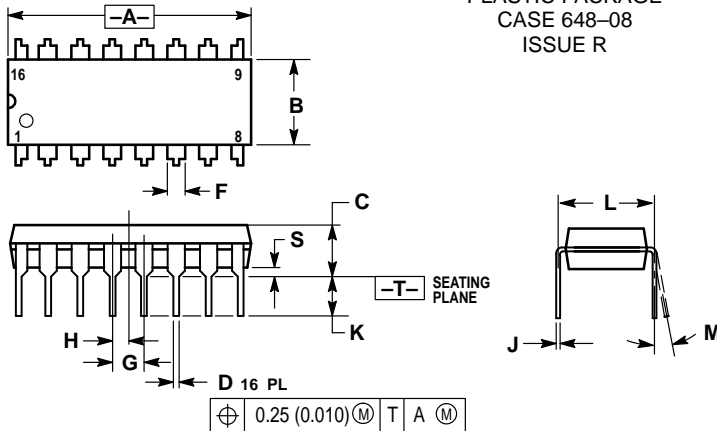


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.80 | 10.00 | 0.386 | 0.393 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.19 | 0.25 | 0.008 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

PC SUFFIX PLASTIC PACKAGE CASE 648-08 ISSUE R



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.740 | 0.770 | 18.80 | 19.55 |
| B | 0.250 | 0.270 | 6.35 | 6.85 |
| C | 0.145 | 0.175 | 3.69 | 4.44 |
| D | 0.015 | 0.021 | 0.39 | 0.53 |
| F | 0.040 | 0.70 | 1.02 | 1.77 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.050 BSC | | 1.27 BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 |
| K | 0.110 | 0.130 | 2.80 | 3.30 |
| L | 0.295 | 0.305 | 7.50 | 7.74 |
| M | 0° | 10° | 0° | 10° |
| S | 0.020 | 0.040 | 0.51 | 1.01 |

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